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Call #: AA107.INT068

Title: Interview with Terry Krulwich, PhD by Albert S. Lyons, MD and Florence Daniels

Date: 1999-02-09

Finding aid entry: <https://archives.mssm.edu/aa107-int068>

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LYONS: —February 9 in the afternoon in the conference room on the fifth floor, Annenberg, in the postgraduate area and interviewing Terry Krulwich—K-R-U-L-W-I-C-H. At the moment, here beside me is Florence Daniels. We expect Dr. Ira Eliasoph and Dr. Martin Finkel to come in momentarily, and this is Albert Lyons.

Dr. Krulwich, when did you first come to Mount Sinai?

KRULWICH: I was hired to begin in the summer of 1970. I actually came down while I was a post-doc at Albert Einstein, after I had met the department that I was subsequently going—invited to join and taught a few lectures in an advanced course they were giving in molecular biology, such as it was then. [tape off and on]

AL: Continue.

TK: Right. So I gave a few lectures before my official start date and began officially in July 1. [I] actually started June 1 because my post-doc was over, so I gave them a free month.

AL: Well, now, this was—

TK: [laughs]

AL: —to be what kind of job? To head the—

TK: An assistant professor of biochemistry.

AL: That's what I wanted—

TK: Never occurred to me at that point that I would end up in administration. Indeed, it was a—

AL: And then what happened?

TK: During my first years here, I was fortunate enough to attract a graduate student early on. And in the first medical school class I taught that very first fall, one of the students was interested in doing a MD/PhD program. And we had no formal MD/PhD program, but the two institutions at which I had most recently trained, both had very active ones and I had known those programs, those program directors and how they were run. And so I went to Irving Schwartz, who was Dean of the [Mount Sinai] Graduate School [of Biological Sciences] at that time and Harold Burlington, who was the sort of, really, chief operating officer, what CUNY [City University of New York, Mount Sinai's academic affiliate – Ed.] called the Executive Officer of the doctoral program and said, "You know, why don't we do this?" And we've had a prior student, Arthur Frank, who had done two degrees [MD and PhD] kind of ad hoc and disjointed. And I suggested we start a program around the student, this excellent student. [tape off and on]

AL: You mentioned Dr. Schwartz. When the school started [1968], they started right with a Graduate School. Is that right?

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TK: Correct. The Graduate School was started at the same time as the medical school, and Irving Schwartz was chairman of the Physiology Department and also Dean of the Graduate School. It started with specializations in a small group of the traditional basic science departments, a small number of students.

DANIELS: And then?

TK: And so I became interested through this student, Mark Sobel, in developing MD/PhD training here and became involved through my own involvement with my own graduate student, PhD student, with Mark and with other PhD students in the Biochemistry Department in graduate training. And it was a small group and basic science faculty is very interested in having graduate students, the well being of junior and senior faculty, but especially the junior faculty, is very tied up with the availability of excellent graduate students. Our program was really just still in its infancy in 1970, of course. So, when the position of Executive Officer [of the Graduate School] became available in 1974, it—I guess it was pretty soon—in the early years of Tom Chalmers' tenure -- Chalmers, C-H-A-L-M-E-R-S -- deanship, I thought about it.

The other thing that impelled me, frankly, was that I was—not known to others but known to me -- in the early months of my first pregnancy. And I thought to myself, 'Well, I should be doing less work with radioactive isotopes and less work with solvents and mutagens during this period. So I'll just get in there and I'll do a little stuff on the Graduate School. I'll have the baby. The baby'll get, you know, a couple of years old and I'll be out of it. And I'll have done what I want to do and I'll get back to the lab absolutely full-time.' That was the plan in 1974. [chuckles] And here I am in 1999 and I have not decanted these tasks yet; indeed, have become ever more involved in them over the years.

FD: May I ask you, how many students do you have now?

TK: We currently have a total of 192 PhD and MD/PhD students at Mount Sinai: 135 of those are PhD students; 57 of those are MD/PhD students.

FD: And may I ask you, if possible, what sort of budget you have, how large an operation is this, roughly?

