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E. Charlton Prather: Let us welcome Dr. Arthur Lewis today, Dr. Lewis is a longtime associate of the state health laboratory system and has a number of notables to his name. He's kind of responsible, in my mind, for bringing formal virology to the Florida laboratory system to include all of the state.

His background in, besides in virology, though he's a veterinarian by base training, and he brought all of the knowledge of zoonosis[1] to the epidemiology programs of the then State Board of Health and the state public health system. He spent the great bulk of his life in virology and his professional life with the state system in virology, and is notable, nationally, for his work with St. Louis encephalitis[2] and also for his work with the amoeba of Florida's warm lakes—*Naegleria*, I think? Is that the right name?

Arthur Lewis: That's correct.

CP: The *Naegleria*.

AL: *Naegleria fowleri*[3].

1Zoonosis refers to diseases that can be passed from animals, whether wild or domesticated, to humans.

2St. Louis encephalitis is transmitted to humans via the bite of an infected mosquito. In rare cases, long-term disability or death can occur. Treatment is specific on an individual case by case basis.

CP: *Naegleria fowleri*.

AL: Yeah, as opposed with the other *Naegleria*.

CP: Okay, that's the one.

AL: That's the one.

CP: Yeah, and Dr. Lewis is known for his work with that. And Florida received some notoriety back a number of years ago because of some human cases of this funny thing. But possibly, we'll be able to talk about a lot of that.

Dr. Lewis, it's a pleasure to have you here. And I thank you for your willingness to come and talk about your career in Florida public health and some of the changes that's been wrought since you came several years ago. I'm aware that you came to Florida in about 1953, '54.

AL: Correct.

CP: Good, and spent all of your professional career, really, with the Florida public health. In fact, how in the world did you ever get interested in public health to begin with?

AL: Well, come graduation from veterinary school I went into practice with another individual in northern Michigan. And it was a situation in which there were just too many veterinarians in the area for the large animal population, so I had an offer from the United States Public Health Service, at that time, and I decided to investigate it because it sounded quite interesting, and I joined the United States Public Health Service. My first assignment, of course, was to the state of California; they were having an outbreak of encephalitis at the time.

They wanted to distinguish whether they had Western encephalitis going or St. Louis encephalitis going, and so as a part of the epidemiology team I spent my time looking

3The *Naegleria fowler* is a type of amoeba that is found in warm freshwater sources and hot springs. It can also cause a lethal infection of the brain, called naegleriasis, in which the amoeba enters the host through the nose and uses the brain as a food source.

into wild mammals, domestic animals looking for evidence of whether it was St. Louis encephalitis or Western encephalitis[4] that was being circulated. That went on during the encephalitis season. And thereafter, I had another lucrative assignment in California and that was to find out what the epidemiology of Q fever[5] was.

CP: Of Q fever? What does Q stand for?

AL: This was originally an Australian disease, and it stands for query; Q stands for query.

CP: Oh, thank you for that. And so you got involved in the epidemiology of Q disease, Q fever in what animal?

AL: Well, just to go back a little bit, in that time when sheep were driven to the cattle cars to be shipped off to feed lots etcetera, they were driven into town because this is where the cattle cars parked. And why, then the question came: why does every butcher, baker, candlestick maker in the town come down with a respiratory disease, which is diagnosed as Q fever, after we've run the sheep through? And so it behooved us at that time to try to find out how the agent was getting over from these sheep into the town populous.

CP: Oh, fascinating.

AL: And towards that end, to make a long, long story short, we brought in a band, several of us had bands of sheep out there. We brought in from Kansas where the disease in sheep did not exist yet, and we followed the disease in sheep then on our ranches to determine how it was being spilled over into the populous.

CP: Into the human pop—did your sheep from Kansas pick up Q fever?

AL: Yes, they picked up Q fever. It's an innocuous disease in sheep, but of course, the rickettsia, when it's shed, can get into the air is not so innocuous for man. In essence, we

4Western encephalitis is an acute inflammation of the brain by the Western equine encephalitis virus. The virus is transferred via mosquitoes and is primarily seen in rural areas during the summer months in the Western United States. The main complications associated with WEE are death and impairment of the central nervous system.

5Q fever is a worldwide disease with acute and chronic stages caused by the bacteria *Coxiella burnetii*. Many species can be infected but cattle, sheep, and goats are the primary sources. The bacteria are spread to humans usually through inhalation of the bacteria from the air through dust contaminated by the bodily fluids and excrement of infected animals.

watched just a few sheep of the first year become infected, and then the second year just about our whole band of sheep of 1,000 was infected. And we were continually collecting specimens during this time to find out how it was being shed.

In essence, when sheep lamb, the placental fluids contained tremendous amounts of Q fever rickettsia[6]. The rickettsia, of course, flood the air, but it also, this is a hardy organism; it sticks to the wool and so when the sheep come into the town it gets it off the wool and into the respiratory systems of the humans.

CP: So it's airborne from the sheep's wool. How does it go from sheep to sheep? Airborne, too?

AL: Same way, airborne. They also, of course, they shed it in the fecal material; also shed it in the urine, but not as much as they shed it in the placental membranes and placental fluids. And, of course, in California at that time of the year right after they lamb, it gets very dry. So the sheep that are being held before they're sent off to the high mountain pastures, grind up all these dry placentas and, of course, further inundate the air with rickettsia.

CP: So everybody around—is there a vaccine? Did you develop a vaccine for that?

AL: Not to my knowledge. We never developed a vaccine.

CP: Okay, fascinating. Now, that was a fun sort of story, and I can gather that you really enjoyed your public health experience.

AL: Oh, that was—

CP: That beginning.

AL: That was deeply rewarding.

6Rickettsial pathogens are a variety of pathogens from the genera *Rickettsia, Orientia, Ehrlichia, Neorickettsia, Neoehrlichia,* and *Anaplasma*. These pathogens can cause rickettsial infections, such as spotted fever rickettsioses and scrub typhus. Most rickettsial pathogens are transferred via ectoparasites such as fleas, lice, mites, and ticks.

CP: Yeah, how long did you stay?

AL: Well, I was there two years.

CP: And if I'm remembering my public health, US Public Health history, veterinarians were uncommon in the public health service.

AL: That is true, within the state of Florida. Of course, we only had one public health veterinarian at the time, and of course, that was my next assignment after California, assigned to Dr. James Scatterday, who was a public health veterinarian at the time.

CP: Oh really? And you came—well, I declare, talk to that; speak to that.

AL: Speak to that.

CP: Yeah, I had—

AL: Well.

CP: Yeah, you came as a public health veterinarian. And I'm going to quickly move into how in the world did you ever get into the laboratory, but start with your assignment with Scatterday.

AL: Well, of course, Dr. Scatterday assigned me to the laboratory upon my arrival, and really, my supervisor at the time was Mrs. Mildred Galton, whose primary interests, at the time, were salmonella and also *Leptospira*[7].

