

TRANSCRIPT OF A TAPE RECORDED INTERVIEW WITH

CHRISTINE JONES

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Interview with Christine Jones,
on April 15 & 22, 1976.

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3

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Subject Table of Contents of Tape-Recorded
Interview with Christine Jones

April 15 and 22, 1976

Page	Topic
	Childhood and Early Schooling
1-2	birth; parents and sister
2-3	encouragement on school from parents
3,12-13	sister's academic interests
3-5	childhood activities; friends' interests
5-6	peer pressure
6	high school science; prep. for college work
6-7	home life
7-8	interest in math, astronomy; career expectations
8,93-95	parents' expectations for her re marriage and career
9-10	high school teachers, guidance counselors
10-12	high school classmates: their careers; mutual support of women in science/math
12-13	NSF summer program
13-14	traditional female subjects, junior high sch.
14-15	social life, high school
15,92	self-esteem
15-17	encouraging women to pursue science, math careers
	Undergraduate Study, Radcliffe College (1967-1971)
17-19	choosing a college
19-22	life at Radcliffe
22-23,92	intimidation by bright males in science courses; being only woman
24	prep. for scientific career
26-27	tutorial program, astronomy
26-27	choice of Harvard for graduate work
27-30	summer jobs
	Harvard Graduate School (1971-1974)
30-31	decision to get Ph.D in Astronomy
32	specialization
32-33	Bill Forman's (husband's) field-astronomy
33-34	graduate school life
34-35	alternatives to Harvard
	Postdoctoral Work
36	first job as Smithsonian Postdoctoral Fellow (1974-75)
37	Harvard Junior Fellow, Society of Fellows (1975-78)
37-38,47	women at Harvard; at Harvard's Astrophysical Center; in field of astronomy
	Marriage and Family
39	expectations re career, marriage, family
40-41	marriage to Bill Forman; question of children
42-44,52-4,57-9	working in same office with husband
44	mother's death and father's remarriage
44-45,80-1	stepmother's professional life
45-46	domestic activities of self and husband
	Work and Research; Women's Issues
46	nepotism at Smithsonian
47	work with members of High Energy Astrophysics Div.

48-49,77-9 published papers; co-authorship
 50-51 travel for work
 55-63 1976 summer program for high school students
 63-66,91 problems encountered by women; attitude towards women's
 movement
 66-67 Nininger Meteorite Award, 1970
 67-68 article, "X-Ray Sources and Their Optical Counterparts" (1974,75
 68-75 Uhuru satellite and related research
 75-77 proposed national X-ray institute
 79-80 accessibility of other scientists at work
 80-87 positive changes for women
 81-90 women in astronomy
 83,87-9 "buddy" system in astronomy; discrimination; teachers all male
 86 publishing under maiden name
 86 salary
 37,91 interest in research and teaching
 92-93 problems with self-confidence-- high school, college
 95,100 life at present; goals
 96-98 entertainment, recreation; reading, sports
 99 long working day
 99 personal assets, capabilities

MIT ORAL HISTORY PROGRAM

Project on Women as Scientists and Engineers

Interview with Christine Jones

by Shirlee Sherkow

Arlington, Massachusetts

April 15, 1976

Session 1

Transcribed by R. Archibald-Woodward

Sherkow: I thought we would start when you were a child. You mentioned on your resume that you were born in Minneapolis, and I was wondering if you grew up in Minnesota.

Jones: No, my father was a graduate student in chemistry at the University of Minnesota when I was born, and we moved to Dayton, Ohio when I was about three; so I grew up in Ohio.

Sherkow: What were your parents' occupations as you were growing up?

Jones: My father was a nuclear chemist for Monsanto, and my mother taught high school. She taught a variety of subjects.

Sherkow: Did she have an advanced degree?

Jones: She'd taken graduate courses; I don't think she had more than a bachelor's.

Sherkow: In education?

Jones: No, in science.

Sherkow: Did she teach science courses?

Jones: Yes. It's hard to remember. It was in the days when there were not enough high school teachers of any kind, so that when I started school they'd been asking her to come back and do some teaching in the high school. So we started at the same time.

Sherkow: And your father was a professional chemist?

Jones: Yes.

Sherkow: Did you have any brothers or sisters?

Jones: A younger sister.

Sherkow: Oh, you're the oldest.

Jones: Yes. Is that common?

Sherkow: No, not particularly. Where were your parents born? Are they both Americans?

Jones: Yes. My mother was born in Canada, but...

Sherkow: She's a naturalized citizen?

Jones: Yes. Well, her parents were both Americans, but my grandfather was a Lutheran minister and had gone to Canada and then had homesteaded there, which means you had to become a Canadian citizen. So they were American citizens, then Canadian, and then she got her official citizenship ten years or so ago.

Sherkow: What kind of encouragement did your parents give you in terms of science or any other areas?

Jones: It's very hard to say. I guess when I was growing up, I always

thought that science was a completely natural thing for anybody to do because both my parents were involved in that. My father would often be on trips, and people would often come and visit him; when they would, they would often come to the house either before dinner or for dinner, and we saw a fair number of other [scientists]. I mean, scientists were mainly the people that we saw socially or in any other way. There were not very many women scientists; there was one woman who was an engineer who came to visit.

Sherkow: How much younger is your sister than you are?

Jones: Four years.

Sherkow: Is she also in science?

Jones: Yes, she studies animals. She's decided not to go to veterinary school, instead to go to graduate school in animal research, mainly in genetics.

Sherkow: Has she finished?

Jones: She is now a graduate student at Cornell in animal sciences.

Sherkow: When you were growing up, at school, what were your friends' interests? Were they also scientific?

Jones: You're talking about the high school now, because I don't think before then anybody had any particular interests. When I was in ninth grade, just ending junior high school and starting high school, we moved from the community in which my mother taught high school to another nearby community, partly because she didn't want either of us in the same high school in which she was teaching and partly just

moving to a better neighborhood, a better house. When we moved, the first class I had was algebra, and the first person I met was somebody who was also interested in science, and we became best friends in high school.

Sherkow: This was a girl?

Jones: Yes.

Sherkow: So you grew up in Ohio then?

Jones: Yes.

Sherkow: Dayton, did you say?

Jones: Yes. Actually, it was first Miamisburg and then West Carrollton High School. Although we live in a township, it's actually Dayton.

---[interview interrupted]---

Sherkow: What kind of activities did you participate in as a child? I guess I was thinking of things like Brownies. I'm trying to think of some of the activities that I was involved in because we're pretty much the same age. I'm twenty-eight.

Sherkow: You're twenty-seven. You were born in '49 and I was born in '47. I was involved in things like Brownies and the Girl Scouts, but I'm also Jewish so I was involved in all those kind of activities: I had to go to Hebrew school, and I had to go to Saturday school. I was just wondering if you can remember back that far?

Jones: It's hard.

Sherkow: I know, it is.

Jones: I remember doing a lot of swimming nearly every day in the summer; I really loved that. And I was in Brownies, but I never made it to Girl Scouts. There seemed to be all kinds of clubs and things in high school: French clubs and--

Sherkow: Were you involved in those French clubs?

Jones: Yes. There was something called Junior Council in World Affairs, which tried to study different countries and do activities. But it's hard--I think I just played a lot.

Sherkow: Did you play any musical instruments?

Jones: Piano.

Sherkow: I played the accordion. I also took piano for a while, but I didn't like it. I took about a year.

Jones: I took piano for maybe four or five years.

Sherkow: Four or five years. Yes, my older brother took it for six years, and after about three or four, you can play something decent.

Jones: Yes, it's okay. I never really enjoyed the practicing very much.

Sherkow: I know, as a kid you just want to be outside and play a lot. Did you feel or notice a lot of peer pressure when you were younger?

Jones: I don't think at all. I think throughout, there were fairly outstanding women in science classes, especially my friend Linda.

Sherkow: She was involved in science, too?

Jones: Yes. What's she doing? She's now doing her residency. She has an M.D. But, she really loved biology. We tended to do a lot of projects together in high school, especially in labs....Basically, the classes were broken up so that there would be a better physics class with the better people in it and then another physics class, and there were--

Sherkow: Sort of advanced and then not so advanced?

Jones: Right. But it was not a super kind of high school. Something like only thirty-some percent of the graduates went on to any sort of advanced degree in nursing or anything. I think the high school tried to do something for the people who were going to go on, but I think they also really felt that the people who weren't going to go on to any other education, this was it, and they had better prepare these people for life as well as they could. So they didn't have any advanced placement courses of any kind.

Sherkow: That's interesting. What was your home life like? I was thinking in terms of: warm, intellectual, mother- or father-oriented?

Jones: I remember it being very independent because when I started school my mother was teaching at the same time, and my sister was about two at the time, and she stayed most of the time with a neighbor. I also had a grandmother and a grandfather then who moved, sometime about that time, from Iowa to our neighborhood. I remember coming home from elementary school--it was in the days when everything was safe and I could get into the house through an attached garage; you could just either walk in the door of the garage or walk in the garage door. So I would come home, and there wouldn't be anybody at home, or sometimes, I'd go next door where my sister was.

Sherkow: So your mother was really a career woman? She really worked the whole time you were growing up, and your father worked?

Jones: Right.

Sherkow: So you were independent. That's really nice.

Jones: I remember when my parents would go out at night, and I would protest having a babysitter. And I remember being sick and their insisting that there be somebody there; I'd really rather have been on my own.

Sherkow: Well, you'd just grown up that way, being your own, so what would be the point of a babysitter? I can see what you meant. What did you do in your spare time? But you sort of answered that, playing and swimming. Did you have a lot of friends?

Jones: Yes, there were a fair number of friends in the neighborhood.

Sherkow: So you went to high school in Ohio. As a high schooler, did you have any expectations in terms of a scientific career? Were you thinking along those lines at all?

Jones: It's hard to say; I think so. I guess that was basically that; I know there wasn't anything else I wanted to do. I'm not sure how much I had decided to do science, but I never considered studying English or history or anything else. At that time, I guess, I thought I wanted to be a mathematician.

Sherkow: I see. In high school?

Jones: Yes.

Sherkow: So you took a lot of math courses then?

Jones: Yes. I also attended a National Science Foundation Summer Science Training Program (NSFSSTP) for two summers at Ohio State University. There were a number of special programs at a variety of universities.

Sherkow: While you were at high school?

Jones: Right.

Sherkow: Okay. What were your parents' expectations of you as you were in high school? Did they expect that you might go on and have a career in science?

Jones: I think they expected me to do well.