TK: It's a very large budget that, happily, is going to get even larger next year as we raise the students' stipends significantly. All PhD and MD/PhD students, as is traditional in any competitive program, are supported by a stipend and by the full cost of tuition, as well as health insurance and travel funds and other amenities. Our school budget is well over \$2 million. Our additional sources of funds from training grants and the participation of research mentors in the support of their students through research grants is—doubles that, more than doubles it.

FD: And in the last 20 years, have you had any breakthroughs that have become the model for other institutions around the country? It sounds like an innovative program.

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TK: We have done many things over the years, some of which are at least ahead of the curve, different from the mainstream, some of which have been watched and modeled by at least some other programs, just as we have learned from the innovations of others. We have become over the years, a program that, as science has become far more multidisciplinary, our program design has become far more multidisciplinary. That started with the introduction of an entry pathway, which now is the only entry pathway in which all our pre-doctorals, PhD and MD/PhD students enter without a firm commitment to a formal training area. This is because the overlap among fields and the multidisciplinary nature of things makes the boundary somewhat artificial and not necessarily corresponding to departmental lines, which are very important faculty organizational units, but not necessarily the way science is truly practiced these days. And so for students to make really mentored and serious choices—for example, if a student comes in wanting to study neurosciences, such -- many undergraduates do enter our program with an interest in neurosciences. But they may not know whether they want to do neurosciences that's developmental neuroscience, study the developmental as the emphasis, the neurosciences as a piece of it, or whether they're really interested in the disease entities and want to study from the mechanisms of disease point of view, or even may get very involved in the genetics of certain disorders and want to study it from the genetics point of view. Most likely they will, in fact, enter our multidisciplinary neuro—and very fine neurosciences program. But these are decisions that, in a sense, are part of their training.

One of the things we have as a kind of general principle is that thoughtful decisions about careers, even your training careers, in a mentored way are good practice for what you're going to have to do later. It's not just the crucial, rigorous training in a research field and in a laboratory and in concept mastery. There are also decisions about how you become a scientist, how you greet change, how you confront new trends with gusto instead of with an "Oh, my gosh!" kind of reaction. So that's one of them. All our students enter in a flexible entry mode. They can adhere as closely as they want with an area initially, but they get a multidisciplinary exposure. That's one thing that we do.

We have a core curriculum that we introduced some years ago, a multidisciplinary core curriculum that is now taught by multidisciplinary teams, has small group functions. This is working very well. We have many advanced graduate courses, and a substantial number of them are taught—and this is probably not unique, but fairly innovative -- they're taught in a modular way. So instead of a 15-week course, which most of our research-involved faculty don't want to teach a 15-week course anyway, we teach, very often, in five week mini-course blocks that have different focuses. And a student can, because we schedule them appropriately, actually splice among these different advanced courses to highly individualize their advanced coursework so that they're not taking courses forever, which no PhD student wants to do, but can individualize the program without having to add yet more courses. Our training areas, which the student chooses with the preceptor they've chosen after a series of lab rotations, are also now all multidisciplinary in character. This is very nice.

FD: What percentage of your graduates remain on the staff at Mount Sinai?

TK: Don't know that number.

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FD: Well, the—

TK: Don't know the percentage. We have currently on our staff two MD/PhD graduates on the faculty and considerably more than that among the PhD graduates. Probably—I might be wrong but it's five or six.

AL: And where do the others go?

TK: About a little over half—about 55 percent or more of our graduates—about 50-55 percent, maybe, of our graduates are still going into academic tracks of one kind or another. They are in all kinds of institutions: private, public, big universities, medical centers. Among the MD/PhD students, they are, of course, in academic tracks primarily in medical centers: the two here, others in the city, are at various places all over the country, at Yale, three at Penn, three at Pitt, at Harvard, at Northwestern, UCLA, University of Connecticut, UC Davis—all over the place.

FINKEL: Do they have an obligation after—

AL: A little louder please.

MF: Do they have an obligation after they finish training to serve in an academic institution for at least a couple of years?

TK: No. There are no obligations that come along with their degree. There were, for a while, on training grants, government paybacks. But even then, the obligation was small and you could bypass it. Among our MD/PhD graduates, we have only—we have a small number, who are exclusively in private practice, although even among those, a substantial number are involved in clinical trials [unclear] of some sort. And they're—that's a small number. Overwhelmingly, they're in academic tracks and a few are now showing up as leaders of pharmaceutical development. For example, we've got one graduate who's at Pfizer, who is director of new pharmaceuticals and oncology. We've got another one who's in health care planning and modeling for big pharma companies. He's a computer expert systems guy. But for—and there are a few, of course—there's one who's a section director at NIH National Cancer Institute and another one who's at the Fox Chase Cancer Research Institute. So there are some—

AL: At the where?

