

Accession Number: BDDG-69-SHELF 6724

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Folder Title: ORAL HISTORY - KENNETH G. SCOTT  
TRANSCRIPTION OF ORAL HISTORY  
INTERVIEW, RMT & RB DIVISIONS

R

Transcription of tapes

Date of Interview: 17 December 1979

### Family Background and Early Education

Hughes: ~~It's December 17, 1979, and I'm in the home of Doctor Kenneth~~  
~~Scott - Doctor~~ <sup>Dr.</sup> Scott, would you tell me a little bit about  
your family background; maybe start with your grandparents  
and tell me their names and where they came from?

Scott: Yes, I'm from Arizona originally, and my grandparents were  
immigrants, ~~from~~ mostly Wales. ~~And~~ they settled in Bisbee  
Arizona, and worked for the ~~Phelps~~ <sup>Sp?</sup> Dodge copper mines. They're  
no longer open; it's just a ghost town there. ~~And~~ I enjoyed my  
boyhood very much with them, I was around <sup>them</sup> 'til I was about six  
years old. ~~And~~ they lived right on a street called Brewery  
Guich, which was loaded with second hand stores, ~~and~~ they'd built  
the Saint George Hotel, which still stands on the land that  
they had. The original home was completely removed, it was  
burned out or something. <sup>Q</sup> I was born in Douglas, Arizona <sup>in</sup>  
February the 16th in 1909. ~~And~~ I had some schooling in New  
Mexico, ~~my~~ father was operating a steam shovel. He was sort of  
~~an engineer~~ a locomotive engineer. <sup>Q</sup> I went to the first grade  
in Santa Rita, New Mexico, and I found it a very interesting place,  
it was primarily Chicanos ~~then~~ or Mexicans or whatever we used  
to call them "greasers." ~~And~~ from there we moved back to my  
original place of birth, Douglas, ~~And~~ I went through two grades  
there. ~~Then~~ <sup>Then</sup> my mother and father were continuously fighting and  
separating and getting back together again. I got a little fed  
up with the whole thing. (Laughingly) ~~And my mother moved us,~~  
I have an older brother and a younger brother. <sup>Q</sup> ~~And~~ my mother  
moved us to Los Angeles, ~~this was~~ during the latter part of  
World War I, which I remember very well. ~~And~~ she was taking a  
beauty school course, but she never did anything with her courses.

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later inherited  
 She ~~led her~~ part of her mother's fortune, which came around  
 in the Depression. ~~And~~ she was back into beauty school, but  
 she gradually frittered away everything. ~~And~~ I left home at  
 that point; I was going to school at U.C. Berkeley. ~~And~~ I  
 should mention that all of my undergraduate school and high  
 school was done at Dunsmuir, California, which was a big  
 railroad.  
 town

SSH: By that time had your mother and father split permanently?

KGS: They never did, except periodically.

SSH: (Laughs) So your father was always around to support the family?

KGS: Well, you could call it that, he was quite a drinker, and he would disappear with all of the money that he had and stay away 'til it was gone.

SSH: <sup>Did</sup> that <sup>make</sup> it pretty rough on your growing up years?

KGS: Well, they were very limited as to what we could get. ~~And~~ my answer to that was to go get a succession of jobs. Dunsmuir, as you may know, is near Shasta Springs. ~~And~~ I first got summertime money by establishing a vegetable <sup>route</sup> ~~post~~. I'd go around and get orders for fresh vegetables and then deliver them in a baby buggy that I had by the end of the day. (Laughter) I raised a lot of rabbits and I would sell them from door to door and take orders in advance and then go prepare them. I liked that and I liked animals.

SSH: Were you beginning to be interested in science in high school?

KGS: Not really, I was so busy working in high school that I didn't ever get to take a lot of courses. I took the required mathematics. And it wasn't much of a school we had in Dunsmuir; it was a community school district. But I learned the most and got the most out of people when I was employed by one of the local

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pharmacies, run ~~and~~ owned by Cecil Jones. And he taught me more about dealing with people and general problems in anyone I can remember. <sup>I'm really indebted to him.</sup> ~~I know him.~~

SSH: Just by example? or was he really setting himself?

KGS: Mostly by example. He was a father figure to me. And I think I got paid \$70 a month. But I worked every afternoon, every Saturday, every other Sunday. So I didn't have the time to do a great deal. <sup>[ok]</sup> I wasn't really a good sportsman anyway. I wasn't performing physically like I thought I should. So I gradually got away from that.

SSH: Did he have any part in your going on to Berkeley?

KGS: No, he didn't. I got ~~what was~~ a better <sup>paying</sup> job ~~in pay~~ later on. ~~And~~ I guess about half of my high school career I worked for a haberdashery shop called the IXL Clothing Store, which was run by Mr. Welch, who later became postmaster of Dunsmuir. <sup>sp?</sup> (I think he's still around in his 80s), and an old character by the name of <sup>Berkeley</sup> ~~his name escapes me now, it will occur~~ <sup>sp?</sup> And they ran this haberdashery store and we sold really fine clothing. The shirts <sup>th</sup> at Macy's wants \$20 for now, sold for \$3.50. So I got through high school, and I spent another year preparing myself for the College of Business Administration, <sup>th</sup> it was mostly economics in Berkeley.

SSH: Was it your idea to go on to college? ~~And how did that?~~

KGS: Yes.

SSH: ~~Because~~ <sup>g</sup> neither of your parents had had college educations.

KGS: No.

SSH: Did they care about your education?

KGS: Well, not really too much, my parents were really out of it. My father barely got through the third grade, ~~and~~ <sup>g</sup> his mother

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was a very severe Baptist type, who my mother didn't like, and they had their battles up and down. And they lived in New Mexico, and her husband, my father's father, died early at the age of about 47. And she married again, to a retired engineer, and was quite concerned with us as children because she could see what was happening. And I refused to go to Sunday School (laugh) didn't want to give them that nickel. And when she died, her property was given to my father all of it. There were some country homes and some very nice vacation places up in the mountains in New Mexico.

SSH: Was that connected with the copper mine? Was that where the money came from?

KGS: No, she didn't have anything to do with the copper mines. The Phelps-Dodge company installed an ore roaster and a copper refiner in Douglas, so the good ore went down there on the train. It's a matter of 15, 20 miles. So my days at Douglas were really uneventful. I went by there a few years ago and the place is still there. Had big white pillars like an old southern plantation type of place.

Undergraduate at the University of California, Berkeley  
SSH: Well, how did you get the idea of going on to college, since it doesn't sound as though you were in an environment where that kind of thing was very common.

KGS: Well, it's strictly non-academic. And I had the desire to become a physician and surgeon, and I never really gave that up, even when I was in college. I changed my major several times. I used to bug my advisor, because I'd promise to do something and I'd come back the next year with a whole new program, and he couldn't remember from one year to the next. He was in the bacteriology department.

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SSH: But you originally had the idea of going into business?

KGS: Yes, I did.

SSH: Why business rather than a pre-med course?

KGS: Well, most of the people that I admired were sales<sup>men</sup> and people of that sort, that came by with <sup>50</sup> suitcases worth of samples and stuff, <sup>and</sup> stimulated me into a business career.

And I took extra courses in mathematics at <sup>the</sup> high school <sup>as</sup> ~~and~~ kind of a fifth year student. Our principal there was a Mr. <sup>Switzer</sup>. ~~And~~ the school board was down on him, and as students we held a march and an uprising against an old lady who was the head of the schoolboard, ~~and~~ <sup>and</sup> ~~put~~ <sup>the</sup> ~~her~~ <sup>on</sup> that.

And when I did go to Cal he was very careful about my grades, he gave me excellent grades, I think he even changed ~~the~~ <sup>final</sup> what grade I got.

~~SSH: My homework.~~

~~KGS: Yes.~~

SSH: Well, was it unusual to send a student, a graduate from Dunsmuir, to Berkeley in those days?

KGS: It was, rather, yes.

SSH: So you were sort of a prize student.

~~KGS: Yes.~~

~~SSH: Was he?~~

KGS: Well, not really. (SSH laughs) I was lousy in everything, in English, in history, ~~and~~ we had a lot of unusual teachers ~~there~~ there.

SSH: But you were good in math.

KGS: Well, I was fairly good in algebra, ~~in~~ advanced algebra.

SSH: Well, if you were so bad, as you say, in all <sup>of</sup> the other subjects, why was he ~~pushing you to go to~~ encouraging you to go to

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Berkeley?

KGS: Past favors, I think.

SSH: ~~Oh, really?~~

KGS: ~~Yes.~~

SSH: ~~And then~~ what happened when you got there? Was it rough for a while?

KGS: Well, ~~I was~~ I entered in the class of 1928. ~~And~~ I had a cousin, who is retired now and still lives in Bishop. I haven't had any contact with him for years. But he was in the Economics Department as a teaching fellow. ~~And~~ his name <sup>is</sup> was Bruce Lockling. ~~And~~ he got me enrolled, <sup>and</sup> this was a very confusing thing to me, because it was so much bigger even then than anything that I'd witnessed. ~~And~~ I had a devil of a time <sup>in</sup> the first semester I just worked my tail off trying to get somewhere, but I always had that money problem too.

SSH: ~~How were you doing?~~ had you saved money from your jobs?

KGS: No, all I had when I arrived in Berkeley at U.C. was <sup>\$50,</sup> fifty dollars, which paid my tuition. ~~The name of the partner at the haberdashery shop that I was trying to remember is Gerky. He was about 74-75 years old.~~

SSH: What did you do to supplement the \$50 to get you through the year?

KGS: Well, I got a room job, waiting on tables at a sorority. ~~I took~~ I don't remember the years all flow into each other, but I had a lot of jobs. I used to roll down the course in a ~~private~~ golf course and water <sup>that</sup> lady there was very suspicious of me. She didn't think I did anything. Well, you water in Berkeley ~~and~~ in a few minutes it's all dried out.

SSH: How did you do as an undergraduate?

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KGS: Well, I started, and this begins my real scientific career. I took a course in physiology, and if I could devote all the time that was necessary that a student would devote, I did very well, exceedingly well.

SSH: Who taught the course, do you remember?

KGS: Well, Sherburne Cooke, whose name is scattered all through these. <sup>[points to reprints]</sup>

~~SSH: Yes, I've seen it?~~

~~KGS: Yes?~~

SSH: Was it the introductory physiology course?

KGS: Yes. <sup>SP?</sup> And we had Eric Ogden there and a fellow I've lost track of by the name of Simpson. They were instructors in the department, and Rosa Milton Rose, <sup>who</sup> later took up psychiatry, and I ran into him quite a few times when I was giving courses on nuclear medicine.

SSH: These people were all instructors at that stage?

KGS: Yes. They used to play with each other, sending fake emergency

~~SSH:~~ calls into them in the middle of the night, and getting them out and so forth. It <sup>was</sup> quite a nice place. This was at the old Spreckells building, <sup>which is now</sup> I guess it's the art department on the campus. Then it was a beautiful redwood building, probably designed by Maybeck. And it housed the Laboratory, which is very close to the Men's Faculty Club. And I wasn't aware of its existence 'til much, much later, but that's where I came from.

SSH: What was it about the course, do you think that caught your attention?

KGS: <sup>(pause)</sup> Well, it was very stimulating intellectually to me. And the place

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had a beautiful library and I used to satisfy my curiosity by going down there and reading books.

SSH: Was it ~~then~~ more physiology itself than ~~was~~ the lecturing talents of Sherburne Cook? Or was it a combination?

KGS: Well, it was mostly the laboratory, which I found very good and interesting and stimulating. ~~And we~~ did the usual physiology things, like the frog and the turtle and later on the dogs and so on.

SSH: Were you making any decisions ~~at this stage~~ about what you wanted to do later in life?

KGS: Well, I had a bulletin from every medical school in the United States. (Laughter) ~~And~~ I was always looking at a course that would cut the academic time down to zero.