Sherkow: But in no particular area?

Jones: No, I don't think there was ever any kinds of pressure to do one thing as opposed to another.

Sherkow: Do you think they expected you to get married?

Jones: It was never really something they discussed.

Sherkow: Okay. When and how did you develop an interest in astronomy? Do you know?

Jones: That's hard. I guess when I was a sophomore in high school; we had to do a project in biology, and, instead, another friend and I did a project in astronomy and sort of ended with this chapter on how life could develop through amino acids and things. It was drawn to biology but not by much. And I was really fascinated by the things we read.

Sherkow: So it was as a sophomore in high school that you became interested in astronomy?

Jones: Yes. But still I really felt that astronomy was a very, very limited area of science, and I was then convinced to go into mathematics; I felt you could do anything from there. So it was really not a commitment; but astronomy was certainly an interest.

Sherkow: While you were in high school, did you have approving teachers or guidance counselors? It is said that a great deal of teachers and guidance counselors try to channel girls into the more traditional fields, like nursing or being a teacher, and discourage interest in the sciences.

Jones: I don't think I ever saw a guidance counselor for guidance counseling purposes. I barely knew who they were.

Sherkow: What about your teachers?

Jones: There was one guidance counselor who, when we were moving to that community--before we decided to move--my mother knew; we'd gone to visit the high school during the summer, and she'd been there and talked to us and showed us around. I would see her just because she was a friend of my mother's.

The teachers, there was the man who taught math, and he taught math throughout the high school level; Mainly, I guess, my friend Linda and I and a few other people were interested in learning Calculus, and it wasn't given; so he gave us a fairly advanced kind of math program. We only got into the very basics of calculus, but we did get much deeper into other kinds of mathematics.

Sherkow: So you had a teacher that was really--

Jones: He was really very encouraging. Actually, the first teacher I met when we moved to that community--the first class I had in the morning was algebra; that's where I met Linda and also the man who taught that course, Mr. Hauck. He was the one who suggested that I apply to go to the NSF program in the summer, and he also was really very encouraging.

Sherkow: This is a different teacher than the math teacher?

Jones: Yes. Ninth grade was actually part of the Junior high school. And then it was the other math teacher in high school. They were both very encouraging. I don't think that was true of any of the physics or chemistry teachers.

Sherkow: How do you feel your high school prepares students for careers in science? You went to one high school?

Jones: Yes. I guess it did all right. I'm trying to think of the people who I know; I haven't kept track of that many. I was surprised-- there was a group of about eight of us who were in these advanced courses--especially in this advanced math course. The classes were usually twenty or more and they'd put more in the advanced physics.... --[interview interrupted]--But I just found out that one of those guys has also just gotten his Ph.D. in astronomy at Michigan.

Sherkow: One of the guys you went to high school with?

Jones: Yes. It was really amazing to run into him at a professional meeting. I was really surprised!

Sherkow: And then you've kept in contact with Linda? You're still friends?

Jones: Right. Also, through this NSF program in the summer, I became friends with two other women, one of whom I've kept in touch with. The other I haven't in three years or so.

Sherkow: The one that you're still in touch with, is she also a scientist?

Jones: She was very interested in science, and she actually married a guy from the program who is in mathematics. But she's now in almost a mathematical social science--I mean, she treats it very mathematically--and is an assistant professor at Yale now.

Sherkow: In sociology?

Jones: I think so. I'm not quite sure. It's funny, she had been up here applying for a job here in the sociology department--

Sherkow: At Harvard?

Jones: At Harvard. A year or a year and a half ago. But I think her husband didn't get a job in this area; that's why they ended up at Yale. But she was at Princeton before--they both were--and she had met the head of the astronomy department in the Institute for Advanced Study, John Bahcall. He was up here shortly after she was, giving a colloquium. We had dinner with him; he said he was really surprised to meet this person, she was the only person in sociology that he'd met who he felt really had a good mathematical background and really knew what to do; how to not manipulate data, but really how to analyze things.--[interview interrupted]--

Jones: I think I was very lucky to have a number of women around who were in science and math.

Sherkow: In high school?

Jones: Yes, both through my friend, Linda, in high school and through that NSF program. It just seemed to be a perfectly fine thing to do.

Sherkow: Yes, that's pretty important to have. I think this summer program that you went to was really beneficial [because] it was just for your science.

Jones: Yes.

Sherkow: When I went to high school, I wasn't even aware of things like that. I'm a little bit older than you are, but still....

Jones: Where did you go to high school?

Sherkow: I went to a Milwaukee public high school. I just don't think I was aware of a lot of those things and nobody told me. I just didn't know. I didn't have any particular interest in science, but my older brother, for example, had a particular interest in English, and he was told of a journalism course at Northwestern. So while he was a high school student, he spent a summer there; he met a lot of people, and that did make a difference [for him].

Jones: My sister's also been in the same kind of program. She spent a summer at Bridgeport, Connecticut studying biology. I think they're very good programs. The people come from all over the country to participate.

Sherkow: Your sister did the NSF...?

Jones: In Connecticut--

Sherkow: I see, in a different location.

Jones: Right, in biology.

Sherkow: In a different field. Were you in a specific field?

Jones: In mathematics. In pure mathematics, number theory and linear algebra.

Sherkow: When you went to junior high, did you ever have to take sewing and cooking and similar subjects?

Jones: No.

Sherkow: You didn't? Because I did.

Jones: I think if I changed school systems one year before, I might have had to take sewing in seventh or eighth grade. But in ninth grade, and in the high school I didn't. There were home [economics] courses, but they were there as electives.

Sherkow: Right. In high school, yes. Where I grew up, there was no such thing as junior high; there was high school and then grade school. Grade school went through the eighth grade. During the sixth, seventh and eighth grades, I had to take sewing and cooking while the boys took shop and industrial arts; it was very specific.

Jones: I took industrial arts.

Sherkow: Well we couldn't; we couldn't decide, they told us this is what we had to do. Then for one semester, they switched us around. One semester the boys took cooking, and the girls were allowed to take industrial arts, but that was it. So if you were really very mechanical and you were a girl and you wanted to make things--

Jones: You couldn't.

Sherkow: ...you couldn't. And if you were a boy, and you were [interested] in sewing or cooking, forget it. That was really a traditional kind of grade school I went to; they really tried to channel the students into roles. Also, they talked about etiquette, menstrual periods, appearance, and acne, and then you had sewing and cooking.

Jones: We never really had anything like that.

Sherkow: You were lucky. Really.

Jones: We had separate gym classes in junior high school. It was sort of crazy; they had study periods set up for people, but mine was always at some absurd time of the day when I had nothing to do. The two gym teachers both knew somehow that I had nothing to do; so in the spring term I actually ended up in playing tennis with the boys' gym class rather than being in this study hall.

Sherkow: That's nice.

Jones: Yes, it was nice. I don't know why it happened or how it happened; I don't remember at all, but it was fun.

Sherkow: In high school, could you talk a little bit about your social life? You mentioned having friends like Linda, but did you also date boys?

Jones: I guess I started dating someone fairly seriously at the end of my junior year; that was someone who went to a neighboring high school, and I'd met him at the NSF program. Before then, there were parties, and I'd been out with occasional people, but nothing at all

serious. He was a year older, and he came to Harvard the next year. I came to Radcliffe the following year, and we dated through most of college, too.

Sherkow: This is not Bill, is it?

Jones: No, this is not Bill. [her husband, Bill Forman]

Sherkow: I don't know if you've answered this or not, but could you comment on your early home environment and early educational experiences which led to the development of your high self-esteem and competence?

Jones: Wow!

Sherkow: It seemed like a good question, but I think you've answered it to a certain extent. You obviously had confidence in your abilities.

Jones: I think I did in high school; I lost a lot of it in college. But I think in high school I did.

Sherkow: From your own experience, how do you feel we might be able to reach girls in their earlier years in terms of interesting them in math and science, and encouraging them to go into these areas? Apparently, a lot of girls feel that they can't do science and math.

Jones: I've heard so many people say that, but it's hard from my own experience to see that, because I know in high school that there were fairly high percentages of women in the science classes. It wasn't that there were two or three women, but there were forty or so percent. There were a lot of women in the science classes throughout chemistry and physics, and I don't think at that point that any of those women were feeling discouraged about being in science.

Sherkow: Do you think it was later, like in college?

Jones: That's when I would have said, but I talked to my husband, who went to New Rochelle High School, and he said in his high school that there were not very many women in the better classes. So it may depend on the region of the country; I'm not sure that women are discouraged in high school.

Sherkow: I'm not either. In my high school there were quite a few women in all the science classes. In fact I took all the science courses: physical sciences, biology, and then chemistry. I didn't take physics, but I took all the other science courses and three years of math, and I never felt any of those things that people talk about today.

Jones: Right, and that's why I--you ask me how to reach girls in high school and--

Sherkow: And you didn't feel it was a problem?

Jones: No. But maybe it is.

Sherkow: In other places or now?

Jones: Yes. But I think maybe not so much now as opposed to then. I think it depends on the places, and maybe it depends on the sort of social expectations people have for their children.

Sherkow: The parents?

Jones: I can imagine that in an eastern community there would be different expectations; it's really important if you have a bright kid, and you live in a certain fancy suburb, it's important for that

student to grow up, to be great, and to go to one of the better colleges. I didn't have any of that pressure at all. I think my parents hoped I would grow up and go to college, but certainly they didn't deeply care where I went to college.

Sherkow: Why don't we discuss college? How did you choose Radcliffe from all the colleges? Obviously, you probably applied to a few more [than just Radcliffe].

Jones: Yes. My father had gone to Carleton College in Minnesota, and I think he felt that that was a really good school. We went there and talked to people, and we went to--

Sherkow: You went with your parents?

Jones: I went with my parents. We drove to University of Chicago and to Carleton. My parents were from Minnesota, and we have family in South Dakota, so it was partly vacation and partly to visit colleges. At this point I didn't really know what I wanted, but I found out that the University of Chicago didn't have an undergraduate program in astronomy; that it was only part of the physics department. And I also didn't particularly like where the University of Chicago was, the part of town it was in.

Sherkow: How did you feel about Carleton?

Jones: I felt that Carleton was a good school, but it was very, very limited. It's a very small college.

Sherkow: I've been there; it's very small.

Jones: They had just built some beautiful new buildings at the time. I think there was a new women's, or university gymnasium. The architecture was gorgeous. And there's another college up on another hill, they're sort of across from each other. It's such a pretty place.

Sherkow: Saint Olaf's.