TK: Fox Chase in Pennsylvania. Hershey, Pennsylvania. Among our PhD graduates, the numbers are a little different, of course, and the nature of the institutions are different. So, we have graduates who are teaching at Barnard and at Williams, as well as the University of Indiana; lots of universities throughout the 50 states and Puerto Rico, for that matter. We also have foreign students who've gone back to their countries and are holding major positions there. We've got a little cluster who've recently been in touch with us from Taiwan who are doing beautifully and who still have collaborative projects with some of our faculty here and at other places in the United States.

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AL: This brings up the question of, where do most of the students come from into the school, into the Graduate School?

TK: Let me just say that the careers of our PhD students, a very large number are going into biotechnology and pharmaceutical firms in a variety of jobs, some of which are not so different from academic jobs these days. Some are; some aren't. It really depends on the nature of the constellation. And others of our PhD graduates are ending up in various regulatory things. Some go on and do patent law. Some go on and do medical school and end up as physician-scientists. Interestingly, those among our PhDs who go that route end up in the same assortment of careers as our MD/PhDs, which is not always so usual. They do tend to take academic tracks rather than—you know, as a change in career path going into practice.

AL: Where do they come from, most of your students? Or how do they divide up?

TK: Among the PhD students, a little over half of them currently are from the United States and from all over the United States.

AL: From other schools?

TK: Well, we don't have an undergraduate school so these are—

AL: No. So they're from—you mean from different cities and so on?

TK: Yeah, yeah. Different cities, different states, different schools. And somewhat less than half come from a large number of other countries. Many of them come on Fulbright or other individual fellowships, but from a diverse number—diverse countries.

AL: With the MD/PhD—

TK: The MD/PhD group is almost entirely from this country.

AL: From Sinai?

TK: They come into Mount Sinai from undergraduate schools. We have a small number that we accept from either the medical school class or the PhD class. That's maybe one a year or one every other year. All the others enter as freshmen into the dual program from an august group of undergraduate institutions, or some have taken time off to do research or master's work after their undergraduate—

AL: Well, now, let's find out, when students enter the medical school, they come for an MD degree or they come for an MD/PhD degree. When do they have to make that decision?

TK: They have to make that decision—most of our students come in as freshmen, directly into the MD/PhD program. That means they have to have made that decision at the time they're applying to medical school, which is by the prior December. And they indicate on their application materials that they're interested in the MD/PhD program, at which point the nature of the admissions and interview process is tailored to that track.

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AL: How do the courses—course of study differ between those who go for an MD degree and those who go for an MD/PhD degree?

TK: The MD/PhD program is a program that fulfills the requirements both for medical school and the graduate school in an integrated curriculum that also has many special features. The typical duration of the program, as compared to the four years of medical school, the average right now is 7.8 years, and there's obviously a distribution around that mean. The students come in. They're invited to come in the summer before traditional medical school classes would start and begin a research rotation. They do a research rotation additionally during the fall of the first year, and when we start our new curriculum in the year 2000, hopefully we will have even more flexibility in the schedule. They take part of a Graduate School core curriculum, instead of medical school biochemistry. They take the introduction to journal club and the introduction to the science ethics sequence that all entering graduate students take, along with the PhD students. And they take most of the rest of their medical school classes with their medical school class. So they integrate immediately into the two groups and do a bit more by joining elements of the two curricula from the very beginning.

AL: How long is the PhD program, just alone by itself?

TK: Just alone, our average right now is five years. So as you can see, there is an economy in doing the two programs together, because we can have some economies on the coursework.

AL: And the MD/PhD program that you just have described requires the student to spend a lot more time because of extra courses?

TK: They have to do a research dissertation.

AL: That is one of the requirements.

TK: Absolutely. [chuckles]

AL: Yeah.