CP: Ah yes, okay.

7*Leptospira interrogans* is a type of bacterium that can cause leptospirosis, a usually mild illness that may result in liver or kidney failure. The bacterium enters the host through mucus and broken skin. The infection is seen most commonly in wild and domestic animals but humans can become infected via contact with the urine of the infected animal.

AL: And of course, well, we were particularly interested in the first off, with regard to salmonella, how is it spreading in meat packing plants and poultry packing plants so that it gets into the final product.

CP: Oh, that was a long time ago.

AL: That was a long time ago.

CP: And I think of recent news, national news events, over such goodies being in the meats and poultry.

AL: And then, of course, you were on the *Leptospiro* studies with me. I remember taking you out with me, and we were collecting urine from dairy cows to just try to innumerate what the numbers of *Leptospiro* was, that they were shedding, and why we were having so many milkers infected with the agent.

CP: Oh, go back to Scatterday. Give me a paragraph on Scatterday, and then come back to your *Leptospire*.

AL: Well, Dr. Scatterday was quite an investigator. In addition, when I first came to Florida, we were concerned with anthrax in South Florida in the dairy cattle. And it was my responsibility within the lab to confirm or refute whether we were actually encountering the anthrax bacillus[8] in these dairy cattle.

CP: Yes, were you?

AL: Oh yes, we were encountering the dead—

CP: Where were they coming from? Where did anthrax come from?

AL: Well, I think we finally narrowed it down to the fact that somebody had used a wrong number spore vaccine[9] in these animals, and they were actually infecting them.

8*Bacillus anthracis* is the bacterium that causes anthrax. In livestock, the disease is relatively common, but it can infect humans as well. Most forms of the disease are lethal, and the infected meat can transmit the virus to carnivores that consume the infected source.

CP: Oh, really?

AL: And—

CP: You got that straightened out, I hope?

AL: Well, I'm sure that Dr. Scatterday did.

CP: Did you find him a colorful character?

AL: Oh, he was. He was quite colorful.

CP: Was he fun to work with?

AL: Well, he was a stimulating; I'll say that.

CP: (laughs) Our audience will not have the opportunity to talk to Dr. Scatterday, but he was a well-known, very colorful public health veterinarian that considered himself an equine physician basically. Yeah, and I liked that. So, but he assigned you to laboratory. I didn't even remember that particular piece. Was those early years fun for you?

AL: Oh, they were definitely, definitely fun because I was learning all the time, and, of course, I would—

CP: You were also teaching, I think.

AL: Well, not necessarily. I don't think—

CP: If you carried me out with you, you were teaching. Go ahead, what did you learn? You spoke to the *salmonella* with Mrs. Galton. That was some of the earliest work of the

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9Spore vaccines are used primarily in healthy livestock to prevent anthrax.

epidemiology of salmonellosis[10] was it not, in the sense of coming to man via some non-suspecting sources like chickens and their eggs?

AL: Well, not only chickens and the eggs, but also in where we were slaughtering hogs. Where did it first appear, and how was it being spread throughout the plant? Same is true of the beef cattle, how was it being spread and throughout the plant, and ending up in the final product?

CP: Did you elucidate that?

AL: Well, I—

CP: Did you all get it—

AL: I think that we, primarily, found that it first appeared in what was either on chickens or on the hogs in the process of defeathering, on these defeathering machines, and then the hogs on the dehairing machines.

CP: Where did this *salmonella* come from?

AL: Well, you know, they weren't closing up the anus well, and, of course, when they hit those dehairing machines, fecal material spread throughout the whole plant then.

CP: Spread. Went everywhere. You could find *salmonella* anywhere you looked.

AL: You could swab and find it just about anywhere you looked. And, of course, at the time we were doing a lot of serotyping[11] of these salmonella[12], and this, of course, we

10Salmonellosis is the infection caused by the *salmonella* bacteria. The infection can last for 4 to 7 days and most individuals recover without treatment, but, in some cases, the individual may have to be hospitalized.

11Serotypes are groups within a single species of microorganisms, such as bacteria or viruses, which share distinctive surface structures.

12*Salmonella* has many different serotypes. Some are unique to particular animals or geographic locations while others can be found in a varying group of animals and all over the world. Each serotype causes various levels of illnesses, ranging from severe to mild. Serotyping is a core element of public health monitoring of *salmonella* infections for over 50 years.

would find just one serotype. Perhaps every time we went, you know, a different serotype, not the same, but since it would indicate that, depending upon the farm or where these animals came from, there were differing serotypes circulating out in the real world.

CP: Did you go backwards, back to the farms, to try to trace those down?

AL: No, that project was ended before we had the chance. They were primarily interested in just where it first appeared in the abattoirs[13] and how far it got.

CP: And did it get to the finished product? Did it get to the housewife?

AL: Well, we actually went to stores that sold the various products from each plants and we did, we could isolate, especially from pork sausage—

CP: The same salmonella serotypes.

AL: Same serotypes that we were finding in the abattoirs.

CP: Yes, what'd you do about it? Were you disturbed? Was the public health people concerned about this?

AL: Well, I'm sure they were concerned, however, as I say, that project was finished because I think we had achieved our goal to find out where and how it was being distributed over the plant.

CP: And I have to remind our listeners that was more than 40 years ago—

AL: Yeah.

CP: —that this was being done, and that was the cutting edge of our beginning knowledge of the wide distribution of the *salmonella* in the environment. Now we know when we, anytime you turn on the television or read the paper almost, we the public are

13An abattoir is a slaughterhouse.

warned about *salmonella* in our pork products, and our beef products, and in our chicken products, and we're reminded to please cook adequately and to clean up after ourselves, and all that came from your work with the Florida State Board of Health in the early '50s.

AL: Let's say we had a little part in discerning it.

CP: I think still—I'll accept that, but I would remind you that Mildred Galton under whom you worked, was Mrs. World Salmonella.

AL: Right, right.

CP: Yeah, she was, and so you all did. It'd be fun to talk to Ms. Galton some on this same tape, but that's not—so we'll have to use you to help relate to Mrs. Galton and Dr. Scatterday that I hadn't even thought of, and I'd forgot Art, that you had been assigned to Dr. Scatterday. If you'd asked me, I'd have thought you were assigned to Mrs. Galton because you were in her lab. I find that fascinating, that's fun, but you mention, you mention *Leptospira*, too, as a part of your early concerns. What's a *Leptospira*?

AL: It's a little organism that is sort of a spiral shape and propels itself through media much like a snake, you might say, a liquid media that is. And, of course, it has many hosts of, including man.

CP: Okay. Yeah, go ahead. Keep talking.

AL: All right, well, of course, we were alerted to the presence of the *Leptospira* because we were having so many of the milkers in North Florida coming down with a particular disease—

CP: Milkers being the people who do milking?