SSH: Was that for economic reasons?

KGS: For ~~mine~~ yes.

SSH: ~~Did you shift, at that stage,~~ what year was this? ~~Do you remember when you took the~~

KGS: This was in the early ~~thirties~~ <sup>'30s</sup>, this must have been '30 or '29, I kept hopping back and forth.

SSH: You were a sophomore or a junior ~~?~~

KGS: I was a sophomore.

SSH: ~~Then~~ was that course enough to switch your direction towards pre-med?

KGS: Well, I really took all the courses that were required, like zoology, and we suffered through the shark, ~~and~~

SSH: Did you have any personal relationships with any of these people in physiology, or in any of the other science courses you were taking?



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KGS: Yes, I lived at Cook's home for some time, and they were always very nice to me. They had three sons who were young children at that point. <sup>g</sup> And I used to enjoy <sup>them</sup> that. I eventually married Sherburne Cook's sister-in-law, Doreen Cox. ~~And~~ <sup>st</sup> we ran away to Los Angeles, which made him very angry.

SSH: (Laugh) When was this now, <sup>?</sup> after you <sup>?</sup> were in school?

KGS: This was right in the middle of the Depression, <sup>?</sup> I dropped out of school, and I realized sooner or later I was just going to have to go back there and get through. <sup>?</sup> And <sup>?</sup> among the papers I have around here is my diploma, I got out of there in '36.

SSH: ~~Then what happened?~~ Was the diploma <sup>?</sup> now, in physiology?

KGS: Bachelor <sup>in</sup> in physiology, yes.

SSH: <sup>?</sup> And what were you thinking at that stage, when you finally got your bachelor's degree, about what your career would be?

KGS: I didn't even go to graduation, I was doing some experiment that I thought was important. <sup>?</sup> And I can't remember now what the deal was, I was in many fields.

SSH: Were you doing this ~~sort of~~ <sup>?</sup> on your own time, without an official position?

KGS: Yes. They gave me any amount of space I needed <sup>?</sup> and a little money, very little, <sup>?</sup> about \$500 a year.

SSH: This is <sup>what</sup> Cook <sup>?</sup> did?

KGS: Yes.

SSH: Why did he single you out, do you think?

KGS: I don't know.

SSH: He must have known you were good.

KGS: I never really found out from him, <sup>?</sup> he was a New Englander type <sup>?</sup> and had very little to say.

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SSH: But it sounds as though he was encouraging you scientifically, anyway. ~~I mean~~ <sup>it</sup> it's unusual for an undergraduate to be given research space and a little bit of money.

KGS: Well, he did. <sup>He</sup> he went away for one summer, <sup>his</sup> his family was all on the East Coast somewhere, Hartford, I believe. ~~and he told me to investigate.~~ <sup>He</sup> He was very interested in termites. <sup>And</sup> I wasn't terribly interested in termites, but I found out that no matter what I was working on, it became very interesting in the end. <sup>And</sup> he told me to work out the nutritional requirements of the termite. There was a very popular theory going around that was <sup>made</sup> mostly by a man named Cleveland, that <sup>1st name</sup> termites could affix atmospheric nitrogen and thereby create their own source of protein. Well, we found out they couldn't <sup>and we removed the tiny microorganisms in their gut</sup> they have a big gut filled with microorganisms which digest cellulose and reduce protein in the end. If you treat the termite with oxygen under pressure, you can destroy all these organisms. ~~And I started out making~~ I did that to termites and took careful studies on their body weights <sup>and that's published among the early publications.</sup> It did me a lot of good because I got interested in nutrition, and I used to circulate around the people on the Berkeley campus. We had <sup>Dr. Herbert McLean</sup> ~~Doctor~~ Evans, who ran an institute which was on the top floor of the Life Sciences <sup>Building</sup> building, which was my head quarters.

SSH: How did that work out?

KGS: Well, it worked out that termites needed almost everything but vitamin C, as I remember the results, to survive as a population. <sup>he</sup> ~~And~~ we later did some work on the water control or water

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environment of the termite. <sup>sp</sup> Gustacialis, the local California termite, can't survive in a very dry place. But there's one that's in Nevada, <sup>sp?</sup> Termitopsis nevadensis which can survive in very dry areas. We did a paper on that.

SSR: When you say "we"...?

KGS: Cook and I.

SSR: ~~Cook and you~~ <sup>g</sup> And the fact that you were working in Evans <sup>[Harbin McLean]</sup> Institute <sup>[of Human Development]</sup> was that what it was called? Was he giving you space as well?

KGS: No, I would go <sup>catch</sup> purified casein, and things like that, from the people in the Institute.

SSR: ~~All right,~~ <sup>is</sup> so this in the mid-<sup>'30s</sup> thirties? you just received your Bachelor's?

KGS: Very early in the <sup>'30s</sup> thirties. I hadn't received my bachelor's degree by then.

~~SSR: Oh, you hadn't~~

~~KGS: No.~~ <sup>g</sup> And poor S.F. Cook came back and he'd forgotten what I was supposed to do in the summer for him, that I'd done already, and I couldn't interest him in it very much, but we eventually published it.

SSR: Was that your first publication?

KGS: One of the first, yes. I did some photo-dynamics studies, <sup>sp? who</sup> Harold Bloom was in the department. <sup>g</sup> And we were able to make the roots of barley <sup>implants</sup> bend <sup>in</sup> and light sources. <sup>g</sup> And I found that very interesting, but I was no match for Harold Bloom, and <sup>his</sup> ~~his~~ mathematics were just way beyond me. I did publish a paper with him.

SSR: Well, I notice that from 1934 to 1937 you were "research assistant" <sup>[on your curriculum vitae]</sup>

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at Berkeley.

KGS: ~~Yes.~~

SSH: ~~Now, where was that?~~ in what laboratory?

KGS: That was in the physiology department. I had the job of running the <sup>room</sup> issue and preparing all the animals and other necessary laboratory things for the students, who gave both the medical class and physiology.

SSH: At that stage had you ever thought of going on to a higher degree?

KGS: No, not really. I was naturally thinking of an M.D. degree and (background noise) I was never really able to give that ambition up completely.

SSH: Were you working with the idea of accumulating some money to go to medical school?

KGS: It wasn't possible. I used to get some whatever money I got I went out and spent it until it was all gone and then suffered the rest of the month. I didn't have any way of keeping myself dressed properly. My socks used to end at about the shoe line. And I was very poor.

SSH: Were you doing any research while you were working at your job?

KGS: All the time, yes. I had a continuous series of projects.

SSH: Were you still working with Cook?

KGS: Yes, he was there, available all the way through until I got

my Ph.D., which I did <sup>at</sup> Crocker Lab mostly in

Early research using Radioisotopes and Radiation

SSH: When did the connection with radioisotopes and the Radiation Lab occur?

KGS: Well, we're just about coming to that. I went to a beer party with a bunch of physicists that lived in the upper portion of Durant Avenue, Berkeley. And I got to talking with them about the

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cyclotron. <sup>And</sup> I was interested in blood and nutrition. I asked them what elements they could make that were <sup>to be</sup> interesting. And it turned out our best bet was radioactive phosphorous.

SSH: Do you remember what year this was?

KGS: It was after '31. The paper, which was one of the first that came out of the Radiation Laboratory, was published. But publications took a long time.

SSH: Now ~~was~~ <sup>is that</sup> the phosphorous study in chickens that you ~~were~~ <sup>was</sup> about?

KGS: Yes, we did the study on the effect of P32 on the white <sup>of</sup> the chicken. <sup>A</sup>

SSH: Now, who is "we", <sup>is that</sup> again, <sup>is that</sup> again Cook?

KGS: Well, Cook was in there, in sort of a, well he's dead now, he can't defend himself, but my impression of it, that he was forever smoking cigarettes. He had a pile of Saturday Evening Posts about three feet high, and his memory, <sup>other</sup> powers, weren't the best. <sup>And</sup> he'd sit there and read these damn magazines, day after day, smoking cigarettes.

SSH: You mean in the Lab he would do that?

KGS: Yes, in his office. He had the little corner office on the right-hand entrance to the Life Science <sup>of</sup> building. <sup>And</sup> he had a couple of labs there and we had some other general facilities.

SSH: So he was reading while <sup>other</sup> people were getting the ideas and doing the work?

KGS: Right.

SSH: Who was involved with that phosphorous study in chickens?

KGS: Well, the physicists were people like Edward <sup>in</sup> McMillan, who was

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very much in the act in those days, <sup>Luis</sup> and <sup>whom</sup> Louis Alvarez, you probably know <sup>he</sup> just got a prize.

SSH: They were in charge of producing the isotope?

KGS: They were running the original 37" <sup>was</sup> cyclotron, which <sup>is</sup> the biggest mess of gum <sup>and stickum</sup> and wires <sup>and</sup> cages that you <sup>could</sup> see, but it ran very well. <sup>They</sup> And <sup>and they</sup> it ran all day, made 14 microcuries, which is a very small amount of radioactive phosphorous <sup>for me</sup>.

SSH: Why did they become interested in doing biological experiments?

KGS: Well, they had this machine and they were interested in doing anything <sup>that</sup>. I think they were probably interested in helping me, too. <sup>and we</sup> And <sup>we</sup> they went through Professor Lawrence for most of the support on that. <sup>And</sup> And he finally threw me out of the Lab, because <sup>I</sup> it was such a <sup>wanting more</sup> pest, <sup>made</sup> phosphorous <sup>to feed these</sup> chicks on.

SSH: I've read that Ernest Lawrence, in the early and mid-<sup>'30s</sup> thirties, was very interested in applying the cyclotron to biological and medical purposes.

KGS: He was, because <sup>I</sup> that's the only <sup>source of</sup> money <sup>he could get</sup> he had. Things were very tight in those days. They made me <sup>more</sup> later <sup>more</sup> radioactive phosphorous, <sup>and</sup> sitting in his office, I guess, and I had a lot of proposals to make <sup>for</sup> things we could do with radioactive phosphorous. <sup>And</sup> And he was at loose ends, apparently, and brought me back into the fold. He had an associate that's died very recently, <sup>who</sup> by the name of Cooksey Donald Cooksey, who ran things, <sup>he</sup> was the first lieutenant, I guess, in the Laboratory.

SSH: Did you have to go through him to get isotopes?

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KGS: They got so used to me that I used to get them by winning small battles with Edward <sup>in</sup> McMillan.

SSH: (Laugh) You'd just go up and pound on the door and say, "I need some more phosphorous?"

KGS: I ~~don't~~ <sup>didn't</sup> want the target to be made out of brass; it just louses up the radiochemical preparation which follows it. <sup>And</sup> I wanted aluminum. <sup>And</sup> McMillan said, "Aluminum isn't going to do any good, it dissolves very rapidly in acid solutions." And I said, "No, it doesn't." And he said, "I'll show you," <sup>and</sup> <sup>he</sup> got some aluminum and stuck it in a concentrated nitric acid and nothing happened. <sup>And</sup> his face was very red, and he's been needling me all through these years about one thing or another. I don't think he ever forgave me <sup>for giving a lesson</sup> ~~chemist a lesson~~ in radiochemistry, which is <sup>biggest</sup>.

SSH: Well, it probably made a bit of difference, too, that here you were just a ~~recent or a~~ fairly recent bachelor's degree holder <sup>too</sup> and you were showing up somebody much <sup>other</sup> higher along.

KGS: Well, that's partly true. He was from the California Institute of Technology, and they have an excellent staff down there. McMillan is an excellent man, but... (pause)

SSH: Was he largely in charge of the isotope production in those years? What about Martin Kaymen, when does he come in?