TK: That's the central requirement. There are course requirements. There are journal club and seminar requirements, but the core of any PhD program is the individual research project, supervised by a faculty mentor or a team of faculty mentors in some instances; that the student must do innovative, creative scientific work, resulting in significant new knowledge.

AL: When do they make the decision into which area of the PhD they are going into?

TK: They go through a process that's spread out a bit more over time but that is exactly the same as the PhD students do. They enter without commitment to a laboratory or a field. They must take at least two laboratory rotations, even if they think they know who the mentor is. We ask them to do at least one more, just for the experience. And most of them will do as many as three or four laboratory rotations before they make their

decision. They will decide on a research mentor generally by the middle of their second year in the whole dual program. And in the third year, they have the option of starting their PhD work right away after the national boards, part one. Some of them choose to take a special tailored clinical rotation that has been developed for them in either medicine or pediatrics to give them a taste of what many of their class—medical school classmates are going on to and to give them closure on the introduction to medicine sequence and physical diagnosis skills they've begun to build so that they've consolidated them a bit before they go into PhD work. Because during their PhD work they are also offered the opportunity to work with a clinical advisor from a clinical advisory committee that Kurt Hirschhorn [MD, former Chairman of Pediatrics at Mount Sinai and head of Genetics Laboratory-ed.] has organized for many years, so that those who want continuity work during the PhD can elect in almost any ratio of that. And it's highly individualized. Again, we really think that these students have a lot of ways to get there. There are some things—there are many things we require, many things that they need to have, but there are also many choices that they can make to individualize their program to their goals.

MF: You mentioned two fields of study—

FD: Louder please.

MF: You mentioned two fields of study, neuroscience, and pharmacology. Could you mention what range of fields that are open to them?

TK: Well, there are six official training areas, which embody a great many more fields. The six official multidisciplinary training areas now are a multidisciplinary neurosciences program; a program that encompasses the molecular, cellular, biochemical and developmental sciences; another program that encompasses as a general theme the more systemic kinds of areas, so that these are the mechanisms of disease and therapy, and they include such areas as pharmacology, immunobiology, cancer biology, gene therapy, systems physiology, cardiovascular, endocrinology and areas of infectious disease and neurosciences. So again, a neurosciences student might choose to work in developmental neurobiology in the molecular cell developmental program, might choose neurosciences, or might want the disease orientation of mechanisms of disease and therapy. There's a Microbiology Department and that has now integrated a multidisciplinary area that encompasses virologists, bacteriologists and yeast geneticists, people working on microorganisms from diverse departments, into a multidisciplinary area with a strong emphasis on biology but also some immunobiology related to virology and bacteriology—some bacteriology and yeast work. There is a young and excellent developing biophysics, structural biology and biomathematics program. And then there is a genetics and genomics program, which is the sixth. So those are the six, and they are run by co-directors, who generally come from different academic departments. They're—and have a steering committee that represents the constituent groups. Hope I mentioned in the mechanisms of disease and therapy, cancer biology, which is a big component of that one. Yeah?



FD: By now, you have a large number of graduates that are all over the world; I hope some of them in Third World countries. What—does any of this come back to help Mount Sinai in any way, the ability to network with a previous graduate for some purpose or other?

TK: We do have a growing number of graduates and we utilize them currently in a number of ways, which obviously we hope will increase. One, we try to stay in touch with them and bring them up to date and interest them in our programs. And now the Mount Sinai Alumni has incorporated the Mount Sinai PhD alumni into their mailing lists and their group and brings back representatives from the PhD alumni to speech in the Alumni Weekend, which is a nice innovation. And with our entry into, and transition into being the Mount Sinai School of Medicine of New York University, our program, in some ways, will be administered more completely here on this campus. And so actually, our interactions with our alumni will be enhanced, I think.

AL: Well, now, what is that tie-up with NYU? How does that affect this Graduate School?

TK: Well, until the anticipated transition in July, 1999—July 1, 1999, we have been the Graduate School of The City University of New York, and one of their many doctoral programs. That affiliation has had many joys and benefits. It also has tied us to them administratively, not in a very intense way. But still, our curriculum was modeled by their rules and we had to pass things through their curriculum committee in a rather formal way. Our admissions and our back office functions were, to some extent, administered there. That piece will come, actually, here when we become the Mount Sinai School of Medicine of NYU.