Jones: Right.

Sherkow: So you decided not to go to Carleton because it was limited?

Jones: Because it was limited. Then it was a choice between Cornell and Radcliffe. I'd never seen either. I'm not sure if we'd come to visit Radcliffe that I would have come here, because it's so much in a city.

Sherkow: But how did you decide, in the first place, to even apply to Cornell and Radcliffe? You just did?

Jones: I think because they were just good colleges, good universities.

Sherkow: You didn't have any help from guidance counselors or your parents?

Jones: No.

Sherkow: You just came up with these schools yourself? Did you do any research?

Jones: Yes. I think I wrote away for college bulletins and information. I didn't want to go to the West Coast; I didn't want to go that far.

And I didn't want to go to a large university.

Sherkow: What about Cornell? You've narrowed it down to those two.

Jones: I applied to Cornell and to Radcliffe and basically decided only on the basis that Radcliffe was in Boston; I thought it would be nicer to be in Boston than it would to be in Ithaca.

Sherkow: At that time was Radcliffe an all-girls school or had they gone coed? [A.B., Radcliffe, 1971]

Jones: No, it was coed. the classes have been coed since the Second World War.

Sherkow: They have?

Jones: The diplomas have been the same since 1963.

Sherkow: I thought it was just in the last few years.

Jones: The dormitories became coed when I was there. So that's really the only recent change. Now admissions are also combined.

Sherkow: So it sounds like you decided on Radcliffe as opposed to Cornell because of the location. That's a good enough reason.

Jones: (Assenting nod)

Sherkow: While you were at Radcliffe how did you feel about the required courses? Didn't you have to take certain courses?

Jones: Yes, but there was a wide selection.

Sherkow: So you felt pretty good about it?

Jones: Yes. Really, I enjoyed those a lot.

Sherkow: Did you receive any scholarships to go to Radcliffe?

Jones: No. It didn't cost as much then as it does now. It's terrible. I don't know how anybody can afford to go to school now.

Sherkow: I know, it's very expensive.

Jones: It's over \$6000 a year. When I started, the tuition was actually higher at Cornell than here, and now the reverse is true. I think it was \$2000 for tuition and \$1000 for room and board. But it's more than doubled since then.

Sherkow: I graduated from Washington University in St. Louis in 1969. I think it was about \$3000 for the dorms and tuition, and now it's about double that.

Jones: Yes. It's just amazing.

Sherkow: We were lucky.

Jones: I guess. People thought it was a lot then.

Sherkow: Right, they did.

Jones: Compared to what it had been when other people had been to school.

Sherkow: So your parents put you through school then?

Jones: Yes.

Sherkow: What are your overall feelings about your four years at Radcliffe?

Jones: I guess I have fairly mixed feelings. It wasn't at all what I expected.

Sherkow: What did you expect?

Jones: I'd expected there to be more women interested in science, because Radcliffe was accepting women who were supposed to be bright, and in my high school the women who were bright were in science. You had to take history and you had to take other things, but none of the people who I knew, women or men, in high school--if they were good, they were in science. They weren't off writing novels and doing other things. So I was very surprised at Radcliffe.--I lived in a small dorm, and there were only about thirty-five of us in the dorm--to find out that there were very few women that were really interested in science for science sake. There were one or two women, who were going to go into premed school. And one woman who was real interested in history of science, but the undergraduate major is called history and science. So I was very surprised that there weren't women in math or physics. And as I went into the courses and things, there were still no women.

Sherkow: When you took the science courses? Really?

Jones: I was very, very surprised.

Sherkow: You mean you were one of the few women in the class, and the rest were men?

Jones: Yes. They have a freshman seminar program, and I took a freshman seminar in astronomy. That was small, there were only eleven of us, and there was one other woman. Her last name was Dyson, and she's

the daughter of an astronomer. [laughter] She ended up in journalism. But in the mathematics course, which was introductory calculus, called math 11, there was maybe one or two other women, and that was a class of about sixty people.

Sherkow: The rest were Harvard men.

Jones: Right.

Sherkow: Did that make you feel uneasy in the class?

Jones: Yes. Yes. Especially because my background was not super from my high school. In this class, which is in this antique building, which has since been remodeled, there was a front row of these bright boys from Bronx High School of Science, and as the professor is writing the equations on the blackboard, they're telling him what's wrong.

Sherkow: So they're really ahead of it all.

Jones: It's very intimidating. Yes. I didn't take physics that year, because I'd taken both that math class and the freshman seminar. So I started taking physics my sophomore year, whereas a lot of people, instead of taking a seminar, had taken physics and math their freshman year. But in my sophomore year it was the same thing. In that physics class, which was, again, like fifty people, there might have been one other woman.

When I was a junior, I took a physics course called Physics 155, that was intermediate electricity, magnetism, and mechanics. It was fairly small; it's hard to remember how many people were actually there, I'd guess it was like thirty or so. It was in one of the smaller classrooms

as opposed to one of the enormous lecture halls. There was a woman in that class, and she had been in one of my previous physics classes; she was a year ahead of me. I was really glad that she was there. But when it came time for the first exam, she wasn't there; she was just auditing the course.

Sherkow: So you were really the only woman that was actually taking the course?

Jones: Yes. There was one woman who was a year ahead of me and was majoring in astronomy; but she went to law school. And, there was one woman in her class who was in physics as an undergraduate. But I don't know of any other women in my entire Radcliffe class who were in either astronomy or physics.

Sherkow: How large was your freshman class?

Jones: The Radcliffe class? About three hundred.

Sherkow: And you didn't know any other woman who was in science?

Jones: Not in physics or astronomy. Especially in astronomy, I know that the next woman after me at Radcliffe was a freshman when I was either a senior or a first-year graduate student. There are just not many.

Sherkow: What did the other girls take as courses?

Jones: A lot were in sociology, social studies. It was a very popular field, very hard to get into, but popular. I roomed with two people in college. The one that I roomed with first, what did she end up in?

She really loved painting and liked sculpting, but at that time--I think that was maybe the year before there was actually a visual studies program. She probably ended up in fine arts as a major, which at Radcliffe and Harvard is the old academic system; if you're in fine arts, you become a critic, it's not an active, participatory field.

Sherkow: If you want to be an artist, then you would not go to Radcliffe or Harvard.

Jones: Right, you would not, except now visual studies exists as a major. And the other roommate was every other year alternating back and forth in majors between English and history. A lot of women were in English and some history, but mainly the other social sciences.

Sherkow: But not mathematics and sciences?

Jones: No. And then there would be some percentages premed and in biology--mainly in biology as a premed major.

Sherkow: What kind of preparation do you feel that you received at Radcliffe for a scientific career? Do you feel it was adequate, even though you were one of the only women in all of these courses?

Jones: I think it would have been very, very adequate if I'd done more. Because I was the only woman and because until the end of my junior year the dorms were not coed, it was very lonely to be in science, because it meant doing the homework completely alone. I was asked by one guy to do problems with him and his roommates; I tried that for maybe a week or two weeks, but he basically wanted to go out with me, and I was already going out with somebody else; it seemed to be not

really a good working relationship. Doing science was basically a very lonely thing, so I tended not to do it; I would much rather spend time reading books for comparative literature courses.

Sherkow: But your degree from Radcliffe--

Jones: Is in astronomy.

Sherkow: So you did take enough?

Jones: Yes. I took the main courses and several more.

Sherkow: But you didn't take a great deal of science courses? Is that what you're saying?

Jones: Not exactly. Rather that I didn't learn as much from the ones that I took as I should have. I took a lot of courses and I would tend to do enough. But I think I could have learned a lot more from the courses; more basic physics kinds of things which I've had to learn since then.

Sherkow: Well, after you got your BA, or AB--

Jones: I don't know which it is. I keep writing down BA, but I think it's actually AB.

Sherkow: I think it's AB. The, on your vita it says a master's degree from Radcliffe, also in astronomy.

Jones: Right. It's from actually, Harvard.

Sherkow: From Harvard. So after you went to Radcliffe, you decided to go to Harvard grad school.

Jones: Right. They have one very good thing at Harvard. In most fields, not in physics but in astronomy, there is a tutorial program. The junior year in astronomy, the first half, is a series of weekly dinners and lectures by members of the department; an introduction to different fields of astronomy. The second half of the year is an independent project done with a staff member. And then the senior year is one long independent project. That I enjoyed a lot.

Sherkow: So that was as an undergrad?

Jones: Yes. I really did spend a lot of time doing that. The junior year was primarily just a library literature search. The senior year was when they launched the satellite Uhuru, and I actually worked in the spring on some of the data that was coming back from that. I knew by that time exactly what area of astronomy I wanted to do.

Sherkow: That was one of my later questions. So you decided to go into astronomy while you were at Radcliffe?

Jones: Yes. It was just through this freshman seminar. Also, partly because of what I'd seen in the introductory math classes, I thought the math department was extremely cold. It was large, had very few women--I did know a woman who was a year ahead of me who was in mathematics--but I felt the department as a whole was very, very, cold, and I liked the astronomy department. It's a combination of the Smithsonian Astrophysical Observatory, Harvard College Observatory, and the department of astronomy. So it has enormous numbers of people. It has about 150 Ph.D. astronomers, and as an undergraduate you can work with anybody you want to. I'd worked during my sophomore year ten hours a week in one of the labs...

BEGIN TAPE ONE, SIDE TWO

Sherkow: How did you decide to go to Harvard University as your grad school?

Jones: As an undergraduate, I was involved in this tutorial program, and I had decided through that program that I thought X-ray astronomy was a really great field to study. At that time the main group doing X-ray astronomy was American Science and Engineering, and several people there were associates of the Observatory. And since then, most of those people have come to the Observatory. So it was a decision really to continue doing that kind of work, and the choices were here, or the MIT, although it was at a much less advanced stage then. They have a satellite similar to the one that I've worked with, but that one was just launched a year ago; so it wasn't really at the right stage for doing a thesis.

Sherkow: You also mentioned that you had done some summer work while you were at Radcliffe. Didn't you mention that, working with the satellite one summer?

Jones: That was only during my senior year, as part of the tutorial program.

Sherkow: Oh, during your senior year.

Jones: Yes. I spent most of the summers in Ohio. I spent one summer here during college--actually only a piece of the summer. Most of them, I worked in Dayton. My stepmother works for NCR, and I worked one summer as a computer programmer for NCR.

Sherkow: How did you like that?