KGS: Martin Kaymen was very busy in that area. Most of that production came on later. We had one technician in the old radiation <sup>lab</sup> <sup>where the</sup> <sup>was</sup> working on a 37" <sup>inch</sup> cyclotron, which was an old wooden building, and next to the Gilman Hall, the chemistry building. <sup>And</sup> the only person around that did any work in which I was involved was a <sup>Miss Condit</sup> ~~Ms. Condit~~ I've forgotten her front name <sup>or</sup> <sup>Condit</sup>.

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where she is, maybe she's not around any more.

SSH: What did you do with her?

KGS: Well, the other big thing that happened to me was that Ernest's brother, John Lawrence, ~~He~~ got very interested in radioactive phosphorous, and he knew quite a lot about transmissible animal tumours. ~~And~~ we had a leukemia, <sup>or a lymphoma</sup>, which you transmit to certain strains of mice. ~~And~~ he was at Yale at the time, and he brought a lot out and got me started with leukemic mice and mice with solid tumours, lymphomas.

SSH: What were you trying to find out?

KGS: I was trying to cure cancer.

SSH: ~~were you?~~ So you were looking for something that would localize.

KGS: Yes.

SSH: What happened from there?

KGS: Well, we had terrible equipment problems at that time, and measurement was always a problem.

SSH: Excuse me, but were you now actually working in the Rad Lab or did you still have a niche in the physiology department?

KGS: Well, both. My first memory of Joseph Hamilton was when we were weighing out some mouse tissues to assay for radioactive phosphorous. ~~And~~ Joe came in and sat down on a stool in the Lab behind us and introduced himself. He was from the Neurology Department at the U.C. medical center. ~~And~~ later, Joe denied <sup>it</sup> any of this, but I still remember it. ~~And~~.

SSH: Was that very early? ~~what was that?~~

KGS: That was very early, that was ~~before the first~~ a couple of years before the first publication on <sup>the</sup> treatment of mice for leukemia with P32. ~~And~~ by carefully judging the dose, I was able to

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percent  
 cure about 30% of my animals. They turned out sterile, and it was a very careful dosage routine I had to follow.

- SSH: How were you determining the dosage?
- KGS: Well, I got a standard from McMillan. McMillan said, "This standard emits 500 <sup>beta</sup> alpha particles ~~or, yes, must have seen beta particles though~~ per minute," and I built myself a standard out of uranium oxide, which was a powder, ~~and get it~~ to discharge the electroscope at the same rate <sup>Thor</sup> ~~and I~~ <sup>said this</sup> ~~at the standard~~ emits 500 particles <sup>a minute</sup>. ~~And~~ since the microcuries is the <sup>is</sup> disintegration rate of a certain amount of any isotope, All of our radioactive phosphorous was based on that standard.
- SSH: How did you determine biological effectiveness?
- KGS: By blood counts, mostly ~~and~~ if they fell out of sight, why, usually the animals would die.
- SSH: ~~And~~ did you find that there was significant localization?
- KGS: Well, in the bone marrow. ~~And~~ those <sup>days</sup> were the very beginnings of radiography, ~~those days?~~ ~~And~~ other people in the Lab, whose names I've been trying to remember, who were physicists, ~~were~~ <sup>were</sup> ~~of~~ helpful to ~~but~~ <sup>but</sup>
- SSH: I've read something stating that Hamilton was responsible for developing the technique of radioautography. ~~Did he?~~
- KGS: No. We had a Dorothy Axelrod, <sup>Heller</sup> who made many radioautographs, ~~with mostly plutonium~~ because it's an alpha ~~matter~~ <sup>emitter and</sup> you get beautiful pictures.
- SSH: But that was later, wasn't it? That was ~~their~~ <sup>the war</sup> ~~more~~
- KGS: Much, much later, yes.
- SSH: Do you know anything about who was responsible for the initial ~~development~~ <sup>done</sup> of the technique? Was that ~~done~~ at Berkeley?

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KGS: It was done at Berkeley by <sup>a</sup> ~~the~~ young Belgian, <sup>an</sup> [Charles Fisher].

~~(end of side one)~~  
~~(side two)~~

SSR: He was killed in the war. (No)

KGS: No.

SSH: That must have been sort of a cover-up that I read then.

KGS: I guess it was, <sup>cause</sup> I don't know what was wrong with him, he had a very nice wife.

SSH: That was in the <sup>'40s</sup> ~~forties~~ <sup>that he died?</sup> ~~did he die?~~

KGS: Well, it was the early <sup>'30s</sup> ~~thirties~~, I think. It was before '37. ~~and~~ He and his wife lived in a little one room apartment deal that I used to live in. The landlady would come busting in any time of day or night and close the curtains to protect the place, or something like that. ~~Felt like a~~ <sup>it</sup> it was one of those fishbowl jobs, you know. You couldn't relax with her in the area.

~~SSH: No privacy at all.~~

~~KGS: None.~~

SSH: Well, what was the response to your work with the P32? Was there excitement about a potential cancer cure?

KGS: Well, we were very enthusiastic and other people were, too. the Chronicle's emeritus science writer, Gobind Lal, <sup>(he)</sup> wrote a one page dissertation on radioactive phosphorous.

~~SSH: How do you spell his last name?~~

~~KGS: Gobind Lal. He's an Indian, East Indian type.~~

~~SSH: L-A-L-L?~~

~~KGS: L-A-L, I think.~~

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SSH: I-A-I, ob?

KGS: I have a copy of that among all these papers around here -  
somewhere a reprint out of the paper. ~~Now if I can find~~  
(SS) ~~it I'll surely give it to you~~ Because I had people fluctuate  
come in through my office when I was at San Francisco. And  
every once in a while I met the original person who did the  
original work. So I had this thing on the wall and I just  
said, "Well you're wrong, I did the original work ~~and go~~ read it  
for yourself." ~~And~~ there was an Australian character by the  
name of Sharp I think they became Sharp electronics - Who ~~it names~~  
thought he was <sup>the</sup> first investigator but that wasn't so.

SSH: Who was working with you ~~now~~ on these early P32 studies?  
What role was John Lawrence playing?

KGS: John Lawrence was really the director of the project, and his  
brother Ernest, who <sup>was</sup> very fond of his little brother John.

SSH: What sort of accommodations did John have at that stage? ~~Because~~  
~~this is now~~ you're still talking about the period before  
he comes permanently to Berkeley? he's still going back and forth  
to Yale?

KGS: ~~was~~ Yale, yes. Well ~~they~~ came out one year on a full-time basis,  
And ~~he~~ couldn't live anywhere, <sup>him at</sup> and we tried ~~them~~ with the Faculty  
Club and he was bitten to death by fleas..

SSH: He lived with his brother for a while, too, didn't he? ~~Or was~~  
~~that only a very short time~~

KGS: I don't know too much about his comings and goings. Somewhere  
along that line he married Amy Bowles, who was a very lovely  
girl, and very wealthy, incidentally.

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SSH: I think that was 1942, so that it was a little bit later.)

KGS: Yes

SSH: Were you working with Paul <sup>Aebersold</sup> ~~Evans~~?

KGS: Well, Paul was very helpful in the Lab, and he was a very efficacious guy. And Robert Stone didn't give him the credit he deserves. He ran that million volt X-ray tube from the beginning for Robert Stone, which he mentioned in his letter. And he later became the ambassador of isotopes for the Atomic Energy Commission <sup>SS in</sup> and I had a very pleasant association with him. I got interested in neutrons <sup>'30s</sup> this was in the late thirties. And I compared the effects of neutrons on mouse tumors <sup>their</sup> and how <sup>it</sup> interfered with the radioactive phosphorous deposition in <sup>their</sup> the tissues. And neutrons were very useful in causing tissue damage <sup>for us</sup> and that was published. Paul did the neutron dosages because I wasn't in any position to do it.

SSH: Had they begun cancer therapy at that stage?

KGS: Yes, this was during the period where we had the 60-inch cyclotron at Crocker Lab.

SSH: Can you tell me about the decision to try neutron therapy on patients? Were you involved with that in any way?

KGS: Well, when we found <sup>out</sup> those funny particles were neutrons no one knew what a neutron was in those days. Everybody got in the act and I did my study, which I'm still very proud of. And it's a very useful tool. ~~Some~~ Many years later some Russians thought they had discovered this effect of neutrons on the distribution of radionuclides in the body. And they published their great experiment as proof and I sent a reprint

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to some place way off in Russia somewhere, stating ~~that~~ what we had done, and it was much earlier than theirs by, oh, a generation, <sup>the</sup> practically.

SSH: What do neutrons do to <sup>the</sup> distribution of...?

KGS: Well, they're about six times more effective than X-rays, <sup>as</sup> a rule of thumb that we use, Ion for ion <sup>or</sup> dose for dose. ~~And~~ I heard from those Russians, you know they were there, and they were very pleasant about the whole thing.

SSH: Well, getting back to the neutron therapy, were you a part of that operation?

KGS: No, I was just in the same lab. Let's start <sup>out</sup> with Crocker Lab, because it <sup>was</sup> never really got <sup>for</sup> built yet. But, it was built, and I don't know why they tore it down, they claimed it was too heavily contaminated with things like plutonium <sup>and</sup> so on.

SSH: But you don't think that was true?

KGS: Well, I don't think so, no. I was very careful, <sup>in</sup> I've been handling stuff like that, ~~And~~ I insisted on recovering everything I gave <sup>in</sup> the way of doses of radioactive elements to animals. And you can knock on wood, but I'm one of the pioneers that doesn't have leukemia.

*Crocker Laboratory*

SSH: I'd like to talk about that a little bit later; let's talk about Crocker.

KGS: Well, the people at Crocker were people that John Lawrence attracted. There was Lawrence Tuttle, most of these people went through <sup>my hands</sup> because I would show them what we did with our equipment. And he worked with me for quite a while.

SSH: Where did he come from?

KGS: He was from U.C., <sup>in</sup> the department of agricultural engineering.

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or something like that.

SSH: ~~What and why~~ had he previously been interested in radioisotopes?

KGS: No, he just came in looking for part-time work, and they put him on as a radiochemist-biologist type.

SSH: ~~And how~~ were you, by this time, a full-time employee of the Crocker Radiation Lab?

KGS: For \$50 a month.

SSH: ~~For \$50 a month. How~~ was that brought about by your association with John Lawrence?

KGS: Yes.

SSH: It was just sort of logical for you to come along ~~with him?~~

KGS: Yes, I was doing his work. We were <sup>then</sup> treating patients with leukemia with radioactive phosphorus. And my job was to do the excretion bit with the stools and so on.

SSH: How was that decision made, to treat the first patient? I believe it was in 1937, was it?

KGS: Yes, it was <sup>oh</sup> at Christmas Eve, or something like that, like they ~~said~~. And I remember I got a call at home, I was supposed to come in right away. I don't think the Lawrences ever really trusted my radiochemistry, so they got Tuttle to do radiochemistry for a while.

SSH: Why would they not trust your radiochemistry?

KGS: I don't know. I wasn't a chemist, for one thing.

SSH: But Tuttle wasn't either.

KGS: No, he wasn't, but I'm trying to think of the other people we had around there, there was <sup>a much</sup> Martin Kayman.

SSH: He was doing a lot of it, wasn't he?

KGS: Yes, he really knew chemistry.

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SSH: Well, that was his background.

KGS: Yes.

SSH: Was Seaborg in the picture at all <sup>at</sup> that stage?

KGS: Well, at a distance. He was early involved in the Atomic Energy Commission. But Crocker Lab in the early days was a very strange place, we had all these characters around throwing their weight around. We had an Alfred Marshall, who was a very fine cellular physiologist, I guess he would be. <sup>And</sup> I read in the paper where his sister was looking for him, <sup>And</sup> she went to Berkeley, and I guess he wasn't anywhere near there, He'd not been there for years. ~~And I~~ ~~run into him,~~ <sup>or</sup> I used to run into him every once in a while. ~~The last time,~~ He always hates John Lawrence, because he thinks he gave him a raw deal.