And we will retain what has been a very good feature for us, and that is the degree is granted in Biomedical Sciences. This has facilitated our ability to move toward a true multidisciplinary model. Those schools whose degrees are formally granted through their state education systems, in specific disciplines that may no longer be their training mode, have to go through a very cumbersome and also sometimes impossible task of getting the state to approve a whole bunch of new programs under new names. And if you didn't get them exactly right the first time, you may have to go through that a number of times. Because we've got an umbrella program as our degree-granting program, we can make changes, try things, see if they're right, improve them without having to go through the enormous bureaucracy of both—first a university and then a state --every time we make a change. This is going to be great.

AL: Does NYU have a PhD/MD program?

TK: NYU, the university does not. NYU School of Medicine has one of the most longstanding ones in the country. NYU School of Medicine and Mount Sinai School of Medicine of NYU are entering July 1, 1999 as separate medical schools, whose medical school programs, medical school degrees, graduate school degrees and MD/PhD programs continue to operate autonomously on their own campuses under the purview of the same parent university. We expect to have nice interactions, both with the other medical school in our university, as well as with the Washington Square campus, which we're actually exploring and looking forward to.

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AL: Do they have about the same number of PhD students?

TK: They have—

AL: Either PhD or PhD/MD.

TK: They have somewhat more of each.

FD: Do you foresee the day when they will actually merge, or do you see this as each one separate but equal?

TK: I don't get involved in those decisions.

AL: And of the—

TK: My sight is not that good and you're looking at my ophthalmologist [Dr. Eliasoph].  
[chuckles]

AL: Tell me, my—the PhD/MD students at Mount Sinai, you gave some idea of what some of them did. Do any of them go into practice?

TK: A small number. But many of them are seeing patients as part of the portfolio of what they do.

MF: This is [unclear] to—

FD: Louder, please.

MF: The question I have relates to the personal issues of the student, relating particularly to the unfortunate suicide that happened in one of the prestigious medical schools this fall—

AL: To which medical school?

TK: That was not a medical school, that was the chemistry program at Harvard.

MF: Yes, that's correct. Yeah. How do we avoid those kinds of issues?

TK: Well, I think it is arrogance and folly to assume that we can immunize ourselves against the vagaries of psychiatric disease. When you've been a dean as long as I have, you have encountered psychiatric problems of various sorts in your student body. And certainly there have been—there was one, one tragic instance and others that certainly are complicated. And you work with them as you do in any part of your life.

FD: Yeah.

TK: So I wouldn't presume that it's always program features that are to blame. People come with their backgrounds, their baggage and their organic disease, in some cases. I can't

speaking about the case that brought such publicity. I will say, however, that this is a program in which we do not take students whom we don't expect to graduate. This doesn't mean we graduate everybody, but for those for whom it doesn't work out, we try gently and as kindly as possible to work with them to realign their goals and carry them safely to their next step. We have advisory committees from the very beginning, which I believe was the thing touted in that instance. We have had this as long as I can remember. We continually work to improve and enhance that system. We have multiple layers of interactions with the students by diverse faculty members who have a real interest in the students. It starts at their interview day and it continues on through. And frankly, we are on the alert for students who exhibit signs of stress and hope that we'll catch and help, not just all the tragic instances—the extreme instances.

You know, I don't know if any of us can be immune to that in any area of our life. What—we worry about that deeply—it would be so awful, such a nightmare. But on the other hand, the day-to-day concerns that you do the right thing, you handle your students in appropriate, ethical, collegial, respectful training manner throughout their careers. This is not always easy. There is a power relationship and a supervisory relationship in the lab. The ultimate seed of the student's PhD is a one-on-one, usually, relationship with a mentor. And there's going to be tension. These are all ambitious, hard working folks trying to get to the secrets of nature that nature doesn't want to reveal in a competitive environment with a lot of pressures. [chuckles] And the tensions arise, and we try to talk with students and mentors about how to work with those tensions, how to be appropriate and try to model good behavior. And that's a lot of what the Responsible Conduct in Science Series is about, to teach students what language to use when certain situations arise, whom to go to, how to behave in a manner and to speak to mentors about the situation.

AL: To come back to you for a moment, has your salary increased through the years?