AL: Right, the hand milking or even the machine milking.

CP: Yes.

AL: And, of course, the cows were usually placed in stanchions while they were being milked. And, of course, they will urinate while they're in the stanchions, and of course, when they urinate they create quite hefty aerosols, and this, of course, results in the milkers becoming in awfully close contact with these particular organisms. In addition, of course, that they don't order boots and many of them, back in those days—40 years ago, as you'd point out—just walked around barefoot. And, of course, this organism has the ability to penetrate, almost penetrate skin, but we know it can penetrate mucus membranes.

CP: Yes, yes. Okay, so with the aerosolized, plenty of opportunity to attack the mucus membranes, but I suspect those feets also had scratches and abrasions—

AL: Correct.

CP: —and not intact skin.

AL: Correct.

CP: Right. So you got involved with demonstrating how it got from cows. Did you suspect the frequency of the organism in cows? Was a part of your study trying to determine the prevalence of *Leptospira* in cows?

AL: Well, this is all we were out to determine the prevalence and also try to get an idea on the number of organisms in the urine as—

CP: Oh, okay.

AL: —as you remember when you went along, you helped determine that by carrying those little baby chicks and we used to—

CP: Hamsters.

AL: —inoculate the (inaudible), the urine into and dilutions of the urine, so that we could make counts of these, the urine that these baby chicks who do suffer a—they multiply the organism, but it doesn't really hurt the chicks. And, of course, we'd take and bleed the chicks and the dilutions that they've received, the chicks that have received a dilution,

and then give some estimate of just what the number of organisms are being shed in the cow's urine.

CP: Oh, and this was useful for what purpose? Why did you need to know that?

AL: Well, it's helpful to know just how many organisms a person is being subjected to.

CP: I guess, okay.

AL: Because, I mean, there are many diseases in which one organism doesn't necessarily mean it's going to cause disease.

CP: Yeah, like in tuberculosis.

AL: Correct, correct.

CP: Well, I can understand that. Was that fun?

AL: That was definitely fun.

CP: You were using techniques with the chickens, live chickens, that seems to me that would be just a normal step to go into viruses.

AL: Well, that's true. I think that Dr. Schneider asked me to head up the virology laboratory that he was establishing after he had received his doctorate at University of Pittsburgh—

CP: Yes, in virology, too.

AL: —in virology, you know, because I did have some knowledge about, not only large animals in the outside world, but also I gained some knowledge of the laboratory animals, and it behooved us to, rather than buy animals, they used to just raise our own, to a large extent.

CP: Ah yes, yes, yes. So you were involved with that too, animal husbandry would we call that?

AL: Oh, I guess so, laboratory animal medicine.

CP: Yes. Fascinating. Yeah, that's another piece of your history that I hadn't crystallized, Dr. Lewis, at your laboratory animal medicine, that's good. You were to keep your brood stocks healthy—

AL: Oh yes.

CP: —and partial and produce what you'd need. What animals were you involved with? What did you all raise?

AL: Well, we raised rabbits, guinea pigs, and mice. And, at one time—well, we weren't raising them—but we were having a stock of monkeys when we were particularly involved with you and the National Polio Foundation. And you were the savior of the National Polio Foundation by determining the *salmonella* and *shigella*[14] that were causing such a high mortality in these animals, on receiving this country.

CP: Yeah, we got very involved with that. And you want to speak to your visits at the monkey farm?

AL: No, because they were very fleeting.

CP: Fleeting.

AL: Yes.

CP: Short-lived.

14*Shigella* is a bacterium that can cause shigellosis, a type of food poisoning. It is closely related to *salmonella*.

AL: Yes, I was too busy with all the cultures you were sending me to determine the serial types of *shigella* and salmonella that we were getting.

CP: On behalf of the Armed Forces Epidemiological Board and the National Foundation for Infantile Paralysis, Dr. Lewis, we thank you.

AL: Oh boy.

CP: You've had a bright, colorful history. You know, you remind me of some of the pieces I forgot. It might be my old timer's disease[15].

AL: Uh-oh.

CP: Speak to your beginning of virology.

AL: Virology was probably somewhat uneventful. Early on, there weren't too many diseases that we had serological procedures for, but those that we did and could either make the antigens or purchased antigens we would try to determine whether a patient had rising antibody against any of the particular viral agents that we had available for testing.

CP: Name some of those.

AL: Well, there was Eastern encephalitis, Western encephalitis, St. Louis encephalitis, measles, mumps, rubella would be another.

CP: What about rabies?

AL: Well, rabies, of course, we were primarily interested there in determining whether animal bites whether the animal that had done the biting was rabid.

CP: And could have transmitted rabies.

15Old Timer's Disease is a colloquialism for Alzheimer's disease.

AL: And, of course, in the early days, the only test that was available was one in which we looked at the brain of the animal, taking out a specific portion, we felt it would enrich the virus, and looking for a Negri bodies[16]. And fortunately, about the time I got into virology, we came along with the fluorescent antibody studies in which we found that by taking these little slices of brain and scanning them with immune serum with a fluorescent tag on it that we had a higher percentage of true diagnosis than we had by just looking for Negri bodies because Negri bodies don't always appear in the animals.

At one time we did 100 rabid brains and we found that the fluorescent necropsy test was by far superior in that it told us that we had 100 brains with rabies, whereas the other test where we were looking for Negri bodies there were only about 92 that were positive by that test so you see—

CP: Oh really, a false negative rate of eight percent.

AL: Yeah, it was pretty high.

CP: That is high; that's frightful. This is because some very serious clinical decisions had been made on Negri bodies.[17]

AL: Correct.

CP: Yeah. All right, then. I'm remembering those studies and I was even sort of frightened then. Yeah, as I remember, you in the state laboratory, it was very influential in some of the very earliest studies on the rabies fluorescent antibodies studies.

AL: We have to bring up the—we were the first state that found rabies in insect terrorist bats.

CP: Speak to that, talk about that a minute.

16Negri bodies were identified in 1903 as the etiologic agent of rabies. They are found in the cerebral cortex and hippocampus of rabies victims.

17The presence of Negri bodies in rabies victims is variable. Some cases of experimentally infected subjects display them while others do not. As a result of the inconclusive quality of Negri bodies, the presence of Negri bodies, or lack thereof, is generally not used as a diagnostic for rabies.

AL: Well, there was just a little boy over at Plant City. He wasn't doing anything outwardly wrong, just sitting in his yard, and a bat—insectivorous bat—flew down and bit him on the chest. Well fortunately, they caught that bat and then examined the brain at the Tampa Regional Laboratory. And, low and behold, we found out that here we had rabies in our insectivorous bats in Florida. And, of course, this was the first time it had been found, I believe, in insectivorous bats in the United States[18], period.

CP: That should have shook up our public health standard.