SSH: On what specifically? Do you know the background?

KGS: Well Marshall had a fellowship, which was quite a nice fellowship, ~~And~~ John just let him run down, ~~and~~ had nothing else to offer him.

SSH: ~~This was now,~~ <sup>or</sup> was this in the war years? ~~Because he leaves~~ ~~me~~.

KGS: Before, before.

~~SSH: Was it?~~

~~KGS: Yes.~~

SSH: Wasn't there some political controversy too?

KGS: Well, the only political controversy I heard about was the Lawrence's trying to move the first year medical school to the [U.C.] medical center [in San Francisco].

SSH: But that was later, was it not?

KGS: Well, it happened later, <sup>a</sup> but it was continuing on for ~~the~~ whole

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generation.

- SSH: How early do you remember them trying to do that?
- KGS: Well, in the late <sup>'30s</sup> ~~thirties~~, I would say, is the first I became aware of it.  
week.
- SSH: Why were they so interested in having it moved?
- KGS: Well, everyone was very critical of the U.C. medical center,  
with its old-fashioned school and its old-fashioned faculty.
- SSH: Well, let's finish with the P32 therapy because that's an interesting episode. Can you tell me about the first patient treatment on Christmas Eve? Did you go in when you were called at home?
- KGS: Well, I went in and did my job. And not very I wasn't interested in that, it was kind of a big grandstand act.
- SSH: For whose benefit?
- KGS: The Lawrences, John and Ernest.
- SSH: Was this again to attract funding?
- KGS: Yes, and fame.
- SSH: What was the basis for making the step from the animal experiments to human therapy?
- KGS: Our results on mice in the early days; on monkeys we eventually had some monkeys.
- SSH: I believe that P32 therapy for leukemia peters out in the war years. Was that simply because it was realized that it was not effective?
- KGS: Well, I don't think that it ever got a fair chance. If you can cure mouse leukemia with P32, you can cure human leukemia. But no one had the guts enough to give them the amount that they needed at the right time.



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SSH: You mean they were underdosing?

KGS: Underdosing and letting the disease keep ahead of <sup>them</sup> it. I established the lethal dose of P32 in ~~the monkey~~ rhesus monkeys. <sup>[Anna] Low-Beer</sup> And Mrs. <sup>^</sup>Loebler did the cell counts for me <sup>^</sup> and had a dose <sup>of about</sup> of about <sup>^</sup> if I remember correctly, 2 1/2 millicuries/kilogram bodyweight. <sup>^</sup> That would just about kill half of them.

SSH: Why were the Lawrences afraid to take that one extra step? To really give an effective dose?

KGS: Well, I don't know, part of it was the shortage of P32, we had trouble making enough on the newer cyclotron that they built and put it in Crocker Lab.

SSH: The <sup>60"</sup> 16-inch.

KGS: Yes.

SSH: And yet the <sup>60"</sup> 16-inch was a better producer of isotopes than the 37-inch, wasn't it?

KGS: Oh, much, yes, much better.

SSH: But it still wasn't enough for adequate...

KGS: Well, it just didn't have the output to do it with.

SSH: What was the response of the medical community, and specifically the medical school in San Francisco?

KGS: They were interested in what we were doing. A man's name <sup>Dr. [Robert S.] Metier</sup> pops up in Doctor Stone's tape, Stacey <sup>Medier</sup> Medier, was in there. And I remember S.P. Cook going to San Francisco with me, with our leukemia studies <sup>and</sup> in the effect of P32 on leukemia and so forth. <sup>^</sup> And I remember talking to <sup>^</sup>Medier, who was just a young man then, <sup>^</sup> And one of the therapists <sup>^</sup> he got leukemia cases and so forth.

SSH: Is that where you were actually treating the patients?

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KGS: No, they were ~~at~~ ambulatory, most of them, and they came ~~under~~ <sup>into</sup> John <sup>Lawrence</sup> ~~March~~ for their work <sup>-ups</sup> ~~outs~~. Lawrence Tuttle, who was kind of a character anyway, I'm very fond of him; I've lost touch with him. ~~He~~ <sup>He</sup> used to talk to these patients and kind of "play doctor." ~~And~~ John thought it was me, and he blamed me for it and got very upset.

SSH: John <sup>thought</sup> ~~thinking~~ that that was his role as a doctor, and not ~~me~~.

KGS: Oh yes, a doctor-patient relationship. We went right by the book on that.

SSH: Was there a problem in those days about patient treatment? I know that becomes a big issue <sup>from</sup> ~~in~~ the mid-<sup>'40s</sup> ~~forties~~ onwards, about patient treatment on the Berkeley campus.

KGS: Well, I don't think any patients got treated on the Berkeley campus ~~except~~ the ones that went into John's laboratory there. ~~And~~ it became Donner Lab. ~~And~~ then they had a pavilion ~~in~~ ~~the University Hospital~~ at Cowell Hospital.

SSH: But in these early days all the patient treatment was done at the medical school with medical faculty presiding.

KGS: Down in the physics department at U.C., in the Radiation Lab, under John Lawrence's direction.

SSH: ~~And~~ that was all right with the medical school? ~~And~~ they weren't worried about the fact that physicists...

KGS: Well John Lawrence was never accepted in <sup>the</sup> medical school. He wasn't a Board member of anything, which they always looked down upon there, you've got to be certified ~~in~~ <sup>in</sup> ~~something~~ <sup>in</sup> ~~something~~, hopefully radiology, but the radiology department just wouldn't have him.

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SSH: Why was that?

KGS: <sup>Dr. g</sup> Doctor Stone didn't like him.

SSH: Was that just a personal thing?

KGS: I think it was kind of a personal thing, and a political thing.

SSH: Did Stone look upon Lawrence as a threat to his monopoly over all forms of radiation?

KGS: No, I don't know if he felt that way, but Stone really owed Ernest Lawrence a lot. He made the 60" ~~inch~~ cyclotron available for the neutron therapy that <sup>Dr. g</sup> Doctor Stone did. There was another man, who worked with Stone, by the name <sup>of Larkin</sup> Larkin, who was upset by all of this, because Larkin thought it was his neutron therapy. <sup>Dr. g</sup> And Doctor Stone's wealthy patients used to roll up with their chauffeurs and their iced champagne. In the Laboratory they had a big field day that afternoon; we all got ~~sw~~acked on champagne and I thought it was wonderful.

SSH: What was the breakdown of labor? You have John Larkin, who was an M.D., and Robert Stone, and then John Lawrence was involved in the early days in that neutron therapy. What were the three M.D.'s doing?

KGS: <sup>Dr. g</sup> Prying for power.

SSH: ~~(laugh) What was...?~~

KGS: <sup>Dr. g</sup> It's as straight as that.

SSH: ~~Was it?~~

KGS: ~~Yes.~~

SSH: <sup>Dr. g</sup> What can you expand on that?

KGS: Building on their own personal ambitions and regaining and maintaining control over the program.

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SSH: How was this <sup>Y</sup>aying for power expressed?

KGS: Well, usually by the type of papers that people would give at scientific meetings.

SSH: What do you mean when you say that?

KGS: Well, I was thinking of Doctor <sup>W.</sup> Edith Quimby, who wrote a textbook on nuclear medicine, <sup>W.</sup> finally. And she got up at a meeting we had in the early days and said that radioactive phosphorus wasn't anything that you could use, that it was ~~forced in~~ <sup>more like</sup> an X-ray machine, and you could do anything with <sup>an</sup> X-ray machine that you could do with radioactive phosphorus or anything else. And John Lawrence was sitting beside me, and this was a slap at him to the worst dimension. Although Edith Quimby eventually became grandmother of nuclear energy, and she'd go around, give courses to radiologists who were never really well-prepared in the field anyhow.

SSH: What was John Lawrence's response?

KGS: He was very upset, but he didn't do anything on the surface about it. There was a lot of under the table negotiating going on.

SSH: About what?

KGS: About usually the control of things.

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been there very long when I was walking down the hall one day with <sup>Dr. Stone</sup> Doctor Stone and the dean, <sup>Dr. Stone</sup> Doctor Smith, came out, and offered me the directorship of the Radioactivity Center right then and there. And I was naturally very happy about it. This was after my Ph.D., by the way, and made Stone furious. He said he was ~~not~~ <sup>not</sup> ~~going to~~ <sup>not</sup> see that I <sup>never</sup> got promoted, or do another thing for me. I said, "Do you want me <sup>to resign</sup> for a time?" And he said, "No."

SSH: Why was he furious?

KGS: Because he wanted to control it. He wanted to run it.

SSH: But you were ~~at~~ <sup>not</sup> at that stage, ~~were you not?~~ in the department of radiology. Wasn't the Radioactivity Center, <sup>of the Department of Radiology</sup> research center a branch?

KGS: No, it was set up on its own budget.

~~SSH: Oh, was it?~~

~~KGS: Yes.~~

SSH: So he really didn't have much control.

KGS: Didn't have any, yes.

~~SSH: What...?~~

KGS: So they were sniping at me for years over that, ever as long as they were around.

SSH: What was <sup>Dr. Stone's</sup> Smith's reason, ~~do you think?~~ in appointing you director?

KGS: Well, he spoke to the deans of Pharmacy and Dentistry, and that's what they wanted. They wanted somebody that could lead them around and help them out and not control it like a patent.

SSH: What happened after the initiation of the Radioactivity Research Lab <sup>Stone</sup> and the fact that ~~he~~ <sup>he</sup> was upset that he didn't

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SSH: ~~Well let's backtrack. Do you think that maybe at least the outward expression of these difficulties between medical physics at Berkeley?~~

KGS: ~~Honey Pardon me? (background noise) (description)~~

SSH: Now Crocker Lab opened in 1937. I forget what month it was. Can you tell me how people came to be employees, how personnel was attracted?

KGS: Well, mostly by word of mouth. The people <sup>we</sup> they had there were ~~either~~ people supported by a grant. Like, we were <sup>Dr.</sup> talking about Doctor Marshack. And I'd forgotten what fellowship he had; I think it was a Marshack fellowship.

SSH: Had he been on campus before Crocker opened ~~his bank~~?

KGS: No, he was brought in as an out-of-state person, ~~as an out of state person?~~

SSH: Now, who would have been responsible for that? Would that have been one of the Lawrences?

KGS: One of the Lawrences probably accepted him as a fellow. I helped him quite a bit in the area; I helped him get a car. And anytime anything happened, I was the first to learn about it. And he left in a <sup>in</sup> era which he was very dissatisfied with the performance of the Crocker Lab and what it could do for him.

SSH: Why do you suppose that John Lawrence let his grant run down?

KGS: I don't know. I wasn't in on any of the decisions which ~~were made~~ at the time. And I eventually left the Lab completely.

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SSH: Well, that was after your Ph.D. though, that was.

KGS: No. Before.

~~SSH:~~ No? Oh, was it?  
*Private Business*  
 KGS: q

As I said, I was always interested in nutrition. And I needed an income a bit greater than \$50 a month. Even in those days, you know, that wasn't very much. So I built a home in Richmond. I built the place 1936, stock and barrel. ~~And it was the 4th of July, I remember when I started~~ I bought some cheap lots out in Richmond. One the 4th of July we started digging the foundations. It was hot, and, <sup>oh,</sup> that soil was very hard. ~~And~~ I built a little house with one bedroom and a great big living room, plumbing and fireplace and everything. And we were in before Christmas. And that was my half-time job, transferring my activities over to the sale of laboratory animals.

SSH: I notice on your curriculum vitae: 1939-1942 private business. Is that?

KGS: That was it.

~~SSH:~~ when it was happening?

KGS: I found out how to raise laboratory mice in large numbers by using a diet that I, I can't say invented, but developed. ~~And~~ I found out that mice needed about five times the vitamin intake that dogs did, ~~and~~ Everyone raised them on dog pellets, which was a very poor, unrewarding thing to do. I got it developed to the point where I could get one mouse for every breeding female

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I had in the laboratory, which I had <sup>in</sup> a little building back of the home I built.