TK: I'd like to put in a pitch [laughter]—

FD: For posterity.

TK: I [chuckles]—I must say that the issue of my own salary was one that occurred to me embarrassingly late in my career. This is a typical women's pattern, at least of those years. I applied for jobs, academic jobs just before it became sort of *au courant* - and the law - [chuckles] to give equal consideration for women. It was very hard in those days. I give Mount Sinai credit as a young institution. I give Dr. [Panayotis] Katsoyannis, in particular, the chairman of Biochemistry, credit. [spells his name and laughs] I give him credit for taking a second woman into his department at that time. That was heroic. And the gentlemanly and appropriate and sort of warm way in which he treated his faculty members was exemplary and unusual. About four or five years later when the law changed, just as I was on the cusp of consideration for, I guess, associate professor and whatever, I started getting letters from all over the country from the places that wouldn't consider me in the first place, asking me if I would please consider a tenured associate professorship.

So things began to change. I still think there's change yet to come. There are still issues of childcare and others that do affect women in particular. There may be still glass ceilings in various patches of the roof; I don't know. But certainly, it is difficult because women do often have families just at a time when the pressures of trying to balance research and teaching and a tense period of your career is also going on. There's no simple answer to—

AL: Does your salary, as far as you know, compare well with those of others in a similar position in other schools?

TK: My salary does have a major administrative component. That didn't start as early as it probably should have, because it didn't occur to me to ask, and it probably didn't occur to anybody just to plain come out and offer. [chuckles] Somewhere along the line, I woke up [chuckles] and was immediately given an appropriate raise. I got the Dean's title in 1981, although in fact I had been administering the MD/ PhD program and the PhD program in toto for some time at that point. I had become the first NIH-funded program director for one of the NIH training grants of MD/PhD programs. I was the first woman in the country and currently the dinosaur, the oldest—not oldest, but the longest term serving as a MD/PhD program director on a NIH training grant in the country.

AL: In the United States?

TK: Yes. My salary, I don't know how competitive it is, either internally or externally.

FD: I'd like to ask you—I noticed in your CV that you have numerous publications. In laymen's terms, could you tell me what part of that science that you're interested in. What your research has been?

TK: I have long been interested in a sort of place of overlap between bacterial physiology, the physiology of bacteria, biochemistry, and a little bit of biophysics and molecular biology rolled in, which we often call bioenergetics. This field, as represented in my lab, encompasses work on a couple of fundamental questions, which include how bacteria regulate their internal pH and how they convert the energy from burning their foodstuffs from respiration into the formation of ATP. Some of the mech—

FD: What is ATP?

TK: ATP is the most common chemical form of energy in the cell, and that process of conversion obeys certain canonical rules, according to current thinking. And we work on some bacteria that seem to be disobeying the rules, so they must be cheating somehow, and that cheating might have some interesting energetic repercussions that are of a general interest.

Those studies have, rather remarkably, taken us to a second major area of work in the lab, which is now on a very popularly recognized topic, which is antibiotic resistance, because some of the same transport proteins, proteins that move things in and out of cells that turn out to be involved in cytoplasmic PH regulation, seem to do double duty as those noxious export proteins that can kick out the antibiotics that you're trying to kill the

bacteria with. And so that convergence of a basic interest with one that is rather implied—rather applied, is something we're studying rather intensely and with, kind of, gusto now. After all these years of being sort of the most basic fringe person in the research spectrum here, I find myself serendipitously working on something that has potentially interesting applications.

FD: Excuse me. I notice you have a patent on something. Would you tell me about it?

TK: It's a [chuckles] patent on a putative binding protein that we think binds sodium and has some structural features, the sequence features that lead us to think it might have structural features related to another class of sodium binding proteins of some medical importance. So we patented it against the possibility that we might seek funding to do structural studies. I really don't think it's going to have vast usage in the marketplace.

MF: The question I have relates to your interest on the other end of education. I know you've been concerned with high school students and with college students and encouraging them. Could you tell us a little bit about that?