AL: So that elicited another study: just what is the infection rate in these insectivorous bats. And we went out and shot several hundred insectivorous bats, brought them back, and examined the brains for the presence of the virus; and, low and behold, something like one to two percent of our insectivorous bats had the virus in their central nervous system.[19]

CP: Really? Can you speak to the geography of that? You, of course, went to—you said Lakeland? Where the little boy was?

AL: No, he was in Plant City.

CP: Plant City. Plant City, okay. You looked there, but did you look elsewhere?

AL: Not on a consorted study where we had large numbers that we could look at and, of course, since then we have found that there is bat rabies, you might say, in insectivorous bats as opposed to blood sucking bats just about all over, just about in every state in the United States and, of course, all over Florida too.

CP: And you were on the cutting edge of that; that began in Florida.

AL: Yeah.

18The first case of the rabies virus in bats in the United States was diagnosed in Florida in June 1953. The case involved a *Dasypterus floridanus* (Florida yellow bat) that bit a child. After this initial case, several more cases of bats infected with rabies appeared across the United States.

19The American Journal of Public Health and the Nation's Health published the study, "Rabies in Bats in Florida" on September 1957. Nathan J. Schneider, James E. Scatterday, Arthur L. Lewis, William L. Jennings, Homer D. Venters, and Albert V. Hardy coauthored the study. DOI: 10.2105/AJPH.47.8.983.

CP: Were you a bat shooter or were you the laboratory tester?

AL: Well, both because, initially, I went out with Dr. Scatterday, and we learned how to shoot bats.

CP: Well, I'll tell you, I have tried to shoot bats, but I never did shoot a bat.

AL: I'll tell you, they are very difficult because you have to give them quite a lead, hoping that your shot and they will meet each other.

CP: Yeah, when I was younger than I am now it was, I don't like to say that, but an evening activity, occasionally, to try to shoot bats with our guns. Well, bats, rabies, back to your laboratorians. What was the stimulus for the state laboratory system getting into virus diagnostic studies? That was quite expensive.

AL: It was quite expensive, and actually, the funding you might say primarily came from the National Polio Foundation. It was at that time that the vaccine was coming out, online, and of course, people were going to be inoculated with it, and we wanted to find out just how good it was towards the eliciting antibody.

So this required a neutralization test. And also at this particular time we had discovered how to grow tissue in the test tube. And specifically, this is where you come in once again, the tissue was monkey kidney tissue. That's why we were so interested in making sure that you saved every monkey that came into this country. And we set up tests in the laboratory using monkey kidney tissue to determine whether these patients' serum, after they had been inoculated, immunized, was capable of neutralizing the virus.

CP: Ah, that was the reason for the vaccine wasn't it?

AL: That was the reason for the vaccine.

CP: Did it work?

AL: Oh, it worked quite well, and, of course, this was, as you say, quite an expensive operation, but it was supported by the National Polio Foundation to assure the people that

a vaccine that was coming out was a viable and, indeed, a method of preventing polio in this country.

CP: So that's how we got started for our concerns about polio.

AL: Correct.

CP: I forgot that, thank you for reminding me. Yeah, I forgot that. Well, from there you all really did a lot of polio because some of the major field trials of two of the vaccines occurred in Florida. What part did you—the laboratory—play in those field trials of the vaccines?

AL: Well, once we got into the field trials there were others involved, over the country, that also had part of the contract to look for a neutralizing antibody. So ours wasn't a major effort, but we were in on it, once again determining the efficacy of the vaccine after immunizing these patients.

CP: Yes, you all were involved with the surveillance. As I recall, you as the laboratory was involved with the surveillance of the vaccinenees [sic] from potential complications from the vaccine, and I am recalling a few you were very involved with.

AL: And, of course, it also behooved us on the recipients of the vaccine, should they come down with a polio-like entity, it was up to us to confirm or refute. Is this patient really infected with poliovirus, through actual isolation of the etiological agent of that particular illness.

CP: I have to remind you, Dr. Lewis, there are very few people still alive in the United States who can speak to those early days from personal experience in those vaccines, things not to reflect your age but the fact that you were in the state that was on the cutting edge, and you were the "labratorian" involved. This is valuable information that I hadn't expected in anticipating the amount in your chat today. You've raised some exciting stuff that I didn't anticipate, and I thank you for that.

AL: You're welcome.

CP: Keep talking to those polio because most of the world—we are just so proud of our polio vaccine, and it's really not poliomyelitis[20] in the United States almost to zero to its needs. And in many parts of the developed world, these vaccines that had the origin in, so to speak, in Florida—the field-testing was in Florida; the vaccines didn't come out of Florida, of course.

But you were very much apart of that cutting edge. That is fun to remember. That is fun to remember, Dr. Lewis. Well, from polio you expanded, I don't want to get into encephalitis too quickly, but I'm aware that you were on the cutting edge of much of our current knowledge about St. Louis encephalitis, as well a fearful thing for Florida and for the world, and you were there when it occurred. You checked some of the ducks out of St. Petersburg, the famous St. Louis epidemic[21] in St. Pete in when, '58, '59, '60, somewhere along in there?

AL: There were—there was a minor epidemic, as you point out, in 1959; another minor one in 1961; and then, of course, the large outbreak that resulted in almost 200 deaths in St. Petersburg in 1962.

CP: That's the biggie. That's the one the keeps us all frightened, is it not? And you were there, talk about that.

AL: Well, first off, I was still, in 1959 and '61, I was still in the laboratory in Jacksonville and we did have the means of serologically diagnosing the cases, the human cases, but it wasn't until 1962 that with the large number of cases the Centers for Disease Control aided us by moving a laboratory together with our own, down to Tampa here. And we set up the Encephalitis Research Center.

CP: Ah yes, that was in '62.

AL: Correct.

CP: Was that in response to the epidemic, or was that after the epidemic?

20The poliomyelitis virus, often called polio, infects the spinal cord, leading to paralysis in the legs, head, neck, or diaphragm.

21In Florida, there have been several major St. Louis encephalitis epidemics, which occurred in 1959, 1961, 1962, 1977 and 1990.

AL: That was definitely in response to the epidemic during 1952.

CP: ’62.

AL: ’62, correct.

CP: And so the State Board of Health and the CDC moved laboratory capability closer to the scene—

AL: Correct.

CP: —out of Jacksonville. You moved the laboratory here and called it Encephalitis Research Center?

AL: Called it the Encephalitis Research Center.

CP: Okay, and you came as the labratorian for that? You moved to Tampa?

AL: Right, Dr. Schneider asked me to set up the laboratory together with the Center for Disease Control and to not only diagnosis and confirm or refute human cases, but also to look at these mammals how did nature—to determine how the virus might be transmitted to humans together with mosquitos because at that time we really had no idea of the means of transmission or what the mammalian host in nature might be.