SSH: To whom were you selling the mice? [Albert Park]

KGS: Mostly to the Navy. They went to Doctor <sup>A</sup>Kreuger's lab primarily. He developed a lot of influenza vaccines and I don't know what else with these mice. And it got so big that I was selling two and three thousand mice per month.

SSH: Is that the Kreuger who now is writing a lot about air ions?

KGS: Yes, I think it must be. He's quite old now, he's 20

SSH years older than I am anyway. He's been a bacteriologist at UC for many years.

SSH: Then I'm sure it's the same one. So the business was doing well?

KGS: Well, I made a lot of money. (Laugh)

SSH: Why did you leave it? (Laugh)

KGS: Well, we had a couple of cars and I had a nervous exhaustion experience. I just wasn't happy doing anything with anybody or anything else. So I sold it to a poor fellow <sup>who</sup> ~~which~~ I don't think understood how to do a thing like that.

SSH: And then what did you do?

*Return to Crocker Laboratory*  
KGS: That was <sup>at the</sup> about the time we opened the door ~~to~~ Crocker Lab again. <sup>correct</sup> And I was hired by Joseph Hamilton, who headed up the secret W48-A engineering of the Manhattan District.



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: Well, the Crocker had been opened for a little while before the war.

~~Yes.~~

I think it opened in 1937. The Donner opened in 1942.

: I never had anything to do with Donner Laboratory or their people.

How separate were the two? I mean, from talking to people it seems to me that they were run as strictly independent entities, that ~~Hamilton~~

They were, they were both under John Lawrence's control, I think. And ~~Scott~~, Cornelius Tobias was his man. Hardin Jones became his man. Hardin Jones started out at the Crocker Laboratory.

Oh, did he? Did you have any, both of you being physiologists?

~~In background?~~

I had Hardin as a student, more or less.

Did you really?

And I could never get him to do anything right; his tracer studies weren't, I thought, adequate. He just wanted to do his own thing.

Did you have any dealings with him later on in life, when he was established in Donner Lab?

No, none at all, really.

Going back to the opening days of Crocker Lab. John Lawrence, of course, was there until Donner Lab was opened. And Hamilton was there from the very beginning?

When John moved out of his office in Crocker, Joe

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Hamilton moved in <sup>so</sup> ~~so it was just like that~~ with this new secret project.

SSH: How did that come about? Do you know why Crocker and Hamilton were chosen to run ~~the~~, you're talking now <sup>2</sup> about the fission metabolism ~~experiments~~ experiments.

KGS: Yes, well, Joseph Hamilton had <sup>the</sup> support of Ernest Lawrence. And he became quite capable in the physics necessary to run a cyclotron, So they turned the 60" ~~low~~ cyclotron over to him.

SSH: Do you know how he became interested in radioisotopes? I know he was involved relatively early, before he even came over on a permanent basis to Berkeley.

KGS: Well, I told you <sup>of</sup> my memory of his <sup>first</sup> ~~personal~~ visit to the Lab. He was just a young resident in neurology interested in doing something interesting.

SSH: And you think that visit was what precipitated <sup>[his interest in radioisotopes]</sup> ~~that~~?

KGS: Well, he was hired on the staff by then. ~~And~~ they gave him a laboratory that he could run. He was interested <sup>in</sup> in the metabolism of various elements. I was a guinea pig of his. He worked out the excretion of bromide in the body. And I saved a urine sample every time I had one, until it seemed wrong to ~~not~~ throw them away, <sup>if I</sup> ~~gave them away to someone~~ (SSH laughs) You know that funny feeling.

SSH: ~~Yes. (Laughingly) Destroying scientific evidence.~~ Well, even before that, ~~I believe~~ he had done some radiosodium work with Stone, In fact he published in 1936, I believe <sup>of</sup> before he was really over on the Berkeley

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side of the bay.

KGS: Well, Hamilton always was vacillating back and forth.

~~SSH:~~ Was he?

~~KGS:~~ Yes.

SSH: Do you know anything about those early radiosodium experiments?

KGS: I don't know anything about them, I don't know what he did with Stone, except what Stone says. And the main interest had to be radioactive iodine, in those early days. It's a fission product, as you know. And Iodine - 131 with an eight day half-life was really developed from the uranium materials that were in the nuclear reactor, in the pile. And the Atomic Energy Commission began shipping out batches of <sup>#</sup>131 to any of the sub-contractors, which included us. When I got it at the Radiation Lab, at Crocker Laboratory, I was quite a bit in control of laboratory policy. And I interested Earl Miller in using radioactive iodine to investigate thyroid disease and so forth. And he set up a lab there, at U.C. Medical Center. And it has become quite a famous laboratory. They named it after him, when he retired. (Laugh) Kind of a gift you get out of the University; takes 40 years.

SSH: Isn't that something? I know Hamilton continued his iodine studies after the war. But it's usually that a lot of his work was on the naturally occurring, what's the word I want, well things like the bromide-chlorine studies

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that he'd done before the war, sodium, all those naturally occurring elements. But that pretty much dropped out of the picture after the war, and he became

KGS: Well, I guess it did. We were all mainly concerned with atomic bombs.

SSH: Why was that? just because the AEC thought it was important, and you had the technique?

KGS: Well, that's where our money came from.

SSH: ~~And that was enough.~~ Were you in on that very early war research? Do you know why Hamilton and the Crocker Lab were chosen? Was it simply because of the 60" ~~beam~~ cyclotron?

KGS: Yes, primarily, because when I got in the group, <sup>it</sup> was really secret; I wasn't supposed to know anything. And you can't help but find out, ~~the~~, just by osmosis. When he hired me, I was there as a laboratory technician 1, I guess.

SSH: <sup>Had</sup> Now he sought you out? How had you met up again, after your episode with animal breeding?

KGS: I don't remember. I left there under kind of a cloud. I didn't get along very well with John Lawrence and Ernest, of course, his big brother, but ~~he~~ Ernest was also very nice to me. I made such a mess in the laboratory without a hood for a muffle furnace. I made these disgusting smells, muffling human feces in open air, and (laughter) there was a narrow little walkway between Crocker Lab and the old laboratory. And I can see Don Cook's in

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the back of my mind, coming in one day. He was  
grabbing his throat, coming in the door, ~~was~~  
terrible smell was. (Laughingly) And I said, "You  
can't do this kind of work without a proper hood. And  
I have to do it, so this is what we're faced with."  
Well, he went over to Ernest Lawrence right away.  
SSH: And you got a proper hood.  
KGS: And I got a proper hood. Looked like a steamboat, with  
the thing coming out of there. ~~But that~~ ~~Sweetie~~  
(background noise)

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SSH: Were your differences with John Lawrence mainly <sup>based</sup> on <sup>?</sup> personality, or ~~what were they?~~ <sup>was the</sup> ~~rest of that?~~

KGS: I thought it was based on a matter of performance. I expected <sup>performance</sup> funds out of him, which he was incapable of giving.

SSH: You mean scientific performance?

KGS: Well, yes that, and in everything. He was a terrible laboratory man. And he was also very late on many occasions. And I'd show up walking the floors trying to be present when he needed something and...)

SSH: When you say "terrible laboratory man," do you mean that he just wasn't very skilled in laboratory procedures?

KGS: He was very un-ambidextrous. One of the biggest breakthroughs of <sup>localizing</sup> <sup>A</sup>P32 in an animal tumour, which we were using one of Ernest Lawrence's fancy instruments to measure, turned out to be some contamination on thumb. And he simply got some of the stuff on his thumb, and

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[the instrument]  
 17<sup>A</sup> went right off the scale. That kind of thing.

SSH: ~~Yes~~ What effect did his lack of performance have, ~~do~~  
 you think, on the way research<sup>was</sup> conducted it at Donner  
 Lab?

KGS: I think it held him up, especially when he went to  
 the U.C. Medical Center or anywhere else. People would  
 tend to downgrade him, because of lack of experience and....

(end of tape)

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Kenneth G. Scott  
Transcription of Tapes, Tape 2  
Date of Interview: 17 December 1979

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SSH: Well, do you think there was any tendency, as time went on, for him to go less and less often into the Lab, and become more and more concerned with administrative duties?

KGS: Well, I saw so little of him in those years that I don't know what he did with his time. He also was pretty heavily involved with Cornelius Tobias and Hardin Jones, they had a high altitude laboratory there of some sort. <sup>Aerobics unit?</sup> Plus that was all part of the medical physics group; there was one on the Berkeley campus. And S.F. Cook again took charge of that, <sup>by</sup> just expressing his personality. And they <sup>at the University of California White Mountain Research Station</sup> had this high altitude facility in the White Mountains, that they set up up there.

SSH: How did Cook express his personality?

KGS: Well, he controlled the whole thing for many years. Both budgetarily wise and research wise.

SSH: He had the money?

KGS: Well, he had control of the grant. The medical physics group, which was mostly physicists from the Berkeley campus, and some other people like Cook, controlled medical physics in the University of California for quite a few years.

SSH: Is this in the post-war years that you're talking about?

KGS: Well, this is mostly during the war.

SSH: So they had the grants and consequently could call the shots, is that what you're saying?

~~KGS: Consequently could do what?~~

~~SSH: Could "call the shots," so to speak?~~

KGS: Yes.



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SSH: How did John Lawrence react to that?

KGS: Well, I really didn't know him well enough or have enough to do with him to see what his reactions were. We kind of lost him during World War II.

SSH: And never got back to him after the war?

KGS: No, I've had some very nice chats with him. You meet him in a hallway, near an elevator or something, but...

SSH: What about Hamilton and Lawrence, what sort of a relationship did they have?

KGS: With Ernest Lawrence it was excellent. He and John didn't get along too well. ~~And...~~

SSH: What was the basis of that?

KGS: Struggling for a place in the sun, is about all I can say about it.

SSH: Even after each had his own laboratory?

KGS: Well, that was more or less true, John was usually involved, one way or another. ~~And~~ I can't help you much <sup>there</sup> ~~more~~, my memory is very clear on what happened <sup>when</sup> after I went back to Crocker Lab after my animal business success.

SSH: ~~Yes~~ Well, that would have been about the time that Donner...

KGS: Was opening up.

SSH: ~~Was opening its doors, yes~~ So that's when you lost track of John Lawrence.

KGS: Really it is, yes.

SSH: Is it your impression that Hamilton was left pretty much in charge of the ship, so to speak, <sup>?</sup> I ~~mean~~ <sup>?</sup> he was making the decisions <sup>?</sup> that, in regard to ~~priority~~ <sup>?</sup>

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KGS: Yes, he really was, he had the support of the people back in Washington who were responsible for the Manhattan district. And he had a great deal of influence with those people, they were admirals and.

SSH: How do you reach the stage of having influence with people like that?

KGS: Mostly by being there and talking to them when they had a need.

SSH: And, at least in the early days, was it true that the 60" was about the only machine around which could produce the isotopes that were needed for the experiments that the A.E.C. and the Manhattan Project needed. Is that true?

KGS: Well, they had a facility at the University of Chicago. Now they were nuclear reactor-minded. But I think, mostly they came to Joe Hamilton for help. Now two people figure in this. One is Robert Stone, who went to what we call the Metallurgical Laboratory Project, as director of medical research, I would guess. And the other person that shows up around here is Stafford Warren, who was one of my bosses.

SSH: What are their roles?

KGS: Well, Stafford Warren was a full Colonel in the Manhattan District, and he spent his time traveling around the country, breathing down the backs of people like me, who was given the first plutonium to the experiment with to find out where it went in the body.

SSH: How did that happen?

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KGS: Well, it was primarily the relationship between Hamilton and Seaborg, who was right up at the top in producing new elements and isotopes.