TK: I have, since I came to Mount Sinai, taken high school, which is, obviously, 28 years ago—taken high school students into my lab just about every summer. It started as a loyalty to a school that had been nice to me way back when, and I was paying back. But it quickly extended to schools all around, public schools, private schools, schools I had been to, schools I had never been to, schools that Mount Sinai has intense relationships in developing minority programs, and now schools that I have worked with again in another part of my life. So I have enjoyed that, have sponsored many of them for the Westinghouse talent search and have, to the credit of those colleagues of mine in my lab, since I don't any longer personally work with them, although I torture them a little bit through the summers. We have at least 24 semifinalists and a whole bunch of finalists and a winner or so to our credit over the years. And that's been a source of great satisfaction. Moreover, many of these students keep in touch with me through the years. It's been a real pleasure, and so it's another whole group whose careers I have followed from the time they were 16, 17 years old. And you know, many of them are now professors and whatever, great practitioners and have families and doing all sorts of interesting things in a whole variety of countries. I get a lot of satisfaction from that.

We started a summer undergraduate science program as part of the Graduate School and it is one of the Graduate School's three programs. It's the third. We do this, in part, as a recruitment and, in part, as a minority development program, and part as just a general public service. And again, that's a program that brings us great satisfaction. It's certainly good for the Graduate School and medical school – [a] significant number of these students do go on to apply - and we have graduates of our summer program in our MD/PhD program and our PhD program. But we also take delight in taking other students and exposing them for the first time to science, only to convince them to do really well in law school or history. We have one [chuckles]—and many other things—but be sensitive to science and how it's really done, but also, other students who never thought they could go on to a professional career and come and do our summer program. And it changed their sense of what they can do in life, and that's very satisfying.

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FD: Could you tell me a little about how many minority students you have and how many women students? And has that changed over the years?

TK: Would you like me to take a second? [tape turned off/on] So—

FD: We were discussing minority students and women students and a percentage basis.

TK: In the overall graduate school programs [reading], 40 percent women and 7 percent minority. That breaks down—oh, and it's—I notice, overall, 67 percent domestic students. That breaks down in the MD/PhD program, 30 percent women, which actually is high, as these programs go in the country. And not surprisingly, with a woman program director, you don't even have to say anything. It's sort of subliminally—probably works that way as a role modeling thing, because it's a so much longer program, among other things. That's the—percentage—women are a little lower than in the PhD program, where it's 48, which is comparable to what it is in our medical school. You know, close to half, one way or the other. The minority enrollment is, again—the minority pool for the MD/PhD program is higher than it is these days for the PhD program, although we are working very hard to build that, all the way from the high school level up.

AL: And the minority—you mean—

TK: Minority—

AL: By minority, you mean which?

TK: I mean, we use the NIH definition for this, which includes African Americans, Hispanic Americans, Chicanos, some Pacific Islanders. And that's 11 percent—Native Americans, as well—11 percent in the MD/PhD program and 6 percent in the PhD program.

AL: Now, to again go back to you personally. Dr. Krulwich, your father, tell us about him.

TK: My father was Lester Krulwich. He was a lawyer by training but that was not his temperament. And for the most part, he was an inventor of sorts. He did a little bit of attempts—did some real estate work, but primarily, I think he spent his time as an inventor. In fact, so my brother and I really did wonder how he spent his days, and I think it was mostly in our rented space where he invented things. He had 18 patents, I believe, at least that we know of at the time of his death. We also discovered at the time of his death that he had ghostwritten many, many articles under—just under pseudonyms. I guess he hadn't ghost written them. He had done them under pseudonyms, little things, in Popular Mechanics and all sorts of things. So I guess we know where I get one component of my—

AL: Where was he born?

TK: —portfolio. My father was born in the United States. He was born in Harlem, lived for a bit when his own father had some business reverses—they went back to the seat of the family, which was then I think in Baltimore or Washington, D.C. His parents were born in Baltimore and Washington, D.C.

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AL: And the first immigrants who came here, came from where?

TK: On the Krulwich side, the first immigrants came—the Krulwiches came from—we trace back to a town called Simna in, I guess, Lithuania.

AL: S-I-M—

TK: Oh, you got me, N-A.

AL: Who knows, huh? [chuckles]

TK: There's a whole Krulwich genealogy on the web that's been done by a distant cousin. We all stay in touch, all Krulwiches. It translates as "king's son" in Polish, I guess. And we're all related, and the Krulewiches, the Krulwiches, the Kingsons. There are some Leviches; there are some Krulls. Not all of the latter are related to us, but a great many. And that's been traced very far back. We've—that's—there's a couple of cousins in each generation who've been very interested in tracing genealogy; not I.