Jones: It was fun. I knew very little about programming, but it turned out that it didn't really matter because I knew enough about computers. They use a different computer language, they don't use FORTRAN or anything normal. They kept offering to let me do things in FORTRAN, and I kept saying I'd rather do this other stuff because my FORTRAN was not good. But they have an assembly language, and they will either give you a course of instruction which lasts some number of weeks...Considering it wasn't going to start for two weeks after I was there, and I was only going to be there during the summer, it didn't seem practical. [...interview interrupted...]

Sherkow: You were talking about your summers, and you mentioned one summer you worked as a computer programmer.

Jones: They had manuals that you could read, and basically, I learned enough in a week or week and a half to begin to do the programming. They'd also hired, at about the same time, a guy full-time who opted to take the courses, and I guess he had just graduated from college; he was quite a bit older than I was. It was amusing because he was going to all these classes, and I knew everything he was learning already. That was fun; it was fun working with the computers.

Sherkow: You did that one summer and then the other summers you...?

Jones: I worked for a man named Ken Kissell, who was the only real astronomer doing research at Patterson Air Force Base. [...interview interrupted...]

Sherkow: So you worked with him one summer.

Jones: Yes. Mainly again doing computer-type things.

Sherkow: How did you land that summer job?

Jones: During my senior year in high school, the Rotary sponsored a program, which again was mainly for people who were not going to go on into college, but anyone was allowed to participate if you wanted to. It started out with first a career day where everybody, instead of going to their normal classes, would go to different rooms where professionals would talk about their particular field. Then, instead of changing classes, you'd just change rooms to hear somebody else.

Sherkow: And you participated in that? What's the Rotary, I'm not familiar with that?

Jones: It's like a Lions Club. Rotary. It may even be the same as the Lions Club, I'm not sure.

Sherkow: Okay. But they sponsored that at your high school.

Jones: Yes.

Sherkow: And you went to that?

Jones: Yes. Then as part of this same program they would allow people to spend between a day and a week with some one in a particular profession. I told you about my friend Linda who wanted to go into biology; she spent, I think, three days, spread throughout a week, with the county coroner, watching autopsies and terrible things, but she thought it was great. And I visited an astronomer, who was the only astronomer in the Dayton area.

Sherkow: Ken Kissell?

Jones: Ken Kissell. And that was how I started talking to him; then I applied later for a summer job, and that was how I got that.

Sherkow: I see. Was that your first summer after [college]?

Then, was your second summer as a computer...?

Jones: Programmer. And then my third summer I came back here for some time and worked on meteorites. Then the summer after I graduated, I worked again for Ken Kissell.

Sherkow: So how did you get that third summer job? Was that through Radcliffe?

Jones: No, it was through the Observatory. There was somebody here who I'd worked with part-time during the term. This was right after the Apollo lunar landings, and they were bringing back lunar samples; I decided that would be fun. So I started learning about lunar samples and meteorites and then worked with him during the summer finishing up what I had started during the term.

Sherkow: So you worked also when you went to school, you mentioned.

Jones: During my sophomore year, I was paid for working in a laboratory.

Sherkow: An astronomy laboratory?

Jones: Yes.

Sherkow: At what point in your life did you actually decide that you were going to go for the Ph.D. in astronomy?

Jones: When they first sponsored that program in high school, and I talked to Ken Kissell, the one thing I remember him telling me was that if I wanted to do astronomy, I would have to have a Ph.D. I think it actually is fairly much true; if you want to do astronomy, and you want to do independent research and not what somebody else

tells you to do, you have to have a Ph.D. It may or may not, in practice, matter, but it is like a ticket, and you have to have that ticket because, otherwise, you don't have the respect or are given the responsibilities.

Sherkow: So you decided when you were a senior in high school?

Jones: No, no. I hadn't decided to go into astronomy then--

Sherkow: Until college, right.

Jones: ...but I guess I decided when I was going into astronomy that that was necessary. As long as they were going to pay me for doing that, there was no reason not to. There would then not have been, I don't think, any really viable alternatives at the time because it would have meant just working for somebody else doing the kinds of things I'd been doing as an undergraduate.

Sherkow: One of the things I was surprised at was that you had gotten a master's degree from Harvard also. Somebody had told me at MIT that usually you get the BA, and then you just ^{go} for the Ph.D. at Harvard.

Jones: All you have to do is fill out a form at Harvard to receive the master's in addition to the Ph.D. You take one year of course work, and once you've satisfied the course requirement, you fill out a form saying you've taken your eight half courses, or whatever they are, [and] the degree is just printed. So it's not a big deal at Harvard. It is at some other schools. My sister is getting her master's at Cornell, and she has to write a master's thesis.

Sherkow: That's what I'm saying, in different areas of concern--

Jones: Right. So if I had to do that, I would not have done that.

Sherkow: See, I have a master's degree in sociology and that's a specific and separate program from the Ph.D. in sociology.

Jones: This is the same.

Sherkow: So you decided on your specialty of X-ray astronomy and optical studies of X-ray sources while you were at Radcliffe?

Jones: I decided on X-ray astronomy, and the optical part of it in my second year of graduate school.

Sherkow: I see. I just was a little interested in how people actually specialize even further. Are there a lot of different areas in astronomy to go into?

Jones: Yes, lots of [them]. You have theoretical astronomy, which means that you can study any areas of astronomy, then you have optical astronomy, radio astronomy, X-ray astronomy, infrared--different pieces of the spectrum--and gamma ray astronomy.

Sherkow: Isn't your husband, Bill, also in astronomy?

Jones: Yes.

Sherkow: Now is he in the same special areas that you are?

Jones: Right.

Sherkow: That's what I thought.

Jones: He had started out doing mainly optical astronomy, and I'd started out doing mainly X-ray astronomy. But the X-ray astronomy

is a tremendously exciting area of astronomy, and he then started working partly on X-ray astronomy. I was still pretty convinced, mainly because of the situation at the Observatory in optical astronomy-- there was nobody there that I thought I really wanted to work with-- that I was going to continue doing X-ray astronomy.

But Bill was going out and doing some observing in Harvard, Massachusetts and I would sometimes go with him. It was fun. It's a nice place to go, and I really felt that, as an astronomer, one was expected to know how to operate a telescope. So I would go with him and actually do some of the observing. His advisor, who was Bill Liller, very much encouraged me to do more. Bill had gone with him to Cerro Tololo, in Chile, to observe, the year before, and he said to me one September or November that he had observing time in Chile again, in February, and did I want to come along? I said sure. We actually got more time on one of the smaller telescopes, and I did that, as well as, work with him on one of the other larger telescopes. Then he left, and I stayed and did more on the small telescope.

Sherkow: Did you have any fellowships?

Jones: Yes.

Sherkow: At the graduate level?

Jones: Right. I forget. [At] Harvard I had a regular fellowship my first year, which pays tuition and pays me support, and then, I guess, my second and third years I had teaching and research fellowships.

Sherkow: The program at Harvard was a three year program?

Jones: No, it's whenever you finish.

Sherkow: Do most people do it in two or three years?

Jones: No, most people do it in four or five.

Sherkow: And you did it in three?

Jones: Yes. But I think I was very lucky, partly because being an undergraduate I had taken some of the graduate level courses, so I didn't need to take these when I was a graduate student. I also knew what area I wanted to do research in, and I didn't spend two years trying different things and changing my mind.

Sherkow: You said you decided on Harvard because of a number of factors, but did you ever consider going out to the West Coast? I don't know if they have good schools there or not, in astronomy.

Jones: In certain fields of astronomy they're very good, like optical astronomy. But I think because I wanted to do the X-ray astronomy--

Sherkow: You wanted to stay here.

Jones: ...I wanted to stay here. When I was applying to graduate school, I applied all over, being totally convinced I was not going to be accepted anywhere. So I applied to Berkeley, either Wisconsin or Michigan, and was turned down at Wisconsin.

Sherkow: Really?

Jones: It's very peculiar.

Sherkow: There's no logic to those acceptances.

Jones: And applied to Harvard and to Cornell. It was sort of like

being in high school again: I mean, Harvard and Cornell, and that was actually where the choice came again, between Harvard and Cornell.

Sherkow: Did you get accepted at Berkeley?

Jones: Yes.

Sherkow: But you didn't want to be out there?

Jones: I thought that for doing the kind of astronomy I wanted to do, Harvard was much better and--

Sherkow: The X-ray studies, basically?

Jones: For Cornell it would have meant going into a really different kind of astronomy; at Cornell the astronomy department is very small, and it would have meant choosing one of several areas.

Sherkow: You mean further specialization?

Jones: No, no. Instead of X-ray astronomy, it would have meant studying infrared or radio astronomy or planetary sciences. It's a very small department, and these are the fields that they have people in.

Sherkow: So for what you wanted, Harvard was the best place, and you got accepted and you got a fellowship your first year.

Jones: Yes.

Sherkow: That's great. The next thing I wanted to ask you about was your first job. It is listed as a fellowship/postdoctoral position

at the Smithsonian. I was wondering if you could tell me what kind of work you actually did there? You were there for just a year?

Jones: Right. This year they accepted four people; the year I was there they accepted six people. It's a center postdoctoral fellowship, and it's a two year appointment; you're essentially able to do anything you want to do. I continued doing very much the same sorts of things I'd done for a thesis, which was working with the X-ray satellite data--very little optical work, mainly the X-ray satellite. We did take two observing trips, but they were both short.

Sherkow: So you were there for a year. You said it was a two year...?

Jones: It was a two-year appointment, but during my first year, the chairman of the department asked me if I would like to be recommended to be a Harvard Junior Fellowship, and I said sure. [Laughs]

Sherkow: Why not? So you lived for one year in Washington?

Jones: No, no, it's here. Smithsonian Astrophysical Observatory moved here in 1955.

Sherkow: I see. For some reason I connected it with the Smithsonian Institute, which is in Washington, right?

Jones: It is. It is part of that.

Sherkow: It is? But what you were involved in was here, so you actually didn't have to move.

Jones: No.

Sherkow: You went to Radcliffe, then you went to Harvard, and then you worked here.

Jones: Yes, and I'm still here. I'm even in the same office that I was in before.

Sherkow: That's nice.

Jones: I'm not convinced--well, it depends. I think that if you're very aggressive, if you see yourself as a professor someplace--a better way of attaining that goal is by moving, by spending a year here and a year on the West Coast and getting to know more people.

Sherkow: What are your goals in astronomy?

Jones: I'm actually very happy doing what I'm doing, and I would like to continue doing research.

Sherkow: Independent research?

Jones: I actually work with a group of people, but my work isn't decided by someone else. In that way, it's independent.