SSH: Well, plutonium had been produced on the 60", had it not, for the first time?

KGS: Well, I guess it had, for physical experiments. But that wasn't enough to use in animals. And I was given, through them, 11 milligrams of plutonium. It's in that plutonium reprint. [Interruption]

~~SSH: I don't know my way around these well enough.~~

~~KGS: Sweetie. (background noise)~~

SSH: Now who would have been responsible for making a decision to have plutonium set aside for biological research?

KGS: Hamilton, through Seaborg.

SSH: And would Stone have played any role in that?

KGS: No, he was completely out of it that part of it. He was in Chicago and later Oak Ridge.

SSH: Yes. Do you suppose Hamilton would have written to Seaborg and said, "Please give me a piece for biological experiments?"

KGS: Yes. That's how we got all the fissionable materials, which we eventually did and published on. That included Americium and neptunium and so on.

SSH: Was that done by telephone, do you suppose? Do you think letter were?

KGS: You couldn't make a phone call and have it stick. It was strictly top secret stuff. [Interruption]

~~SSH: Then, do you want me to take that again?~~

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KGS: Honey (background noise, pause) Well, I went back into the laboratory in October, 1942. And there were these two chemists that I'm very fond of, <sup>[Ray] Ov</sup> Overstreet and <sup>[Louis]</sup> Jacobson, <sup>They</sup> that were very good soil chemists. And they were used to working with trace minerals and elements. But they wouldn't work on anything unless it was a white ash, which <sup>is</sup> <sup>was</sup> one of their conditions for me. So I brought something in dripping of blood, and they would say, "Don't bring it here. Take it away and make it into a white ash." ~~Thank you, dear~~ (interruption)

Later my friend Overstreet died not too long ago of cancer. ~~And~~ he was a chain smoker, and he had cancer of the lung.

SSH: How did they come to be at Crocker Lab?

KGS: Joe Hamilton hired them, found them as part of our group.

SSH: What was your job during the war?

KGS: I was the major flunky and tracer man. I was surprised to find out that no one knew how to do a decent tracer study when I came back <sup>to</sup> ~~from~~ the Lab.

SSH: Including Hamilton?

KGS: Including Hamilton. He knew how to do it, but he didn't have the patience for that, measuring <sup>ments</sup> ~~ing~~ and so forth. So I set up all the tracer studies and directed them. I finally wound up with a staff of about 14 girls, and we had our ins-and-outs as all personalities will. ~~And~~ this is where Patricia Durbin came along. ~~And we did, in fact,~~ and I would never tell this to anyone who didn't ~~know it,~~ <sup>mention it,</sup> but we did hire her as a dish-

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washer. She did come along and develop beautifully as a scientist.

SSH: What was Hamilton's role, <sup>?</sup> ~~if you were...~~?

KGS: He was her boss.

SSH: But in the Lab as a whole, <sup>?</sup> if you were mainly doing the tracer experiments, what was left ~~for Hamilton~~?

KGS: Well, about 5,000 plutonium analyses, I was pretty slap happy. He said, "Well, what are you doing all that for, Scott, you can go hire some people to help you." And that was new, you know, to me. And I hired quite a few people. One of them was Durbin, one of them was ~~Crawley~~ Josephine Crawley, who <sup>was</sup> a lovely girl. And I only know of what has happened to her since Patricia Durbin told me, and she had a complete mental collapse over the project in general and her part in it. She was one of my right-hand people.

SSH: You mean several years after, <sup>she had the collapse</sup> ~~she had~~?

KGS: Yes.

SSH: Why, <sup>?</sup> over the project, ~~do you think~~?

KGS: It came on much later, she was a devout Catholic girl. And I was emotionally interested in her, involved, I was very fond of her, but there wasn't anything I could do about it, I was married already, and we had a close relationship, but it wasn't any more than that.

SSH: Well, what was Hamilton doing, <sup>?</sup> while ~~?~~?

KGS: Buzzing around the country mostly.

SSH: Was he?

KGS: Picking up unusual radionuclides that he could bring back

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to the Lab and toss into the hopper.

SSH: What about the cyclotron itself, who was responsible for keeping that going?

KGS: He was.

SSH: ~~He did it.~~ Well, what happened when he was off buzzing around the country?

KGS: Well, he left it with the crew, we had a regular cyclotron crew. We had some young physicists. One of them was the son of the chairman of the physics department, Doctor ~~Doyle~~ Birge, who was kind of a survivor character. You know he'd issue you a key and charge you a dollar to LeConte Hall. And then if you lost it, he'd give you hell, and if you found it again, he said, "Oh, you only found it because you could get your dollar back." (SSH laughs)  
That kind of a guy.

SSH: Was the crew solely responsible for scheduling and operating?

KGS: Yes, if I needed something I'd go to the chemist, and go to the crew. And I don't remember the members of the crew too well, as to what their names were.

SSH: ~~Well~~ Well I know there was other work, aside from the fission product metabolism studies going on. I mean, ~~there was~~ Hamilton I know had a contract which he shared with Axelrod, do you know about that?

KGS: Yes, that was due to radioautography of fission or fissionable products, or other things.

SSH: You had nothing in specific to do with that project?

KGS: I worked with her directly. I usually gave her all of

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If  
the specimens, she needed a lung or a liver from a rat,  
I gave it to her.

SSH: Was there anything else going on in the way of research  
in the war years?

KGS: Well, we were using the cyclotron to make fission products.

And I think the first things the chemists produced that  
we used was radioactive strontium, which is a fission  
product. We were bombarding uranium, and  
was making the world supply of, I can't  
remember if polonium. And he exposed himself to  
polonium, which is one of the things that probably led to  
his leukemia that killed him.

SSH: You mean accidentally <sup>exposed himself?</sup> ~~the exposure?~~

KGS: Yes, he did in the one of the laboratories in the chemistry  
department. The whole thing got away from him and blew  
up or burned up something like that.

SSH: So you think that the exposure to rad#oisotopes <sup>was</sup> ~~did have~~  
a factor in his leukemia?

KGS: Well, yes and the fact that you couldn't keep him out of  
the control room ~~where the cyclotron~~ or the bombardment  
area where the lead came out. If somebody wanted something,  
he just couldn't rush in there fast enough. And there's  
a lot of residual radiation from a thing like that. I  
could pick it up on my instruments that I ran <sup>in</sup> LeConte Hall,  
which was in the basement, and it had to shine down from  
the cyclotron all the way down <sup>into</sup> ~~under~~ that building.

SSH: Why did he take such risks?

KGS: Impatience, I think mostly. He was a very impatient man.

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I think he realized that he <sup>had</sup> already had it <sup>in</sup> ~~of~~ the way of radiation exposure, because of accidental things and so forth. And...

SSH: So he didn't think precautions were necessary.

KGS: Not enough, and I jumped on him for it, and <sup>we</sup> all got after him, ~~it~~ didn't help.

SSH: How was he in regard to the safety of other people?  
~~both in regards to...~~

KGS: Well, he was kind of thoughtless of it, I think, ~~he really~~.  
He never worried about whether I had any plutonium in me or not. ~~And~~ it turned out to be one of the most deadly things you can get.

SSH: I hope you were worried. (laugh)

KGS: Well, I was being very careful in those days, ~~and~~ I knew what I wanted to do, and how to do it right. And if you did it right there wasn't any radiation exposure.

SSH: Well ~~was it~~, if ~~if~~ wasn't particularly concerned, then who was seeing to it that people ~~who~~ in lesser positions in Crocker ~~were~~ were taking proper safety precautions?

KGS: Well, I was very concerned. ~~And~~ that was one of the reasons why I left Crocker in 1951, and moved all of my activities to the <sup>4</sup>Radioactivity <sup>as</sup> Research Center on the San Francisco campus. ~~And~~ I went away and I never came back really.

SSH: Because you didn't think that the safety standards were high enough?

KGS: Well, he wanted to do some very, what I thought were

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incautious experiments. I thought they were morally wrong.

- SSH: Are you talking now about the human experiments?
- KGS: Yes.
- SSH: And he went ahead and did those?
- KGS: Yes, he did, and he did the first one with my help.
- SSH: That was the plutonium?
- KGS: Plutonium-248, which we gave to this nice man who was scheduled for stomach surgery. They were sure Earl Miller, for example, was sure that he had cancer of the stomach. And his probable survival wasn't very great. He was 55, maybe, ~~or so~~ when I first found him. And we injected him with plutonium-238, and the story of it is that he didn't have a cancer that anyone could demonstrate. Earl Miller got very upset with ~~it~~ <sup>that</sup> and looked for days at slides of this man's post-op remains. And he just didn't have it. I got very interested in him as a person, and I contracted through the laboratory to buy all of his urine and feces, for which he would get a monthly check. And we would go up once a week and pick it up, <sup>in</sup> and acid carbols <sup>ase</sup> in various bottles we left up there with him.
- SSH: Did he know what was going on?
- KGS: Never told him.
- SSH: What was the outcome?
- KGS: Finally, the laboratory wouldn't pay for his feces anymore. He was in excellent health. His sister was a nurse and

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and she was very suspicious of me. But to my knowledge he never found out, and he slipped through our fingers at the age of 88 he died from something. ~~And he died~~ <sup>the</sup>

SSH: Nothing to do with plutonium?

KGS: ~~And~~ he got many times the so-called lethal textbook dose of plutonium. Patricia Durbin knows more about that. She's kept up with ~~the data~~ his data.

SSH: Well in those days it was possible to do experiments on human beings with such ease?

KGS: Yes, yes.

SSH: What did it involve, I mean was it just a matter of ~~deciding?~~

KGS: It involved getting a needy patient who had known disease, or thought it was known, ~~and~~ he came out of the clinic for us at U.C. ~~And~~ I took the plutonium over there and gave it to Earl Miller, who injected it into this guy.

SSH: ~~And~~ later other experiments of that nature were done?

KGS: There was one more that Pat reminded me of, of an Australian child who received some fissionable product, I don't know; I think he got plutonium <sup>too</sup> who was dying of leukemia when they got him. And I think he subsequently died in a very short time.

SSH: *Human Use Committee:* When did the human use committees put a stop to all that?

KGS: Well, they never really did. We used to, I was on the committee when it was organized in 1948, which was about ~~when we were there then~~ <sup>when we were there then</sup> ~~And~~ we used to screen these

*Human Use Committee*

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applications, one by one.

SSH: Now this was the committee of the medical school?

KGS: Yes. And it was through that committee that the University of California got the permission from the Atomic Energy Commission for blanket authority on various and sundry radionuclides.

SSH: So it was just a matter of this board meeting and making a decision in regard to each case?

KGS: We'd circulate each application around, and I guess I had quite a bit of weight in the committee; we went through a whole series of chairmen. And the president's office in Berkeley used to have his secretary call me up and ask me, "Who do you suggest next?" So I went through a whole bunch of people, including <sup>Dr. [Name]</sup> Doctor Sheline, who is now a radiotherapist in the department of radiology. I think he's been loaned to the National Cancer Institute or something.

SSH: Why do you think you had such authority?

KGS: Well, I was the only one over there who could really figure out in radiation dosages what the experiment was going to give to the recipient, and what I thought, whether what it was worth doing or not, or whether it was just a pie-in-the-sky thing.

SSH: So this committee was only considering cases that were going to involve the use of radioisotopes.

KGS: Yes. On what we'd call an experimental basis.

SSH: I see. Would this include experiments that were projected

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from Donner Lab and Crocker Lab, <sup>?</sup> I mean <sup>9</sup> did you have control over the Berkeley campus <sup>time?</sup>

KGS: No, what they did <sup>at</sup> Berkeley was finally none of my business, and I didn't want it. I didn't want to have anything to do with it, really.

SSH: Do you know anything about how those decisions were made? Was there another committee somewhere ~~that was~~ <sup>?</sup>

KGS: Well, there was a state committee that was for the Northern California branch of the University of California, and I was chairman of that for quite a few years.