CP: Speak to that research. That was research in a formal sort of sense, wasn’t it? What all did you do? And what did you learn?

AL: That was quite an undertaking in that under Dr. James Bond, who headed up the—

CP: This is 007 James Bond—

AL: That’s the one.

CP: —or the epidemiologist for Florida, James Bond?

AL: He set up a, the epi—no, the Encephalitis Research Center and there were really four components all working together to elucidate some answer to the particular questions that were being asked about St. Louis encephalitis at the time. There were the laboratory group, who I was in charge of, who were receiving the specimens from the epidemiologist, the mammalogists, and then, of course, the people that were interested in the aliens. And they were all—all these other three groups were submitting specimens towards trying to solve just what was happening out in nature, how it was being transmitted to man.

AL: And I think we pretty well determined that the principle vector was *Culex nigripalpus*, the mosquito, and as far as a mammalian host, of course it was postulated thereafter that the wild birds in the St. Petersburg area, which had been declared a bird sanctuary, and as there were large numbers of appropriate hosts were the amplifying hosts for the virus and, of course, they were then infecting the mosquitos, and the mosquitos, being quite heavy that particular year, were infecting the humans.

CP: The amplifying host. That means that is the host in which the virus really built up into high numbers.

AL: That's correct.

CP: Where was the prime host?

AL: The prime host out in nature, I don't believe we really ever elucidated what it really is. We've found evidence of antibody in opossums, raccoons, several rats that are out in nature—wild rats, and we've never really—where does it go during the non-epidemic season? We don't know really.

CP: Well, that disappoints me.

AL: So we really haven't solved that particular part of the equation.

CP: All right, and is there still research going on?

AL: Oh, definitely. The people up at Vero Beach are still engaged in trying to determine what might be the host out in nature that perpetuates this from year, to year, to year.

CP: Yeah, and whether or not it stays here in nature or whether it is brought in from somewhere else.

AL: Correct. It is possible that it comes in on the bird flyways[22] that come in from South America. Although the viruses that arise in those birds is not exactly the same as the infecting agent in Florida at all times.

CP: I seem to recall from those days in the early ’60s, the hey-day of the Encephalitis Research Center, they gathered birds on Dry Tortugas as they were entering Florida from the south on the flyway, and they found only a smattering of St. Louis antibody, but not very great in a variety of types of birds.

I hadn’t kept up with that research, Dr. Lewis, but that’s fascinating, and I’ll remind our viewing audience that right now, as you and I speak, there is a build up of St. Louis in a number of our counties in the sentinel chicken flocks that we’re getting a build up of St. Louis encephalitis[23] but there are no human cases as of this talking. Speak to that, that it continues to go on, and we use today chicken flocks, little chickens that are put out in the woods and then these people go by and bleed them periodically to see if St. Louis, if they have been infected with St. Louis. As I recall, that was some of your work at the Encephalitis Research Center, these chicken flocks, was it not?

AL: Right. This program was really established by Dr. James Nickels, and he encouraged us, once again, to aid the various counties that were putting out these, what we call sentinel chickens.

The chickens of course are devoid of antibody at the beginning of the year when they’re placed out and then, of course, bled on a weekly basis in some cases, and, of course, when we noticed a conversion from a negative status antibody to a positive status antibody that indicates to us that the virus is circulating out in nature and, of course, alerts the county health departments to get out there and, if necessary, initiate mosquito control measures so the disease doesn’t spill over into the human populations.

22Bird flyways are migratory routes used by migratory birds. Many of these routes are used to reach breeding grounds. There are four major flyways: the Atlantic Flyway, the Pacific Flyway, the Central Flyway, and the Mississippi Flyway.

23In 1999, one sentinel chicken in Belle Glade, two in Delray Beach and Loxahatchee, and two in Pahokee were the five confirmed cases of St. Louis encephalitis in Palm Beach County, Florida.

CP: And you can do that by mosquito control? Mosquito control—mosquito being the vector, so if we control the mosquito like we do in malaria, we can control the human cases.

AL: It's a big help, let's put it that way.

CP: Doctor James Nickels, was this the state veterinarian—state public health veterinarian?

AL: This was the state public health veterinarian, at the time.

CP: Yes. And it was his idea for the chicken flocks.

AL: His initially, as I recall. Yes, it was his idea initially to put out chickens.

CP: Oh, very good. All right, and we still use that, that still was in the early '60s—early mid-'60s.

AL: Right, it's still a useful tool and a relatively inexpensive one.

CP: We really haven't improved over all these years, and we still have the St. Louis virus around.

AL: Well, you know, one of those chickens can certainly sample an awful lot of mosquitos that you couldn't possibly do that number of mosquitos in the laboratory looking for the virus.

CP: I can see the reason for that. That's good. So then all this came out of the Encephalitis Research Center where you were the chief labratorian, and you did the laboratory work for the bird folks, the [ornithologist], for the mammalogist. Just for the record, name some names. Who was the mammalogist?

AL: Mammalogist—

CP: The main one.

AL: Oh, it was Dr. William Jennings as I recall.

CP: Dr. William Jennings was the mammalogist, and Dr. James Bond was the human epidemiologist.

AL: Well, not only that, he was actually the director of the epidem—I mean, Encephalitis Research Center.

CP: And do you recall the ornithologist who was associated?

AL: A gentleman in ornithology, I really can't recall his name right now. I feel embarrassed right now.

CP: That's okay. I know, he was a PhD birdwatcher.

AL: Correct.

CP: PhD birdwatcher. I was privileged to go on some field trips with him, Dr. Lewis. And I was terribly impressed walking through the woods, silently as we could walk, and he would identify the birds from their calls. And the most of us were there just to do the marking, when he told us to mark, you know, keep the tabs. And he would listen sometimes—I wouldn't hear the bird, but he would hear a bird call and say very quietly, There's a so-and-so. And I would perk up my ears, and I would hear the call too. But I hadn't heard it originally.

I was very impressed with that man. I don't recall his name either. But the way that he could hear birds that I identified with it through my Boy Scouts, that I have a Boy Scout merit badge in bird watching, so I appreciated his—I was really impressed with what he could do. What was the other staff, the other chiefs out there? There was ornithology, mammalogy, human epidemiology; who were some of the human epidemiologists there? I remember a Dr. Quick.

AL: Definitely Dr. Quick, but primarily assigned to us, I can't remember her last name. I remember her as Dr. Emily—

CP: Gates.

AL: Gates, correct. Right.

CP: Doctor Gates. Right, and she was permanently assigned on staff. She's still living in Miami Beach—I mean, Jacksonville Beach is where she lives right now. So, for those good days, how long did you keep up that?