Sherkow: Why don't you tell me about that because I'm not that clear [about it]? Is this a three year appointment?

Jones: Yes. [For] the Harvard Society of Fellows, there are twenty-four junior fellows and ten senior fellows. You're selected, and, basically, you have three years to do whatever you want to do. It has no particular restrictions or anything; the only recommendations are that you attend dinner on Monday night--

Sherkow: Dinner?

Jones: Yes, and lunches on Tuesdays and Fridays are recommended. But it's not really a work-related sort of thing. People are picked on the basis of scholarship and potential. Women have only been admitted

for the last four years into this society.

Sherkow: You said there are twenty-four junior fellows. Of those twenty-four, how many are women?

Jones: Four.

Sherkow: That's not a very good percentage.

Jones: No. There are ten senior fellows; none of them are women.

Sherkow: How do you feel about that?

Jones: That percentage is not that different than the percentage in science.

Sherkow: All over? Do you think it might get better?

Jones: That's almost twenty percent. In astronomy it's only ten percent women with Ph.D.'s.

Sherkow: So that is pretty good compared to the numbers of women who have Ph.D.'s.

Jones: It's not. The number, I think, will increase mainly because the Society tends to choose people who've gone to Ivy League schools and colleges, and the ratio of women to men at those colleges has been low--Radcliffe was four to one before, now it's two and a half to one. And Yale had no women until a few years ago. So that their pool of people to choose from has probably had about the same ratios of men to women.

Sherkow: But you anticipate that maybe more women in the future will go into astronomy?

Jones: I think that for the Society, just as the number of women at the Ivy League schools increases, the number of women in this Society will increase. I don't think that there's going to be a dramatic change in the number of women going into astronomy. The number has stayed close to ten percent for about twenty-five years.

Sherkow: That's not too bad.

Jones: No.

Sherkow: In physics, it's like--

Jones: Physics is two percent or so. About the same or less.

Sherkow: Right, and in engineering, it's like one percent. It's very very little. So at least you're better off than those two fields. Was it always your expectation that you would have a career of your own and that you would get married? I mean, at some point you decided that you were going to have a career, right? And now you have it. Then at some point you got married.

Jones: Right. I think I always felt that I would have a career--at least have a means of supporting myself. I don't think I ever expected to grow up and get married and have somebody else support me, financially.

Sherkow: But you always expected to probably get married at some point or another? Or didn't you?

Jones: I don't think I ever thought about it.

Sherkow: Right. It just happened?

Jones: I think you wonder when you're growing up, you sort of wonder if you're ever going to be popular or ever going to be asked out by

anybody or....

Sherkow: At what point in your career did you get married?

Jones: The summer of 1973. The year before I finished my Ph.D.

Sherkow: How did you meet your husband?

Jones: He was at graduate school here when I was an undergraduate.

[...interview interrupted...]

Sherkow: I was asking you at what point in your career did you get married?

Jones: The year before I finished my Ph.D. we'd actually decided in the fall before that to get married, and we told my parents at Christmas. I was at home, and Bill came to Ohio. When we told my father we were getting married, the only thing he asked was if I was going to finish my degree. We didn't care that my background was Christian, and Bill was Jewish; he said, "Are you going to finish your degree?" [Laughs] That's sort of interesting.

Sherkow: That is. He was obviously interested in your finishing your Ph.D.

Jones: Yes.

Sherkow: Did you meet Bill while you were an undergraduate at Radcliffe?

Jones: He came here as a graduate student, and we met in one of the courses that we were both taking. I was taking it my senior year; he was taking it as a first year graduate student.

Sherkow: So you're both in astronomy.

Jones: Yes. It's fun. I recommend it.

Sherkow: It's interesting.

Jones: It's very nice to be able to spend that much of your life with someone else.

Sherkow: Yes, I know what you mean; it's nice to be in the same field. But anyway, did a choice for you between marriage and a career ever really [come up]?

Jones: No.

Sherkow: Because some women feel like they have to make a choice.

Jones: Right. No, never.

Sherkow: Was it your expectation that you would have children someday?

Jones: Maybe someday we would. I think that we enjoy our situation so much, and we find really nothing lacking. I'm not sure what kind of impetus finally happens to convince people to have children, but it hasn't happened to us yet.

Sherkow: Having had animals myself, they are really very much like children. I had two, but you have a dog. It's kind of like your baby; it's not like a human being, but there is a similarity. So I have: "Do you plan on having children?" Maybe. Would that be correct?

Jones: Maybe, yes. I think it's a very hard decision to make not to have children, and we've certainly not made that decision. I think that we certainly envision having children; I'm just not at all sure when we're going to have time. [Laughs]

Sherkow: You're working in the same office with your husband at Harvard, right?

Jones: Right.

Sherkow: Did you plan it that way, or did it just turn out that way?

Jones: No, it turned out that way. When the X-ray group moved from American Science and Engineering here, I was a graduate student, and Bill had just finished his Ph.D. and was hired to work with this group.

Sherkow: Which group is this now?

Jones: The high energy astrophysics group. The man who directs that group called me and said that he had tried to get an office for each of us, but he had not been able to get the office space and would we mind sharing one of the large offices? And we said no. I hadn't even expected to be offered any kind of office because as a graduate student you don't expect that. There are graduate student offices, but they tend to be in certain buildings and certain places and not mixed in as members of a group.

Sherkow: Is Bill, also, a junior fellow?

Jones: No.

Sherkow: He's not.

Jones: No, he is a Smithsonian employee.

Sherkow: So you're actually working for different...?

Jones: Yes. I am officially employed by Harvard, and he is employed by Smithsonian, by the Center for Astrophysics.

Sherkow: I see, so you have different employers, but you share the same office; that is unusual. It's nice though; I assume you like it.

Jones: Yes. [Laughter] It is a little hard, though.

Sherkow: Is it?

Jones: People often tend to think that, first of all, we do everything jointly. We do many things jointly, but not everything. People will often tend to credit something I've done, to Bill or something Bill's done, to me, and it seems that this sometimes happens as an excuse. If I'm being recommended for something--it's almost stopped happening now, but it used to be if I was working on my thesis people would say, "Oh, her husband did it all," or if Bill was coming up for something they'd say, "Oh, his wife does it all." I think we do at least enough work for two people; no matter how you split it up. One person could not possibly do it all. But it is a little awkward.

Sherkow: But you do some work together?

Jones: We do a lot of our work together. Currently there are only three scientists working on this project, and we're two of them.

Sherkow: What is the current project?

Jones: The Uhuru satellite project.

Sherkow: Oh, that's still going on?

Jones: The data analysis part is still going on. It will go on about another year and a half.

Sherkow: And so you and Bill are both working on that.

Jones: Partly it's just that if there were other people to work with, we would probably tend to work with them, but because we're two of the main people, we do tend to work together. It's much easier that way than to work alone.

Sherkow: You mentioned that your parents never really had expectations that you would have a career and/or get married. You just mentioned that they expected you to do well and probably go to college. How do you think they feel about this?

Jones: I think they're very happy about it all.

Sherkow: You mentioned that your father is a chemist, right?

Jones: Yes.

Sherkow: And he really wanted you to finish your degree. Is your mother still teaching?

Jones: My mother died when I was an undergraduate.

Sherkow: Oh, she did. And your father remarried?

Jones: He remarried a couple of years later. My stepmother was also a chemist. She was a senior research chemist for NCR. You know the paper that you can write on, and it writes through?

Sherkow: Yes.

Jones: When she started working she was one of the four chemists that the company had and they developed that paper.

Sherkow: So they're both chemists. That's nice.

Jones: But then maybe two or three years ago, they moved their research

division from Dayton to Appleton, Wisconsin.

Sherkow: Is that where they live now?

Jones: No, they live in Dayton. Marge said, "Fire me," because she didn't want to move; it's very far to commute. She went into real estate at the time and did that for maybe a year. At the time she was fired by NCR, she was the highest ranking woman employee, and I guess HEW came down on NCR and said, "Why don't you have any women among management?" So they hired my stepmother, Marge, back as the head of corporate personnel hiring.

Sherkow: Is your father still working as a chemist?

Jones: Yes, he still works for Monsanto.

Sherkow: Oh, Monsanto has a base or branch in Dayton?

Jones: Right, in Miamisburg. They have some AEC employees, Atomic Energy Commission people, there, and it's mainly the nuclear chemistry that's done there.

Sherkow: I wanted to ask you about domestic jobs. I guess this is a question more for women who have a full-time career and have children because that seemed a little difficult to manage, but you probably don't have a problem with that. You and your husband both work, probably, on domestic things.

Jones: We tend to go out to lunch with a group of people at the observatory, and lunch is actually a fairly social occasion. It's a very good time for seeing people, not only as friends, but for seeing them and talking about problems with them. Most of the people tend to

be fairly busy, so it's hard to walk in and talk to somebody for an hour; you don't really feel you want to bother them. But if you're at lunch, you can say, "Oh, I'm really having a terrible time with this." So we tend to go out for lunches, often at Chinese restaurants. This is usually a big lunch, so our dinners are fairly light, and either of us will cook. And the same thing with keeping the house clean; either of us will do that, usually together.

Sherkow: You have your own house?

Jones: Yes. [...interview interrupted...]^{Sherkow:} / Did you ever have any problems with nepotism rules?

Jones: I asked at Smithsonian. Joanne Tondryk is one of the persons who does personnel, and I asked her what would happen if I applied for a job through Smithsonian.

Sherkow: Where your husband works?

Jones: Which is the official employer of my husband. Because there are rules which say that a wife can't work there with a husband. And she said, "Oh, we take that rule to apply only if it's like a husband hiring a wife, and she's not already in the field. If the people were already in the field before they were married, then we try to disregard that rule." So there hasn't been a problem. The only problem has sometimes been in credit for who did what; it's been other people's problems recognizing that we really are two separate people.

Sherkow: How do you feel about working at Harvard? Have you been working there for a year?

Jones: This is the end of my second year.

Sherkow: Two years then. Do you like what you're doing, and do you like working for Harvard?

Jones: I'm not really involved at all with Harvard University. I work with a group of people at the Observatory, and I enjoy that very much.

Sherkow: By this group of people, do you mean the Fellows?

Jones: No, this is the High Energy Astrophysics Division.

Sherkow: Of Harvard?