AL: Did they—

TK: [chuckles]

AL: —[unclear] observe religiously, anything?

TK: Yes. I was brought up in an orthodox Jewish home. I am a strongly affiliated Jew today.

AL: Now your mother.

TK: My mother was Beatrice Kahn, whom everybody called Baby, because she was the youngest of nine children. Her parents were—immigrated to this country from various parts of what was Russia, probably, or around that area or the Baltic States. And she grew up on President Street in Brooklyn. We were allowed to root for nobody but the Brooklyn Dodgers, and intensely for the Brooklyn Dodgers, if we wanted to be fed. And she, uh—

FD: What influenced you to take this up as a career, besides the inventive streak that ran in the family?

TK: My mother, probably, and my mother's family shows the naturalist streak that I also got. My mother was very interested in—and she didn't finish college because the Depression hit. And she went and worked and drove her brother and his classmate, Jonas Salk, to NYU for medical school each day, and she went and worked, and continued to do so afterwards. But what she had been studying in school before she left to take her job was biology. She was a born naturalist. She became an avid bird watcher very late in life. She was fabulous at it before Alzheimer's disease robbed her of all of that. And that streak of the naturalist idiosyncratically runs very strongly through the family. You see it in each generation in a couple of people. And I clearly have it and had it from early childhood. I was tremendously interested in—you know, this is the middle of

Manhattan—I was growing up. I loved nothing better than a park or any beach I would go to look at the leaves, the trees, to know how they worked. I learned metabolic pathways because I learned that they existed. And I memorized them. You can't get students to memorize them these days. I just—there's something about it that looked magical to me and, in my head, merged with the organismal level. It's probably in the hardwiring somewhere.

AL: Do you have siblings?

TK: I have one older brother. He's not as much older now as he used to be. [laughter]

AL: Is he interested in sciences?

TK: No. He's a very successful management consulting partner for Price Waterhouse Cooper's; also a strongly affiliated Jew. We have each three sons.

AL: Now, your husband.

TK: My husband.

AL: His name is Pozner.

TK: Paul Pozner, yes.

AL: And he—his field?

TK: He is a lawyer by training, who has done a whole bunch of things over his career, and most recently tends to investments as a private investor. [tape off/on]

MF: Computers are becoming more and more important as we practice medicine. And I have a question. Are there any plans to incorporate a discipline in medical informatics, as there are PhD programs around the country in that discipline?

TK: Medical informatics, per se, as a PhD program, not immediately. There is a—an august group of our colleagues right now meeting to plan a PhD program in clinical research. And certainly one of the big components of that would be medical informatics, as well as all sorts of mathematical epidemiology. In addition to that, we have a lot of building of bioinformatics on the genomic side. That's a big part of genetics. That's a big part of molecular modeling and structural biology. And we have had one of the first and earliest biomathematics departments here and are now enjoying a growing interrelationship with other very strong programs in the area, the program at Courant [NYU] and the program at the Institute for Advanced Study at Princeton. So we have a strong commitment to these areas. In addition, of course, computerized education is part of the educational scene now, and we are increasingly—try to use this in innovative ways with our students. It's very important training component.

FD: Would you care to comment on the current vogue for HMOs and all the managed care? That doesn't enter—



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TK: Not my—

FD: —into your program?

TK: Not my field.

ELIASOPH: Would you like to comment on Mount Sinai as an institution and what's gone here over the years?

TK: Yes, I would comment that I think some of the strengths and special pleasures of developing and tending a graduate program at Mount Sinai is that the spirit of inclusivity that was part of some of the initial impetus, the original founding of the original institution that has translated in these modern days to an inclusivity of other groups, to a smaller set of boundaries between men and women clinicians and basic PhD and MD/PhDs and MD students has been a helpful part of our environment. The commitment of the institution to community service, to teaching, to developing programs with schools is something that benefits all of us and enriches our program. I think this is a lovely part of the ethos of the institution. I think we

AL: Thank you very much Dr. Krulwich.

FD: We are going to run out—[end of tape]

[End of Interview ]