AL: Well, we were able to garner our funds for approximately ten years thereafter the epidemic, and then the outside world really lost—since there were no epidemics in the interim—the outside world really lost interest in St. Louis encephalitis so that it sort of just fell by the wayside. Strictly with just a, you might say, a sentinel program going on from year to year and the people of Vero Beach doing some basic research studies into mosquitos and into the St. Louis encephalitis in their small confined area around Vero Beach.

CP: Yes, okay. Did they have St. Louis in nature there? Was there St. Louis virus circling?

AL: Oh yes, there was. Quite a bit, I am trying to remember the county below.

CP: Indian River.

AL: Indian River County, especially.

CP: Okay. So there was plenty in nature for Vero Beach to continue the study, so they made it worthwhile for them. Well, there was a natural progression of the Encephalitis Research Center though, and you became something else. I don't recall that you moved back to Jacksonville.

AL: Well, you know, to have an Encephalitis Research Center in the state budget got sort of embarrassing to the political types, and so it was decided that there was no such thing as encephalitis. And so—

CP: Oh all right, by political fiat we declare that there is no encephalitis, okay.

AL: Correct, and so to manage to garner funds, still state funds, to maintain ourselves, we changed the name to Epidemiology Research Center.

CP: Oh, did you change your thrust? Did you change your mission?

AL: To a certain extent, yes, because then there would be a new problem propped up and that is viruses—human internal viruses in water.

CP: Oh, speak to that. That could be very frightful to the way that we recycle our sewage, our treated sewage water in irrigation fields, you know, that we are beginning to do more and more, and you were on the cutting edge of some of that, and you declared it safe, apparently. Speak to that.

AL: No, I didn't declare it safe.

CP: Oh, okay. Well, we're doing a lot of it. I had forgotten that you was on the cutting edge—that was some of the first. But I really look at sewage effluent from what it carried, and you were the laboratory doing that. Wow, yeah, speak to that. I had forgotten that, Art.

AL: Well, I think the thing to consider here is there are these viral agents in water, we're spewing them out into nature, they are percolating through the ground and, of course, then we are collecting the ground water for drinking water purposes, and so it became our first thrust into a study of what is the fate of these viruses when you do that thrust them out into nature.

And, of course, there were no real techniques back in those days for, say, isolating these small amounts of viruses that are going to be in billions and billions of gallons of water, so we persevered through many years of changing techniques to try to recover these particular viral agents.

CP: All right.

AL: I'm thinking I won't go through all the various techniques, but I think one interesting study was in which we chose two communities here in Florida: one that was in potable water, and the other that was on ground water for drinking water purposes. And we followed them for several years to try to determine, what is the incidence of human interval viral infections in the two communities.

CP: Ah, fascinating.

AL: And, of course, the gist of whole thing is that we found that there was an increased number of human interval viral infections in the people that were on ground water, as opposed to those who were on potable water.

CP: Fascinating. Did you do the laboratory work? Tell me how you did that.

AL: How did we do that?

CP: Yeah, did you keep up with people that got sick and then did testing of them?

AL: Yes.

CP: You had relationships with the hospitals and physicians?

AL: Yes, what we had in that particular study, we not only were sampling their groundwater on at least a monthly basis looking for viral agents, but we also—both communities were on septic tanks, so both communities could be putting a viral agent into their ground water. So—lost my train of thought.

CP: How you kept up with human illness was one of my questions.

AL: Oh, it was really a well-funded study. In that we had a nurse who visited each of these communities and contacted the families in the community, and if there was any type of illness that even had a semblance of being an interval viral infection she collected stools, or had the family collected the stools, and collected them in a manner that would preserve the virus in the first place on a biweekly basis. And collected these specimens,

brought them back, and, of course, it was our responsibility then to try to isolate a particular human interim virus from them.

CP: From that stool?

AL: From that stool.

CP: And you compared that with your results from the water studies that you were doing?

AL: Right. And, of course we found that in a number of instances we found that there were viruses in the septic tank, of course, you would expect. We found that in the ground water and—

CP: How deep, just for my curiosity?

AL: Well actually, we only found them only about, I would say, about ten feet down; that is as far as they had percolated. Now whether that was the extent of the time it could remain viable, we never really determined that.

CP: You put in wells, monitoring wells.

AL: We put in monitoring wells around the community.

CP: Yes, okay.

AL: That would monitor their groundwater.

CP: Okay. This was a fun study.

AL: Oh, it definitely was.

CP: It could have been a fun study. What was the upshot of all that? And who was the—you had another epidemiologist; now, Dr. Bond has gone.

AL: Well actually, at that time, Dr. Flora Mae Wellings was chief of the Epidemiology Research Center and oversaw these studies in the retired team amongst.

CP: Okay, Flora Mae Wellings, we'll come back to her. I want a paragraph on her, too. Just tell us, tell us a—give us a paragraph now on Flora Mae Welling. She has passed on, I'm aware.

AL: Yes, she has passed on unfortunately, but she was definitely a pusher towards doing good epidemiology.

CP: Yes okay, good. I have to respect her for that. And good epidemiology included competent reproducible laboratory efforts to back it up.

AL: Well, true. You know, when things, I've often said, when things don't go well in the laboratory or the findings aren't just right, check the epidemiology.

CP: I totally agree. I totally agree. Where did you get those specimens and how? Were you and Flora Mae a good team? You were the labratorian and she was the kind of the big boss?

AL: She was the overseer.

CP: And she was the labratorian of, kind of, herself and epidemiologist.

AL: Correct.

CP: Well, she was a nurse too, as I recall.

AL: Right, she was a nurse, and, of course, she had done extensive work in working with the dengue viruses while she was getting her doctorate at the University of Pittsburgh.

CP: Okay. And her doctorate was in laboratory or epidemiology?

AL: I feel that she was primarily—her forte was in epidemiology.

CP: All right, how long did these viruses and water studies go on?

AL: Well, they are still continuing.

CP: Oh, today?

AL: Yes, I don't know exactly to what extent, but there are certain processes that are going on out in the outside world that the laboratory now takes and monitors for the presence of viable viruses in the material. I am thinking of, well, deep well injections as a means of getting rid of sewage effluent. Are we putting out viable viruses down in these deep wells and then, later on, bringing it back up with viable viruses in it? Well, the laboratory is currently looking into those.

CP: Good, good, in our own laboratory here?

AL: The one right here in Tampa.

CP: It is not called the epidemiology—

AL: No, it's been taken into and is now known as the Tampa Branch Lab. They're the virology component of that lab now.

CP: Oh, and they are continuing these studies?

AL: They are continuing those types of studies.

CP: That would be regrettable for the long longevity of those studies to suddenly drop them, seems to me. All right, what kind of results are they getting?

AL: I haven't been—

CP: You don’t keep up with it since you retired. When did you retire?

AL: I retired in 1991.

CP: Ninety-one, okay. And you had spent how many years with the state public health system?

AL: About 1954 through 1991.

CP: I’d have to figure that up. You haven’t figured that up?