Jones: At the Center for Astrophysics. I think they're a very good group of people both scientifically and as people. Most people at the Observatory tend to come to work, and a lot of people tend to work by themselves and not develop friendships with the people they work with. There's a truck that comes around with food, and a lot of people buy sandwiches and things from the truck and eat in their offices, or sometimes there are planned lunches to discuss different topics, and they go to these lunches. I think the main reason that we go out together at lunchtime with these people is because it's a very good time to interact with them. It's a good group of people to work with: they're very bright, they're very outgoing, they tend to be very helpful, and they tend to be very excited about the kind of astronomy they're doing.

Sherkow: So you like working where you're working now.

Jones: I like it a lot.

Sherkow: I shouldn't say at Harvard, at the Center for Astrophysics.

Jones: The observatory. [Laughs]

Sherkow: Most of the articles that I read, that were listed in your vita, were works that are done in collaboration with other people.

Is this, this group of people?

Jones: This is this group of people, right.

Sherkow: Because there are different numbers--most of them are three people.

Jones: Yes. What happened was that when the satellite was first built, and when it was first launched, there were four people who were primarily responsible for that. For the first couple years, whether these people were involved in a certain project which resulted in a certain paper or not, these people were automatically co-authors on the paper. Then once it had been decided that these people, who were mostly not even very involved anymore with the projects, had already received enough glory, then they stopped being co-authors; that's when the number of co-authors drops down to the number of people who actually do things.

Sherkow: So right now are you planning on writing some more? There were a couple articles that were listed at the end of your vita as in the process of being printed.

Jones: Right. They've already been accepted by the journal and just haven't been published yet.

Sherkow: The Astrophysical Journal Letters?

Jones: And the Astrophysical Journal. They're two parts of the same journal.

Sherkow: Do you write these articles with these people? You all write them in collaboration?

Jones: Yes. Usually the first author on the paper has done most of the work and has generally written the paper; that's generally the criteria that's used to decide who is going to be first author.

Sherkow: Were you first author on some of them? You were, weren't you?

Jones: Yes.

Sherkow: Most of the ones that are listed in your vita have been written with your husband.

Jones: Right, most of them.

Sherkow: So that means that most of the work that you've done which you've published has been done with your husband.

Jones: That's right. That's still true.

Sherkow: He's just a year older than you are?

Jones: He's two years older than I am.

Sherkow: What's still true? That you're still working...?

Jones: It's still true that we're still working together.

Sherkow: Most of the other people that are working at the Center--this group of people--are they all men or are there other women?

Jones: All of the more senior people are men. There is one woman in our group who does not work at quite a Ph.D. level, although she has an Italian degree; but she does not work independently.

Sherkow: But all the rest of the junior people are ...?

Jones: All the rest of the people with Ph.D.'s are men.

Sherkow: You're the only woman with a Ph.D. from this group?

Jones: Yes, except for the one person from Italy.

Sherkow: How do you feel about that?

Jones: I think that in astronomy it has to be expected.

Sherkow: Do you enjoy it? Does it work out for you?

Jones: It works out okay. I think it would be nice to have other women there.--It's peculiar because I know so many of the husbands, yet I don't know their wives nearly as well. It's a little bit strange. It's harder initially to be accepted than if you're a man, but I think once you're accepted it's OK. Maybe it's just that they're so surprised at the beginning.

Sherkow: That you're there?

Jones: Yes. But it all works out okay. Astronomy involves a fair amount of traveling, and if there's more than one person going, certainly one of them is going to be a man. So there are often comments, sort of "mind your morals." But it's all done very jokingly.

Sherkow: So you've done traveling?

Jones: Yes. Both to Cerro Tololo with my advisor and then to England a couple of years ago with another man from our group.

Sherkow: What country is Cerro Tololo?

Jones: Chile.

Sherkow: Chile. So you've done work there and in England for your--

Jones: And also in the southwestern US.

Sherkow: Does your husband travel a lot, too?

Jones: We're going to England this spring, together.

Sherkow: You mentioned that.

END OF SESSION 1

MIT ORAL HISTORY PROGRAM

Project on Women as Scientists and Engineers

Interview with Christine Jones

by Shirlee Sherkow

Arlington, Mass.

April 22, 1976

Session 2

transcribed by Johanna Kovitz

Sherkow: I am Shirlee Sherkow, and I'm interviewing Christine Jones for the second interview. I thought we would begin with the fact that you and your husband are in the same career. I was wondering if you could talk about competition and support and any issues that would revolve around the fact that you're both in astronomy.

Jones: I think that we wouldn't change our both being in the same field. We've made a conscious decision that if it's possible, we'd prefer to work at the same institution and prefer to work together, rather than have one of us, say, work for Harvard, and one of us for MIT. So I don't think we feel competitive with each other. We tend to work often on the same scientific projects. Bill has certain responsibilities as a member of the group he works in, which I don't really have because I don't officially work with that group. My support comes from the Society of Fellows; that makes things a little bit different. There are problems which occasionally arise because I'm not officially employed and people don't want to consider me as a member of that group, as far as minor things like distributing calculators. But it hasn't basically been a problem among the people who really make the decisions.

Sherkow: You work for Harvard, right? In the Society of Fellows?

Jones: Yes.

Sherkow: And who does your husband work for again?

Jones: He works for the High Energy Division for Professor Ricardo Giacconi, and the Center for Astrophysics, Smithsonian Astrophysical Observatory, Harvard College Observatory.

Sherkow: I see.

Jones: We very much enjoy working. Because we work together in the same field, we tend to be more efficient and to work more; we'll often go back on an evening or a weekend and spend that time trying to get something finished that we both feel ought to get finished; whereas if we worked either at different places or not together, we'd spend the evenings and weekends together and wouldn't spend them working. In that way, we really enjoy what we do and don't mind doing more of it.

We have fairly common interests, as far as what we do, and we tend also to think fairly much alike, which is good, but it's also bad because our outlook tends to not be as broad as it could be. When one of us becomes upset about something, the other one, instead of saying, "Was it really that way? Could it possibly have been this way?"-- tends pretty much to agree with the other about what happened and why it happened, and it makes an aggravation almost worse because there are now two people getting upset; whereas if we really thought differently or worked in different environments, we might have an outsider's opinion on something. But it's very nice because each of us can also appreciate

what the other person is doing and can feel the excitement and the frustrations and just the enjoyment of accomplishing something; whereas I think if we worked in different areas, one person would come home and say something, and the other person wouldn't even understand what he was talking about. It would be obvious that one of us was pleased with what we'd done, but the other person couldn't really appreciate that.

Sherkow: Do you feel that you're supportive of each other in your research? You do some research together?

Jones: We do most of our research together. Yes, we're very supportive of each other.

Sherkow: You and your husband met in an astronomy course?

Jones: Right, when I was a junior, and he was a first-year graduate student.

Sherkow: So the same field--interest was there to begin with.

Jones: Well, at least the same general field of astronomy.

Sherkow: You mentioned before that it just turned out that you were sharing the same office.

Jones: Right.

Sherkow: It's not something that you planned.

Jones: No.

Sherkow: I thought the next thing that we could talk about was the summer

program that you're planning at the Astrophysical Center.

Jones: That grew out of a symposium which happened last fall, which was called Space for Women. There were a number of astronomers from different parts of the country who were invited to give talks. It was primarily for high school women; primarily high school juniors and seniors attended.

Sherkow: Did you set it up, or were you invited to this?

Jones: No, I was asked to give one of the half-hour talks. [There were] six half-hour talks by astronomers or geophysicists. Then there were a number of other people involved as discussion leaders and on panels; a fair number of people were involved.

There were a few things that emerged which were fairly common to people's backgrounds. There was one morning when there were about six of us in front of the audience. There were three of us giving talks and two discussion leaders and one other person. Of the six women, I was the only one who had gone to coed school. All the others had gone to women's colleges, and all the others were astronomers. That's fairly amazing because I think if you're in high school, and you're interested in science, you're told, "Go to a good university." Probably, it doesn't really matter too much between a college and a university, as long as it has a good science program. But I think that, at least when I was looking at colleges, no one ever suggested to me going to a women's college. Several times when I was looking at colleges, people said, "Think about Radcliffe; it's a women's college." I said, "But it's coed; the classes are all coed." And they seemed to think this was fine, but they said a women's college--don't go there

because the science programs are not as strong as you'll find at a coed school. So that to have most of these women come out of women's colleges, there had to be something fairly strong happening at the women's colleges. Probably having the women faculty members teaching the science classes, as role models was a fairly strong influence. It overpowered the influence of women who are interested in science and who may do well in it, go to universities where, for some reason-- either they don't stay in science or they're not receiving the encouragement, or they're not seeing women on the faculties. For some reason the number of women coming out of coed schools is smaller in the sciences; whereas the women who are perhaps not as initially motivated in science are going to the women's colleges and into the sciences. That's a little bit peculiar.

The other things that seemed to be fairly common among the backgrounds was that the women usually in college or maybe just before college, have often been involved in their summer employment in a research situation. This is what had caused them to decide to pick a certain area of science. So what we're trying to do with this summer program is to encourage women and minorities to apply, although the applications are open. It's not limited to women and minorities. We're trying to encourage high school students, juniors and seniors, to apply for this program. There'll be six students who'll be working with people at the Center for Astrophysics on different projects. It's trying to carry out what was suggested by the women's symposium; that this was a way to encourage people and had made a difference before, for other women.

Sherkow: But is this something that you have set up?

Jones: I've proposed one of the projects.

Sherkow: I see.

Jones: The program actually was an outgrowth of the Symposium, and the funding for it was set up by the director of the observatory, George Field. He said, "Here's the money to do this." Then a committee was formed, including all the people who'd submitted projects, to say which of the people we want and how should we go about getting them, and ...

Sherkow: So you're involved in selecting the people.

Jones: Yes.

Sherkow: Did your husband work in this with you?

Jones: No. It was sort of peculiar because I had submitted a project proposal. My husband has about four people working for him and finds that his time is pretty much taken up between doing the research and trying to supervise these people; he really didn't have time to oversee a person fairly closely, a high school student who really needs close supervision. So partly because of his time and partly because I was interested in doing it, he really did not wish to be directly involved in it. So I had submitted a proposal saying that I would like someone who would work in the field of X-ray astronomy.