SSH: Would that have made case by case decisions as well?

KGS: Yes. I was responsible for letting one of my friends, Perry Stout <sup>up</sup> on the Davis campus, bury 215 millicuries of radioactive zinc around an apricot tree or something. The University found out about that later and they had convulsions, practically. ~~And~~ I didn't think the experiment was all that much <sup>9</sup> it was out there by itself in a field. And I had a very opinion of Perry <sup>Stout.</sup> ~~'s~~ doubt. ~~And~~ he was an excellent man. He knew more about colloid chemistry than anyone I'd ever met. ~~And~~ unfortunately he died just a while ago, poor guy.

SSH: The University was concerned because of the radiation hazard?

KGS: Their risk in ~~might be~~ getting sued for exposure by somebody ~~for~~ something like that.

SSH: You don't know anything then about the problems that the medical physicists on the Berkeley campus may have had in regard to human experimentation?

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KGS: I think you could get more information ~~in that source~~<sup>9</sup>  
from Hardin Jones or Cornelius Tobias.

SSH: Hardin Jones is dead. Did you know that?

~~KGS: Did he?~~

SSH: He died ~~about a year and a half~~<sup>9</sup> almost two years ago.

KGS: I didn't know that.

SSH: Yes. He died, <sup>suddenly</sup> I believe it was a heart attack, ~~suddenly~~<sup>9</sup>  
~~he'd~~<sup>A</sup> been to Australia on a rather rigorous trip. And,  
from what I understand, <sup>rather</sup> died <sup>suddenly</sup> after that.

KGS: He used to sound off about marijuana. He got very moral  
towards the end ~~there and so on, but I didn't know that.~~<sup>0</sup>

SSH: ~~Yes. In fact I was talking to Alex Grandon the other day,~~<sup>0</sup>  
~~do you know that name? He was a right hand man of Hardin~~<sup>0</sup>  
~~Jones in the later years, simply because it's of course~~<sup>0</sup>  
~~no longer possible to talk to Hardin Jones, and he was a~~<sup>0</sup>  
~~key figure of the Donner Lab. It was close to two years~~<sup>0</sup>  
~~I'd say, that he'd been gone.~~<sup>9</sup> Well, do you think  
we've covered the war years sufficiently?

*The Bikini Bomb Tests*

KGS: Well, we're right up to Bikini.

SSH: ~~Yes~~<sup>9</sup> Well, perhaps that's the place to start. I know  
you had a heavy hand in that. Can you tell me how that  
arose?

KGS: Yes, Joe Hamilton and Stafford Warren recruited the staff  
for that. I was given a simulated title of <sup>6</sup>Major. I  
think I was a major. It didn't matter much anyway, they  
gave us a bunch of free clothing, which we sweated our  
hearts in it, anything ~~that's [as far] south~~<sup>0</sup> Bikini. ~~And~~<sup>0</sup>

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I set up what I call, they called a radiological laboratory on Hospitalship Haven. And this I was entirely responsible for running. We went through the surface Able test that was the bomb dropped from the air, and I have some pictures of that, by the way, and the Baker Blast, which was an underground explosion thing.

SSH: Does that mean that you were there two times?

KGS: I was there during the both tests, ran over a period of ~~I don't remember whether it was~~ one month or two months, but I enjoyed it thoroughly.

SSH: ~~So you stayed~~ you stayed the whole time there for the two?

KGS: I stayed over, yes.

SSH: What were you supposed to do?

KGS: I was supposed to give them an assay on anything they brought in they thought was radioactive. And I was out in the beginning with monitoring instruments, and later on I had enough equipment in the Lab to make our own detection instruments, like geiger counters. And everything worked beautifully as far as I was concerned. I worked my tail off assaying samples, and I liked the Baker Burst because it was the biggest tracer study that I was ever involved in. The Bikini Lagoon's a fairly good-sized place, and we had samples brought in to us, which we ran, and plotted the distribution of the radioactivity in the lagoon. And we did that by a radiochemical separation, which was quite simple and always works, it was making an iron-hydroxide precipitation of the sea water samples.

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and we'd collect the precipitate and count that and there's practically no mass involved.

SSH: ~~When you say "we" I mean~~ who is "we?"

KGS: Well, ~~in that case, "we" is~~ I had a few men from the Army assigned to me, and that was "we." ~~Stafford Warren~~

SSH: And they presumably had chemical backgrounds?

KGS: No, they were straight out of the service, I <sup>had to</sup> train them.

~~SSH: Oh, did you?~~

~~KGS:~~ Yes. And some of them become very successful. One of them, Kermit Larson, great big Swede from <sup>a</sup> northern <sup>a</sup> plains state, ~~somehere~~ I've forgotten now, became very useful to them at UCLA when they had a radiation lab there. Stafford Warren was always involved in various explosions and tests of one kind or another.

SSH: Why Stafford Warren? ~~I mean~~ what was his background that made him <sup>He</sup> a logical one for that role?

KGS: Well, he was a radiologist, in the first place, a very early day radiologist, who was a Colonel in the Army.

And he was assigned to the Manhattan District. When he was at Bikini, he stayed on the same ship they gave me quarters in, the Haven. And he was literally my boss.

SSH: Did Hamilton have any role in the Bikini Test?

KGS: ~~Again~~ Yes, he was flying back and forth, we saw him, I think, once or twice. Once he brought us a bottle of bourbon. The only bad thing about Bikini was there was no portable liquor, we used to drink laboratory alcohol and lemon juice powder in a K ration. And this beefed

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our drinking up to a portion which was 7<sup>percent</sup> bourbon and the rest laboratory alcohol. And we'd take a couple of slugs of that and then try to make it up the stairs where the general mess was. We ate in an officer's mess there.

SSH: Why was Hamilton flying back and forth?

KGS: I really don't know, something important, you know. Got to discuss something with somebody.

*Joseph Hamilton*

SSH: What was your relationship with Hamilton like? Were you ever close to the man?

KGS: Well, I loved him as a brother, but was never too close. I used to spend some of my vacation time with him; he had a little cabin up in Downeyville.

SSH: Was he a person with whom one could get close?

KGS: No, I could never get very close to him. He <sup>was</sup> the kind of a guy who gets his zipper stuck in the men's room, he won't let anybody help him, you know. ~~(he)~~ laughs. I caught him in the men's room one day, and he couldn't get his zipper up. And he wouldn't let me help him with it. So I got him a pair of scissors, I guess he cut himself out of there one way or another. ~~(he)~~ laughs. But he was a very shy, only son of a very well-known neurologist or psychiatrist. <sup>at</sup> He came from Santa Barbara.

SSH: And they had no children either. I found, trying to trace ~~them~~

KGS: No, they didn't. The closest relation is a fellow . . .



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Mrs. Hamilton had a sister who married one of the heads of the biochemistry department, <sup>[at UCSF]</sup> Dr. Frank Worthington, Doctor Allen.

KGS:

Allen was a peculiar duck, he was a very aggressive homosexual. And he wouldn't have it with any of his graduate students if they wouldn't submit.

SSH:

~~That's pretty sticky.~~

KGS:

Yes, well he died of cancer of the liver.

SSH:

Do you think that Hamilton's shyness influenced the way he ran Crocker Lab? Do you think it was a more isolated group because of the personality of its director?

KGS:

I don't think he did anything other than anyone else would have done. We were under very heavy security all the time.

SSH:

How long did that last? ~~The security?~~

KGS:

Right up until the day I left there, '51. Everything we did and published was classified, that place is full of declassified documents over there.

SSH:

So even if he'd wanted to have a closer scientific relationship with Donner Lab, and that was what was in the back of my mind when I asked that question, it would have been very difficult, just because of the secret nature of the work.

KGS:

Yes, it could have been yes.

SSH:

But then on top of that you had the personal problems <sup>between</sup> Hamilton and John Lawrence.

KGS:

That's right. And I don't think they really had a problem; they were just competitors, and

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SSH: Do you think that problem died down once Donner Lab opened and John Lawrence had his own kingdom, so to speak?

KGS: That's right.

SSH: I noticed that Hamilton is made director as late as 1948. [of Donner Laboratory]

~~KGS: Yes?~~

~~SSH:~~ But he had been effectively director since the opening of Donner Lab.

KGS: In the very beginning he was running it, yes.

SSH: What was the significance of that title, do you suppose?

KGS: Just <sup>at</sup> University... they were backward. When I went to work for <sup>him</sup> ~~them~~ again, he was an assistant professor in radiology and neurology, I think. And in spite of all the terrific things he did, it was very late in life that he was promoted to a full professorship.

SSH: Why do you think that was?

KGS: The University was very reluctant to promote anybody.

SSH: ~~anybody~~. So it really didn't have anything to do, for example, with the <sup>blame</sup> ~~promote~~ of the medical school.

KGS: No. The medical school got the last end of it, in a way,

SSH: I think. *What do you mean by that? (Intermission...)*

~~KGS: But Robert Sproul was still... thank you, sweetie?~~

~~SSH:~~

~~KGS: I'm having a diver's. Every other day I usually do.~~

Robert Sproul kept his thumb on everything, really. When they hired me, they hired me as an assistant professor with the understanding that I would be promoted to associate

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- 1948  
- Sproul  
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professor in a year. Well, that went on and on, and I finally found out because Robert Sproul stated it. He had it in mind to promote me, but I had to wait yet another year.

SSH: Why? Why was it so slow?

KGS: Most of it was budget. I think they just didn't have the money to pay people.

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know all these people personally and discuss their research problems <sup>with them</sup> and help them if they could.

*The Radioactivity Research Center at the University of California San Francisco*

SSH: Why didn't Hamilton do that?  
KGS: Well, he didn't have any facilities. He was on a committee which formally set up my laboratory. And he used to come around once in a while, when he wasn't feeling too well, and remind me of the fact that ~~he was in a fact~~ ~~his committee and~~ the committee he was on was my advisory committee. Well, I didn't ask him anything. I knew what I wanted to do and I went ahead and did it.

SSH: Why do you suppose you were chosen for that position?

KGS: I have no idea, except for maybe the University's experience with me at Bikini.

SSH: Could it also be something to do with the fact that you seem to be able to get along with the clinicians and you were on good enough terms with Hamilton? In other words you weren't a terribly controversial figure.

KGS: Well, they didn't know then when they put me in that position. They knew I was one of Stone's proteges, which was something that was so much in my favor around there that I don't think anyone would have crossed him on it.

SSH: How did you become a proteges of Stone's?

KGS: Through the Manhattan District, and before that.

SSH: What had been your relationship in the war years? I mean <sup>had a had a</sup> how would you have dealings with him?

KGS: I used to see him about once a month. I'd go back to the University of Chicago and have a dinner with him and talk to him.

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SSH: About what you <sup>do</sup> been doing?

KGS: ~~and~~ <sup>about</sup> what we were doing. The importance of it.

SSH: Do you think that he would shuttle projects to Crocker as a result of these conversations?

KGS: Well, he was on many AEC advisory committees for health and medicine, I'm sure he could have blocked any of <sup>them</sup>.

(end of side 1)

(side 2)

SSH: Well, on the other side of the coin, do you think because you were on good terms with him, he was diverting projects to you and Crocker Lab? <sup>or was that just</sup> which ~~was~~ <sup>was</sup> the logical place for things to go?

KGS: ~~It was~~ <sup>just</sup> a way to do it? <sup>just</sup> ~~has~~ <sup>was</sup> get somebody <sup>who had</sup> to ~~add~~ the staff that could do it.

SSH: What sort of an administrator <sup>Stone</sup> was ~~he~~?

KGS: Well, he was an excellent administrator, as you can tell from this little tape. \* Most of the medical specialties are highly competitive <sup>where areas</sup> and <sup>were various</sup> are in the same area, like the surgeon and bronchologist and urologist, and the surgery department was another case in point. Or it could be neurology too.