AL: I think it was 37 to 38 years—

CP: Wow, that’s a long time.

AL: —and I’m not on parole yet.

CP: You’re still working. Good. While you were there, though, there were some other problems that surfaced with your attention to water that I’m conscious of, that your laboratory techniques and virology were the means of researching and explaining. And I think of that little amoeba, the little amoeba that caused encephalitis too. Speak to that. How did you all get involved with that, and what happened?

AL: Well, primarily a number of years before it really became an interesting thing to look at there had been a number of primary amoebic meningoencephalitis[24] that had been detected in the Orlando area. I can’t remember the name of the doctor, the pathologist that was detecting them. In any case, a number of these cases started showing up in the Tampa Bay area, and it behooved us to try to determine what the ideologication (sic) here it was.

There were, in the world of protozoa, there are a number of organisms that belong to the *Nigleria* group and, of course, they had been postulating that any number of these were

24Primary amoebic meningoencephalitis (PAM) is a reference to naegleriasis, an infection of the brain by the *Naegleria fowleri*.

involved in it. But finally, it behooved us to take a look at it. And between ourselves and our water group located in Cincinnati, we determined that really the pathogen in that group was one called *Naegleria fowleri*.

CP: *Fowleri*.

AL: Correct.

CP: Did it already have a name or was this new?

AL: This was relatively new because they had been calling them, any of the other people in the field had been calling their *Naegleria* by any other name. They really hadn't taken a look at this one real closely. And I think the interesting part of this was that, having looked at this from an epidemiological standpoint, all cases of primary amoebic meningoencephalitis one factor always seemed to be coming into play and that was, there was always a history of snuffing water you might say or deep diving.

And even Australia to bring up their experience with it, the people out in the desert, of course, get their water from the coast. And as it travels through these pipelines the organism, due to the heated water, multiplies and it doesn't really heat up enough to kill the organism, but yet this organism can stand heat well above those that can destroy bacteria.

And so out of the desert, of course, their mucus membranes are quite dry, so they took some of that water and snuff it up their nose to wet their membranes, and, of course, people were coming down with primary amoebic meningoencephalitis here in the bay area. Of course, almost all cases we encountered were due to, you might say, deep diving where the pressure of the water was being forced up near the cribriform plate[25], and, of course, the particular enzyme that this organism elicits apparently can just dissolve where the nerves enter passage through the cribriform plate.

There was even one case I remember that a little boy, much like the Australians—the hose that sat out in the yard here on the hot day, and he enjoyed grabbing that hose and turning on the water and spraying his face. And, of course, apparently that drove the organism up high enough to result in his becoming a clinical case.

25The cribriform plate is part of the ethmoid bone, which is responsible for separating the brain from the nasal cavity.

CP: What was the mortality associated with this infection?

AL: The mortality unfortunately is—I can only think of one case in California that didn't become a mortality statistic of 100 percent.

CP: Really, did you all do any prevalent studies for the infection? Was there a way to look for past infection? Do you have an antibody test like you do with St. Louis, for example?

AL: There is a test, that's an agglutination test[26], however, we were never asked to do the test to look for antibody. I think people at Center of Disease Control have done that, but I don't really remember what their data was. I think the other interesting thing about this organism is: this is an organism that is always out in nature.

What I am trying to say is, we sample the lakes in Florida year round, and if you look hard enough, you can always isolate it. Now, it is much more difficult in the winter time when the water temperatures aren't high enough to provide bacterial food for this particular organism, but if you go in the colder months and go into the deeper portions of the lake, you'll find them.

CP: Really? And the warm weather causes it to build up and that's relatable to its bacterial food supply, and it builds up and that's called normal, its normal lifecycle, but you and I get involved by getting into the middle of its lifecycle. It won't jump out and bother us, but if we get into his nest, he'll bother us.

AL: Correct. And if we can force it up into susceptible tissues then we become a clinical case.

CP: And you, the Epidemiology Research Center, how is it that you all got involved with this? Which you all did a lot of research all over the place, didn't you? You even examined the water from outside of Florida, as I remember.

AL: Correct. We had been asked to go as far north as Illinois, especially these electric power producing plants, of course, put out a warm water effluent. And, of course, the people there were somewhat concerned that the water was of sufficient warmth to generate enough bacterial content there, and, of course, as I say this organism is

26An agglutination test is a blood test that assists in identifying unknown antigens.

everywhere in nature and they postulated that perhaps the *Naegleria fowleri* could be growing in the cooling water effluent from power plants.

CP: And you all looked for it?

AL: And we looked for it.

CP: What did you find?

AL: Well, we were only given one shot at it, and, of course, we never had a real chance to look, to do anything that might be scientifically valid.

CP: You speak to *Naegleria fowleri*; there are other species. Did you get involved with the differential pathogenesis of *fowleri* versus the others?

AL: The only—

CP: The others don't cause disease?

AL: As far as we know, in our hands, we never elicited that. One of the particular tests that we use to determine whether we have a pathogen or not was an intracerebral inoculation of three and four week old mice. Only what we call the non-pathogens failed to kill mice, whereas the *Naegleria fowleri* invariably did kill mice.

CP: Fascinating, fascinating. Is any of your work continuing to go on in this *Naegleria*?

AL: Work continues to go on elsewhere, but it's almost, it has evolved on to actually basic research, what is the enzyme that this organism elicits that enables it to pass through the cribriform plate, and things of that nature that are really things to be looked into that we just didn't have the capability to do.

CP: You've had a fascinating career, thinking of all that. Those are the two that I know about and you reminded me of others. What other exciting stuff did you all do at the Encephalitis Research Center, I mean, the Epidemiology Research Center?

AL: Oh my. Yeah, you've got to watch that.

CP: Yeah, I am. I'm being careful.

AL: I think that pretty much summarizes it. I can't think of any other aspects that we have gotten into right off hand.

CP: I'm recalling you all—you're sending your blue bird[27], your mobile laboratory, to Miami to look for typhoid in a well system there. I recall that, did you do much work around epidemic outbreaks and disease epidemiologically associated with water?

AL: Well, you remember recalling me in Tampa, I mean, the Miami incident. We really weren't equipped to really come into an epidemic, as you keep telling me. By the time the epidemic gets at the top of the curve, the worst is over.

CP: Yes.

AL: Ours was mostly to look at things in retrospect.

CP: That's okay.

AL: And to determine just what might have happened, and how can we resolve this so it doesn't happen in the future.

CP: Give me some instances where you all did some work. Some examples, the typhoid's one.

AL: I think we also looked at cases of infectious hepatitis in that particular Miami area among the migrant workers at the time. We actually had no facilities for isolating the hepatitis virus, but I think we conclusively showed that their septic tank was way too close to their drinking water source, which was ground water.

27Blue Bird is a corporation manufacturer of school buses in the United States.