Then there was a publication called The Center Line, which is sent out by the observatory, and when that came out, it said there was going to be a summer intern program, and there were going to be six projects. And one of the projects was that somebody would work in X-ray astronomy with Bill and Christine Forman. After they'd received applications from people, one of the people in personnel

called to set up the meeting to review the applications. She called and just left a message. We were both out of the office, so she just talked to our secretary, and I got the message: "Bill and Christine, there's a meeting of this committee on some day and some time." I called her up and told her that this really wasn't a joint project. I had no idea how it had become that way. Perhaps the reason it became that way was because we were each asked, if we were not there, who would be the person that the student would be responsible to? And like Dave Latham had said that if he were away, the student would be responsible to Dick McCrosky. But when I said that, suddenly the project became a joint project; whereas when Dave Latham said it, it didn't become a joint project between him and Dick McCrosky. I told the person in personnel that it wasn't a joint project, and she's very active in women's activities and is one of the people who's setting up this program. She really understood that making my project joint had not been a good move. Now it's all straightened out. It is sometimes awkward for people to see us as two separate people.

Sherkow: You've mentioned there were other instances when you've been sort of two people as one, rather than that you could be individuals of your own.

Jones: Right. It's often that if one of us does something, someone will come up to one of us and say that they saw this work that we'd done; whereas perhaps it had been primarily the other person's work. Often we work on things together, but even when we do that, the projects are primarily done by one or the other of us. We can never do something where it's really fifty-fifty. There's always one of us motivating the project to be done, and then the other one involved in it.

Sherkow: But this hasn't been a big problem?

Jones: No, I don't think so. There are so many disadvantages that outweigh any of the disadvantages.

Sherkow: You've probably raised this person's consciousness--whoever made this mistake.

Jones: I think that she should have been aware of it already. It was peculiar.

Sherkow: In terms of this summer program that you're setting up, right now you're interviewing?

Jones: This week we're interviewing, yes.

Sherkow: And deciding?

Jones: We'll be deciding next week, after all the interviews are done.

Sherkow: Do you have about double the number of people that you want to accept?

Jones: We're accepting six, and we're interviewing, I think, fourteen. Either twelve or fourteen. There were about thirty applicants.

Sherkow: One thing I didn't ask you: is this just high school students from this immediate locale?

Jones: Right, because they have to be able to work every day.

Sherkow: How did you go about letting the high school students in the area know that this summer program was available? What was the publicity?

Jones: I wasn't involved in that directly; that was through the personnel office. But the two people who were primarily involved, contacted guidance counselors, and they also went to a lot of the different high schools and then talked directly with high school students and told them about the program and gave them applications.

Sherkow: The high school students won't get paid for this?

Jones: Yes, they will. It's for eight weeks, and I think they're paid eight hundred dollars.

Sherkow: So they get the experience plus they get paid.

Jones: Right.

Sherkow: It's like a summer job.

Jones: It is a summer job.

Sherkow: That's really nice. Have you decided if you're just going to accept seniors, or is it open to juniors and seniors?

Jones: It is open. We had many more applicants from seniors than from juniors, and of the people we're interviewing, I think--there are three juniors and nine seniors; I'm not sure about two others.

Sherkow: So you don't have to restrict it just to seniors.

Jones: No. If we were more sure that the program would happen again in the future, we might tend to say, we'll take only seniors this year because the juniors can apply again next year and have the chance then. But because we're not really sure that it's going to happen again and because, if we can get in touch with juniors now, it may

make some difference about where they're going to be applying to colleges, it's probably at least as beneficial for them as for seniors. So it hasn't been limited.

Sherkow: You mentioned that it's not restricted just to minority students or women, but you're only accepting six people. Is there any kind of desire on the part of all of you people who are interviewing the students that you might accept a certain number of women?

Jones: Of the twelve people who I'm sure that we're interviewing, seven of them are women and five are men.

Sherkow: So it's somewhat half and half.

Jones: Yes. It will depend a lot on the interviews. It was sort of peculiar when I went to the first meeting where we tried to decide which of the people that applied we were going to interview. It turned out that the woman in personnel had read the applications, the person who I mentioned earlier, Dave Latham, had read all the applications, and I'd read all the applications; no one else had read all of them. They had been asked in their application to select first, second, and third choices of the projects they wished to work on. Some of the people had read the applications of students who had selected their project as first choice, but Dave and I both felt that high school students had almost no idea what they wanted to do, so that making these selections was a fairly arbitrary choice. I had ranked the top seven or so, and I had ranked only seniors and then had put aside three juniors who I'd said were good, but these were the seniors. He'd also ranked them, but in three groups: good, not quite so good, and the ones that he didn't think were as good.

I said, "Okay Dave, throw out your last group of people." And he said, "Okay, that's these ten." And none of the people he threw out were the ones I had on top. I was, at that point, very surprised because I had read the applications the night before and had spent hours pouring over them because so many of them were so good. I had felt that the selection I had made--that the people were only very, very marginally better than the other people. So to have him throw out this group and to have none of my top ones in that group, I was very surprised. Then they said, "Okay, who are your top people?" He had also done it among seniors and juniors, and he listed among the seniors his top seven people. He had one person who I didn't have, and I had one person who he didn't have. It was amazing that out of the seven we both selected, six of them were the same. The one person he had added was one who I would have put eighth, and the one person he didn't have was someone who couldn't be there the entire summer, but he agreed that she was a very good applicant. He felt that because she couldn't be there, she would miss out on the interaction between the other students; the rest of the committee and I agreed with him, so I took her out of my top seven. But it was absolutely amazing that the numbers had come out so close to each other.

Sherkow: Will you be selecting these people next week or the next couple of weeks?

Jones: I think we're meeting some time next week. The meeting hasn't been set up yet.

Sherkow: When does it start, exactly?

Jones: I think July first, and [it] will run through July and August.

Sherkow: I hope you get at least three women. It sounds like there are at least three qualified women.

Jones: I think that it's going to be a very hard choice; there are a lot of very qualified people. In addition to the application, we had three letters of recommendation. Almost all the letters of recommendation say that this person has exceptional ability and will greatly benefit from this program; everyone says that. It makes it very, very difficult to choose when they all say this person is an exceptionally bright person; so one of the criteria that I used for selection was whether people had done something besides the normal school textbook activities. If someone had participated, like, in an MIT program or Harvard program or had somehow gone out of their way to take other classes at a different place...

Sherkow: Can you do that in high school?

Jones: Yes, there are a number of people who had been involved in summer programs, and one woman who'd taken a photography course for high school students at MIT. MIT apparently runs a number of weekend programs for high school students. I felt that these people, then, had already made an effort to try to do something, and that, to me, was important.

Sherkow: I don't think I asked you this before, but are you currently involved in the women's rights movements?

Jones: No.

Sherkow: I didn't mean as a member; I wanted to know your values or

your attitudes. I didn't simply want to know if you were a member of NOW.

Jones: Okay. I share a lot of the attitudes. I certainly believe that women are equal, that they ought to receive equal pay, [and] that they ought to have the same rights as any men; I share a lot of their philosophy. Unfortunately, I think that the women's rights movement tends to make people afraid of them and tends to scare people.

Sherkow: How or why?

Jones: A lot of it right now is currently around the Equal Rights Amendment, and housewives who aren't trained to do anything are afraid that they will have no rights to alimony or child support if this amendment is passed. Child support is already covered under other laws; that wouldn't be taken away anyway. It also turns out that, no matter what the laws are, the average amount of time that a man paid alimony to his ex-wife is only about a year; women ought to be really aware of this sort of fact. It turns out that about forty percent of women work either full-time or part-time, sometime, and a lot of women have to work either before they're married or after they're divorced. Because women actually are going to, at one time or another, often to support themselves, they ought to develop some kind of career goals or some way of supporting themselves other than learning to type. Being a secretary is fine if you make it a career and that's what you want to do. But I think there are a lot of women who aren't trained, and I think it's these women who really fear the Equal Rights Amendment and who are afraid of women who have careers. But it's hard for me to understand it because I'm not afraid of people who don't have careers.

Sherkow: I've heard different kinds of arguments; some that were different than the ones that you mentioned, such as, women will get drafted, and women will have to share bathrooms with men. The arguments that the anti-ERA people are mounting are many and varied. I don't really know either why so many women are against it, other than the one fact that you mentioned.

Jones: It's almost to the place where one could have made equally emotional types of arguments when they were discussing women's right to vote; that you're going to divide families because she's going to be a Democrat, and he's going to be a Republican, and you really don't want women involved in politics [because] it's going to disrupt the family life. I think that a lot of the arguments are emotional, and there are very clear facts that women are being paid less, even though they are doing the same kinds of jobs. Women have rights; they ought to be made clear, and these rights ought to be protected.

Sherkow: Do you feel that the people that are active in the women's rights movement are not sticking to the facts enough and making it very clear?

Jones: No, I think they are. Instead it's the people who are against it having taken primarily emotional issues and working on the basis of fear and absurd ideas like unisex bathrooms; I'm sure that won't happen.

Sherkow: I don't think so either.

Jones: But it's issues like this, which are unfounded without sense, that it's come down to.

Sherkow: I guess it is difficult to combat that kind of an attack.

Jones: It's hard to take an irrational argument and attack it rationally.

Sherkow: Basically, it sounds to me as if you're saying that you agree with much of the philosophy, but you simply aren't active. It's rather subjective; I feel that this summer program you're doing and some of the other things that you've mentioned indicate that you are somewhat involved in the issues.

Jones: I guess I am, as far as that. To be active in the women's rights movement, I think of as being fairly militant, whereas I think that I'm not a person who goes out and marches on the statehouse for women's rights, or even someone who would organize some kind of letter writing. I really think that the things which are the most immediately gratifying and which can bring about the most positive results are things that I can do just through my working and an attempt to involve these high school students.

Sherkow: In your vita, it was indicated that in 1970 you received an award.

Jones: Oh, it's the Ninninger Meteorite Award.

Sherkow: I was just wondering if you could tell us what that was.

Jones: Every year there's an award given called the Ninninger Meteorite Award, and it's given for someone who writes a long essay or a report on meteorite research. When I was in college, I did a project with Ed Fireman at the observatory, and I wrote up the part of the project that I had done with analyzing pieces of a meteorite called the Lost City Meteorite. There was a network of prairie cameras that would

photograph the path of the meteor coming through the atmosphere; it's like a fireball or a shooting star. From just looking where these different cameras said it was, you can actually figure out the orbit that the meteorite had in our solar system. We measured pieces of the Lost City Meteorite whose orbit was known and also measured pieces of lunar samples when they were first coming back, and that was sort of exciting. From comparing argon isotopes in these samples, we could get measures of the cosmic rays in the solar system; that was what I wrote up as part of this project.

That year the prize was shared between a woman who I just met at this women's symposium last fall--she was just getting her Ph.D. and she had submitted an essay from her thesis. She primarily studies meteorites, but much more from a chemical, geological viewpoint than from an astrophysical one, although I'm sure her degree is in astronomy. But she knows a lot more of the chemistry end than I do.