\* I gave Dr. Scott a transcript of a tape which Dr. Stone recorded in 1964 about the history of the Department of Radiation at UCSF

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*JH* Joe Hamilton got

himself involved in developing the unit that I directed for so many years, the Radioactivity Research Center. And ~~that was~~ a decision which was made on the San Francisco campus, as to what it should be. Stone and <sup>[E.V.] Lou Greer</sup> ~~Lozier~~ were very heavily involved in it, and claimed they started it. And I hadn't

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with Stone?

KGS: Well, it degraded ~~to~~ into <sup>an</sup> (unfortunate) for me, I think, an unfortunate situation. I had other research facilities on the campus. I got some cancer research funds, and I furnished a little building above the unit which had facilities for the ophthalmologists. I found the money for the furniture and a lot of the laboratory equipment, ~~that~~ their building, their walls were put up by a grant from radiology, they had various funds.

SSH: Well, ~~what~~ did the coolness with Stone have any effect on what you were trying to do? I mean ~~you must have had to have had?~~

KGS: Well, I had to work through him ~~and~~ to get <sup>cash</sup> ~~cash~~ for money and eventually the grants dried up and the American Cancer Society and the Cancer Research Institute, which was another entity on the medical campus, were very upset with me when I began curing animal tumours with LSD. (And) they thought that was just poor judgement on my part and they dropped all support finally.

SSH: Why "poor judgement" <sup>?</sup> because it could be used for other purposes?

KGS: Well, they thought LSD and its connotations with the social scheme of things, and all of the difficulties that people got into with acid and so forth.

SSH: It wasn't enough that it was curing cancer?

KGS: Didn't seem to faze them at all, ~~couldn't get them to~~ (SSH laughs) The American Cancer Society <sup>is</sup> was a very

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peculiar group, they don't want any new discovery. I'd worked as much on cancer as I did on anything else. And I came up with a cancer test involving <sup>red</sup>bird cell kinetics with rubidium, where we got very highly significant results statistically. And I went to the World Health Organization in Geneva and everywhere else I could go. And I never got it off the ground.

SSH: Where was this?

KGS: Well, people would be interested, but then they'd say, "We'll let you know," and it fell flat on its face.

SSH: Sort of depressing, isn't it? What was the whole purpose of establishing the Radioactivity Research Center?

KGS: It was to give the campus research potential in whatever specialty <sup>it was</sup> they were interested in.

SSH: So this was supposed to be an institution that cut across departmental lines?

KGS: Right.

SSH: How did that work?

KGS: It worked for me very well, and I think it worked for the recipients very well. We did a lot of things for a lot of people, some of whom don't even remember it. (background noise) Among the people that have become quite famous at the medical center, was that I got started. I got a lot of those people started, and one of them was <sup>Isidore S. Edelman?</sup> Adelman, who is a space scientist type of person. I got <sup>Dr. Richard F. Havel</sup> Doctor Havel started with just enough



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space to keep a dog, <sup>and</sup> help him out with a few counts now and then. He's now, I guess, director of the cardio-vascular research <sup>Institute of</sup> ~~and~~ There was another fellow by the name of Don ~~Bickory~~ <sup>Pickering</sup> who was interested in monkeys and he was breeding monkeys. ~~And~~ it was rather rare in those days <sup>early</sup> to successfully breed monkeys and raise the offspring, ~~and~~ start a colony <sup>that way</sup> ~~and~~ he was just like breeding a monster. His demands for space got greater and greater and we were shrinking and shrinking and he finally went to the University of Portland ~~with~~ his colony and all. He couldn't, he was the kind of person that had trouble dealing with people. He couldn't share anything. So they finally threw him out up there in some big political push. And that was the end of Donald ~~Bickory~~ <sup>Pickering</sup>.

SSH: The center, then, was set up to provide research space. ~~for~~ <sup>29</sup>

KGS: What I did for all of those people was perfectly logical and normal in our operating area. We were there to help anybody that had a problem that we could help.

SSH: ~~and~~ they would come to the Center to do their research, and you would supply the radioisotopes.

KGS: They'd come to me and I'd have a discussion with them and decide if what they wanted to do was appropriate or not, or if we could fix it so it would be appropriate.

~~And~~ I could loan them equipment or I could loan them facilities, I had a technician ~~and~~ kind of a physicist as part of my staff. ~~And~~ we would hand-feed them along

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with this until they either became successful or satisfied their curiosity.

SSH: And then they'd moved <sup>out and</sup> somebody <sup>[else]</sup> would move in?

KGS: Yes.

SSH: What was producing the radioisotopes?

KGS: We were buying most of those, some of them came from the 60" cyclotron.

SSH: You never had a cyclotron on that side of the bay?

KGS: No.

SSH: Didn't Stone have a synchrotron?

~~KGS: Synchrotron.~~

~~SSH: ...synchrotron at some stage~~

KGS: Yes.

SSH: Was that strictly for therapy?

KGS: Well, it was. There's another case in point where a group like the Atomic Energy <sup>[Commission]</sup> Department sets up a unit. I don't care whether it's here or Harvard or anywhere else. And these people move in and first thing they do is shut the door and you never get in there again. And they go on their own little projects. The synchrotron was like that, it was run as Stone used to run the Metallurgical Laboratory at the University of Chicago. They had a Q - clearance and so forth.

SSH: This was in the fifties, wasn't it?

KGS: Well it started out earlier than that, yes.

SSH: ~~Did it?~~ Why would you need a Q - clearance for therapy?

KGS: Don't ask me. Nothing secret in there except this great

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big bloody machine they could never get to run right.  
(Laughter) And when they finally got it going real good  
the physicist that was running it divorced his wife and  
left <sup>for the</sup> University of Oklahoma. And I can't get him  
to <sup>s</sup> answer any letters or anything.

SSH: Was it a human problem, or a mechanical problem?

KGS: His problem was mostly mechanical. He was a very capable  
guy, and he and I were trying to put some of my plots on  
a computer so we could get a computer read-out of the  
data and so forth.

SSH: Was Stone doing any therapy on the machine <sup>that size</sup> at <sup>a</sup>?

KGS: He took it over after they really got it running, and  
he had a <sup>i</sup> Filipino physician, I don't remember her name,  
who treated quite a few patients under his direction.

SSH: How successful was that?

KGS: Well, you'd have to take Stone's word, he said it was good.  
But when he retired nobody would give him any patients.  
See how the worm turns? It just <sup>is</sup>.

SSH: Well, it sounds, the way you describe it, <sup>sounds</sup> like a  
<sup>pretty dog-eat-dog situation</sup> over there.

KGS: That's what academic life is.

SSH: You think it's across the boards like this, or do you think  
this particular milieu is worse than others?

KGS: I don't think it's any different, I think everybody's like  
that, in any kind of competition. I took on 17 Ph.D.'s <sup>that</sup>  
the University of Chicago hired for their <sup>Argonne</sup> Oregon National  
Laboratory, And I skunked them every time. And that was

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because they just didn't know what they were doing.

And that's why they won't speak to me any more.

SSH: You mean "skunked them" in a scientific sense, <sup>?</sup> ~~then~~  
~~a just~~

~~KGS: Yes, and~~

~~SSH: You proved them wrong scientifically?~~

KGS: In publishable results, <sup>where</sup> ~~some~~ of our findings I guess they'll never resolve, ~~but~~ I found a different distribution and certainly a different risk to plutonium that they couldn't repeat.

SSH: Have you ever thought of going back to your pre-war research when you were concerned more with every day physiology rather than fission product metabolism, the bomb-related work?

KGS: Well I really did in my cancer research when we used <sup>rubidium</sup> ~~providium~~ and red dells. We were only getting our red cells from cancer patients. ~~And~~ then I got some data from blood samples that came from the members of the Department of Radiology ~~that were~~. They fell into a different group statistically than our normals. ~~and~~. ~~And~~ I call it radiation exposure. And that's where this test came from. That test is just straight physiology and nothing else.

~~SSH: Let's stop~~  
~~(interruption)~~

~~KGS: I don't know~~

~~SSH: It wasn't just a matter of lack of University money to hire ~~more~~ people for faculty ~~positions?~~~~

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~~KGS:~~ <sup>JF</sup> They could have arranged that. When I moved into radiology, <sup>at the Medical School</sup>

before there was a radioactivity center, my annual salary was \$4,200 ~~dollars~~ a year. And that was it. And later on, after Bikini I was turning down jobs for \$25,000 ~~dollars~~ a year. One of them was, ~~that stuck sticks in my mind?~~ was Hunter's Point. I designed the building, <sup>which I've</sup> that now abandoned or blown up or something, for decontaminating all those lousy Bikini infested ships.

SSH: Was that the sole purpose <sup>for</sup> of the Lab?

KGS: Oh, that was their first problem when this was the end of the thing. The Navy offered me the directorship of that laboratory.

SSH: I was thinking back to when you did <sup>leave</sup> ~~leave~~ for San Francisco in 1951. <sup>It</sup> seems to me that Crocker Lab was in a rather weak position. Hamilton was dead. Durbin <sup>[didn't get]</sup> hadn't had a Ph.D. <sup>until 1953</sup> for all that long. In fact, she didn't have ~~one at all, did she? Did she get her Ph.D. in '53, after you left?~~

~~KGS:~~ I have no idea when she finished.

~~SSH:~~ Well, it was after you left, though I wasn't there.

~~KGS:~~ Yes.

SSH: Well, who was left to administer Crocker Lab? Do you know anything about that?

KGS: Well, I guess nobody. They certainly didn't come around to me and ask for help. So I don't know. Hardin Jones was in there pretty heavy at that time. John Lawrence would have been.

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SSH: Why? Why was Hardin Jones <sup>involved</sup>?

KGS: Well, he was kind of John Lawrence's right-hand man, and

SSH: He didn't have any research connection with Crocker, though

did he?

KGS: No, he liked to fiddle with my research data and turn it over to John as something that we'd done together, or some such thing. I gave him hell for that one time, and said I was very offended, so

SSH: Did you ever have any part in his work on the effects of low level radiation? ~~Because~~ that became quite a controversy ~~apparently~~ later on when he was maintaining that the current acceptable standards of radiation were set way too high.

KGS: Well, he was probably right, but I didn't get into that.

SSH: I think that might have been after you had moved to San Francisco, in fact I'm quite sure it was.

KGS: Yes, could have been.

SSH: But you had virtually no dealings in the scientific sense with Donner Lab from its inception all the way up to the time you left, did you?

KGS: ~~No, not~~ None.

SSH: Why was the 60" cyclotron dismantled and sent to Davis?

KGS: Well, they needed a building for it, and UCLA got the 37" ~~inch~~ one. I guess Davis, who was next in line.

SSH: And the building was destroyed, as you said before, simply

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because people who was it? The University of Administration? <sup>1</sup> felt that it was <sup>terminated</sup> ~~contaminated~~?

KGS: Could have been the health physics department.

(End of tape)

SSH: Birge Raymond, the father, has written a history of the physics department, and there's a section in there on the Division of Medical Physics. ~~And~~ he maintains that one of the real problems with the medical physicists was the fact that any time they were up for promotion - This is people like John Lawrence and Hamilton, I guess the physicians, the M.D.'s - They would be blocked by people at the medical school on the faculty, I guess for the reason that you were referring to <sup>not</sup> ~~thinking~~ that they were clinically ~~accepted~~.

KGS: Well, they'd accepted me ~~body~~ and soul. I did nothing but work with clinicians for years, which I found most stimulating because they have questions which are unusual and sometimes I could help them out.

SSH: Why do you think that they accepted you, and were seemingly reluctant to accept John Lawrence and also Hamilton in the sense that Hamilton was slow to be promoted?

KGS: Well, a lot of them didn't know Joe Hamilton. It was a job where somebody had to get in there and get to