CP: You mean in that Miami incident.

AL: In the Miami incident.

CP: Yeah, okay, so you could speculate that the two somehow might be related?

AL: It certainly appeared that way anyway.

CP: Did you have specific outbreaks of hepatitis that you were specifically got involved with?

AL: No, because once again we never had the expertise to really work and isolate the hepatitis virus. Most of the ability to isolate that virus and identify it has come in very recent years.

CP: Okay, those were some kind of fun years. What was your most exciting projects, Art?

AL: Well, I think the—

CP: —for you, personally.

AL: For me, personally, I think it was the determining the fate of virus in waters that we spread on the land and that were being returned to us in our potable waters, you might say.

CP: Those were exciting in the sense of scientific excitement?

AL: I think they were the most satisfying—

CP: For the work.

AL: —for the information that we were coming back with.

CP: For energy put in, the satisfaction out from your laboratory point of view. Yeah. What were some of the results that caused you to be satisfying because where we are now? I personally continue to worry about our sprayed fields, for example. They're supposedly treated effluent and you can ride through and you can smell the chlorine, you are in the downwind from some of the sprayed fields. Speak to that. You all did a lot of work on spray fields.

AL: Yeah, we most certainly did. Of course, I think the most interesting aspect of that to my thinking curious that if you're going to spray this material out there on the spray fields, you've got to get your small particles that are in that material that you're going to spray, you have practically got to eliminate them. You know, we put a lot of chlorine in, but the chlorine only works on the powder part of the inanimate particle, whereas the virus may still be contained in the center and we haven't inactivated it yet.

CP: That causes you worry?

AL: Well, yeah, it causes me worry because, I mean, things smell good and all the tests show that our chlorine level is up to where it should—

CP: Supposed to be.

AL: —is virucidal, but still that virus in a number of instances is being protected in that particle of inanimate matter there.

CP: And your laboratory work showed that to be so?

AL: Yes it did. We took some of the sediment, and it's awfully small, and further beat it up through sonic energy and found out that, oh my gosh, even though we couldn't isolate anything before sonic energy now we can because we dispersed the smallest particles and it exposed the virus that was contained in there.

CP: Whoops. What did you all conclude from that, from these sorts of studies?

AL: Well, that the people that are going to spray this material out have got to find some way to get the particular matter out.

CP: Okay, that through filtration or other treatment systems.

AL: Sedimentation filtration, what have you.

CP: Is there technology available to do that, and do most folks do it?

AL: I think the people at St. Petersburg have done a wonderful job on that in their means of filtering before they land spread or deep well inject.

CP: Okay, so our risk is minimal—

AL: It's minimal, yes.

CP: —if we apply the proper technology.

AL: Right.

CP: And that came from your laboratories. Those results came from your laboratories.

AL: On studies that we did here in Florida. I am sure other people have duplicated those studies considerably.

CP: Yes, I remember you were on the cutting edge though because Flora Mae traveled all over the world literally speaking to those studies and carrying those data, and she was a missionary. She was a missionary for us to be careful and is critical to Florida. That was the most exciting you said, one of your other categories, and the most satisfying from your professional experience? What was the most satisfying paper you ever presented, in essence? Speak to the results of your research. You have been a researcher; literally your whole life has been spent in research. You have been a researcher in mostly that laboratory center.

AL: Yeah. You know, it's hard to tag on to anything right at the moment.

CP: All of it was?

AL: All seems because it all seems somewhat meaningful at the time and still does. I mean, we started out with a problem and we tried to answer it, and in most instances, I think we did.

CP: I think you did, too, and it's fun, it's fun. What have I left out? What if—let me see—if your son, your grandson is going to see this tape, what would you want him to remember about his granddad as a researcher?

AL: I guess we just got in there like you used to tell us to do and investigate. Investigate and get an answer.

CP: And get the answer, persistence. Okay, when your grandson is looking at this I want him to know your granddad was on the cutting edge of virology in the public health sense for this nation, literally. Most of the base techniques were worked out in the research laboratories, which they could do it for one specimen but had no idea to apply it for the public good, your dad—your granddad was on the cutting edge for doing the base research to make all of this highfalutin laboratory stuff practical to the public welfare.

He did, he was on the cutting edge for working out these practical techniques for making it applicable for public consumption, if you will, for the public good. And Art, on behalf of us all, we thank you for that.

AL: Well, thank you for having me.

CP: We sure do thank you for all of that. Any another word for your grandson though, who is going to be looking at this—you don't have a grandson yet, I know you don't have a grandson, but you're going to have one, one day.

AL: Just tell him to go out and go get them.

CP: Go get it. Go get it. Your veterinary degree is bringing you right on. In retrospect, you could have had a choice of specialized training in laboratory work, somehow you got started with an interest in veterinary work, but very early in your veterinary career you got moved into laboratory work. How much of your veterinary background have you really called on your veterinary training have you called on for your life's work?

AL: Well, I think the academic veterinary training has really taught you to be persistent and look into things, and things are not always what they seem to be.

CP: On the surface.

AL: On the surface.

CP: You need to dissect it out and look at it. Yeah. If you had it all to go over again based on how your career has moved, would you do it the same way?

AL: Oh, I'm pretty sure I would.

CP: Yeah, you do.

AL: I would probably try to do it better though.

CP: Wouldn't we all? Wouldn't we all make a few little adjustments here and there?

AL: That's the way it goes when you look back in retrospect.

CP: Yeah, and I think that's proper. I think that's the way it should be. Any advice for folks that are fascinated with your career as a veterinarian who has spent his life as a laboratorian? And really not so much in animal diseases either, it has been focused on human diseases has been your focus entirely. Yes, that's advice for our young people coming along. Have we left out anything, Dr. Lewis?

AL: We haven't left out a thing. We have dissected you and I.

CP: We did. I'd want our audience to know that both of our careers kind of got started together in the same place at the same laboratory table in a funny sort of way. And I recall those with great, great, great appreciation and pleasure, Art.

AL: Well, thank you.

CP: For the future viewers, I just want them to know that.

AL: And I'll just remember the night you and I went up to north Florida to work some *Leptospira*. In those days, the state cars did not have heaters in them, and you and I just about froze going up there.

CP: They didn't have air conditioners either; I want the record to show.

AL: And that was in something like January and February.

CP: And that was to Monticello. Didn't we go to Monticello, wasn't that where we were going?

AL: Monticello was our destination that time.

CP: Yeah, for *Leptospira*. Those were great days. Well, Dr. Lewis on behalf of the Libraries of the University of South Florida and our oral history collection in public health, you've made a significant contribution to that history, and you've been very reserved in trying to orient it, trying to tell our audience of your part in that. But for the audience, be aware of the contribution this man has made to Florida public health. And Art, on behalf of us all I say thank you for coming by.

AL: Thank you for having me. I appreciate it.

End of Interview