Sherkow: So you shared the award with her?

Jones: It's a thousand dollar prize, so we each received five hundred dollars.

Sherkow: That's nice.

Jones: It was nice, yes. It was very nice.

Sherkow: One of the pieces of literature that you gave me concerning things that you had done was this: "X-Ray Sources and their Optical Counterparts." It is three different issues of Sky and Telescope. [Part I, Vol. 48, No. 5, Nov., 1974; Part II, Vol. 48, No. 6, Dec., 1974; Part III, Vol. 49, No. 1, Jan., 1975].

Jones: It's a popular science magazine and we did it primarily because we felt that there hadn't been very much about X-ray sources in this journal, which in fact, is read by amateur astronomers and high school students. If they want to learn something about astronomy, this is written at their level.

Sherkow: I see.

Jones: That's why we wrote it, for them.

Sherkow: It was the only piece in your resume that was in Sky and Telescope.

Jones: Right. The others are all in the professional journals.

Sherkow: I read all of these. Most of them were in Astrophysical Journal Letters.

Jones: Right.

Sherkow: I was wondering if you could talk a little bit about these publications? Not being an astronomer, I can basically understand what you were trying to do, but they're different studies. Could you talk about some of them? Would you like to look at the list?

Jones: Okay. There was a satellite called Uhuru, which was launched in December 1970. It was called Uhuru because it was launched from the San Marco platform off the coast of Kenya, and it was launched on Kenyan Independence Day. Uhuru means freedom in Swahili; so it was to commemorate the date and because the people have been very helpful, that it received that name. The satellite functioned then

for about four years, and we're still analyzing data from it. Most of the publications concern either observations from the satellite or optical observations of objects discovered from the X-ray satellite observations. There were several results that came from the satellite, and one of them was that there were X-ray sources which were bright members of our galaxy and occurred in binary systems. These sources are small compact objects, either a white dwarf, a black hole, or a neutron star, which is revolving around another optical star. So some of these publications concern the nature of these X-ray sources. It was from the X-ray observations that we learned that they were in these binary systems because if we're looking in the orbital plane of the system, then we would see the X-ray source on, and then we would not see the X-ray source when it was behind the other star. This occurred every so many days, so we could say that this particular object has a binary period of three days. Also from the X-ray observations, we could determine that the X-ray source was coming *from* a particular area of the sky. The observations would not allow us to say that it was coming from a particular point, but instead, a particular area--it's called an error box, the particular position in the sky. So I went with Professor Bill Liller to Cerro Tololo in Chile, and then also made observations with the Harvard telescope at Agassiz, with him and with my husband, to try to identify what stars the X-ray sources were going around. Because we knew the X-ray period, we looked for variations in the optical stars' behavior with that same period. We were able to both suggest and make identifications and confirm other identifications for several of these optical systems.

Sherkow: Were these new discoveries?

Jones: Yes, sometimes. Because it's X-ray astronomy, one has to go above the earth's atmosphere, to observe X-rays. The atmosphere shields the earth from X-rays. Before the Uhuru satellite, the only observations had been either from balloons or from rockets, so they had lasted from hundredths of seconds to hours. So this gave the first continuous kind of coverage. Although it was a scanning experiment, it would scan a certain area of the sky repeatedly for however long it was pointed in that direction. So you could actually look at a source over time periods of days and decide what the source behavior was. It was learned that some of the sources showed periodic behavior and were then, perhaps, in binary systems. And from the optical identifications or from two of the systems which pulsed in X-rays, one could say they were actually in binary systems. For the two pulsating sources, the pulsations underwent a Doppler shift, so the pulsations came further apart, and then closer together when the X-ray source was coming toward you in its orbit around the optical star. From this, you could actually say that the sources were in orbit around a star. To the others, you could just say, "Well, they had periodic behavior, and that they behaved as though they were in a binary system." But the actual confirming evidence came from the optical observations where we said, "Okay, this is the companion; the companion is behaving with this same period."

The one thing that was surprising was that the rocket observations had detected an X-ray source called Sco X-1, and this is the brightest X-ray source in the sky.--There had been a good position obtained for this star from rocket observations, and it had been identified with a thirteenth magnitude star; it's a very faint star. You need a fairly good-sized telescope to obtain spectrographic information on it.

So these other X-ray sources were found and were at least ten and generally a hundred times fainter in their X-ray luminosity than this object called Sco X-1. I think some people tried to discourage both of us-- especially my husband and somewhat me--from making these optical observations, saying, "This is crazy, you've got the brightest X-ray source in the sky, and you can barely do anything with it, without getting big telescope time. What are you going to be able to do on these other sources, which are so much weaker?" But it turned out that there are different kinds of systems, and that these other systems, although the X-ray companion is a much fainter object in its X-ray emission, the star was much, much brighter than the original star associated with Sco X-1; so we could use smaller telescopes for doing long observations of these objects. It turns out that two of them are about sixth magnitude objects, and on a clear night when you go out and look up, you can see these kind of optical stars with your naked eye; they're very, very bright, right at the edge of what you can see with your naked eye, without a telescope at all. You shouldn't predict too much about science; you can be wrong. [laughs]

Sherkow: What are you doing right now, in terms of your research?

Jones: It's continuing working almost totally on the X-ray observations.-- From this satellite we're doing very little optical. What had happened was that during the first six months or so, the satellite had star sensors, and you need to know exactly where you were pointing in the sky with the satellite, so that you could take the data from when it was pointing every time it's pointing in the same place and superimpose that data on top of itself. Every time it scanned by a place, you wanted to superimpose the data so that you could detect weaker

and weaker sources and obtain better locations for the stronger sources. So there were star sensors which identified a star pattern in the sky, and these were used very accurately to determine where the satellite was pointing. Then, after the first six months, there was a problem with the transmitter on the satellite, so that very little data was received for a period of months. During that period of time, the star sensors were pointed too close to the sun, and although there was a sun shield which did cover and protect the star sensor, there was an area to the side of the shield where the sun's rays burned the film and essentially made the star sensors inoperable for deciding where the satellite was pointing.

But there were also on the satellite, three x, y, and z magnetometers. What Bill has done is primarily to use the magnetometers, instead of the star system, to decide where the satellite is pointing and then to decide how fast the satellite is spinning. Because the stars had determined the location before the strong X-ray sources, we also used the strong X-ray sources to help. Instead of using stars to decide where it's pointing, now we used the determined positions of the X-ray sources to also help decide the satellite's pointing. So between the magnetometers and the strong X-ray sources, we can do almost as well as with the stars. Where before, the only data which had been well analyzed was the first six months, we now have about two and a half more years of data which we're able to analyze. We're using that data and finding a number of other interesting results, as well as studying other things in more detail than they could have been studied before.

Sherkow: Are you and Bill working together?

Jones: Yes. At the present time, on this project there are--I'm not sure how many people exactly--about eight or so people working full-time on the project, and there are three independently-working Ph.D. astronomers. There are two people in the group who work as scientific assistants.

BEGIN SIDE TWO, TAPE ONE

Jones: One used to work in nuclear physics, and he was hired by one of the other scientists as a scientific assistant. So there are three of us who work independently, and one of the three is going to be leaving our group this summer; so there are really only my husband and me who are actively involved in really doing independent research. The other people either work for us or part-time or are computer programmers. A lot of the reason that we work together is because you do get a lot of support, and it's nice to have somebody to go to who will really appreciate what you're doing and who can become excited about it. For us, that's been each other. We also work, although not as closely, with other people who used to work on the project but who no longer do, who have gone on and are developing future projects. We tend to try to involve them; at least keep them informed of what we're doing.

Sherkow: So you're working on this with your husband. Are you doing any other kind of research?

Jones: Not currently.

Sherkow: How much longer do you think this project will go on?
You said you have two and a half years of data.

Jones: The data is all processed at Goddard Space Flight Center, and there are four people, primarily the scientific assistants, and I think one of the other ones is called a data aide. These are the four people who go down on weekends and who actually take the computer programs that people have developed and process the data using these. That will be finished sometime next fall, [fall, 1976] and then there'll be, I would guess, another year of work, taking out the rest of both the studies of individual objects and making what will be a fourth Uhuru catalogue, which will contain positions of new sources.

Right now there are, in the third Uhuru catalogue, about a hundred and sixty X-ray sources. We found in looking at the scans that we now have better exposure than in the star sensor data because most of the star sensor data used only the nighttime parts of the orbits, when you could observe stars and didn't use the daytime parts of the orbits. There was one month at the beginning of the satellite observations when day and night were both used. But with the magnetometer, we can go back and get the daytime parts of those orbits and add them to the nighttime, as well as taking both the day and nighttime parts of all the rest of the data after the star sensors failed. In the data we've processed so far, we've looked and have found about fifty new X-ray sources, most of which are fairly weak sources. We think that in the fourth Uhuru catalogue there will probably be almost double the number of sources that were in the third catalogue. There'll be about three hundred sources, just extrapolating from the numbers we've found, and the sensitivities we'll be able to get to. Then

that's the sort of information that will be used by people in making future detailed observations of these sources which we have found.

Sherkow: On your resume, it indicated that from '75 to '78 you are going to be working at Harvard, doing what you're doing now.

Jones: Right.

Sherkow: I know the idea of '78 is really kind of a long way away, but do you have any idea or any plans for what you might be doing after that, or would you perhaps be continuing on?

Jones: I'd like to continue working with the group of people that I'm working with now. There's an attempt that they are making--primarily Ricardo Giacconi is making--to begin an X-ray institute, which would operate national X-ray facilities. It would be very much like the way Kitt Peak is run, where there is a resident staff of astronomers and physicists. An institute would employ a group of people who develop large experiments which are too large, too expensive, and too important for a single university to develop and to have totally for their own use.

The way Kitt Peak is run is that there is so much of the observing time that goes to the staff members, and then so much of the observing time is allotted for outside astronomers who come there and use the telescopes. At the institute, there would be large space X-ray telescopes and other kinds of X-ray experiments, and these would be developed and computer programs to use the observations would be written. A certain amount of the observing time would go to the people who work at this institute, but then the rest of the time would go to people from outside who would apply for time. The data would be given to

them in such a way that they could use it however they would want to use it. X-ray data is a little bit more complicated than optical observations; things aren't quite as straightforward. There has to be some processing of the data to take out instrument responses in the X-ray, which would be done at the institute, and then the observations would be supplied in the form that the guest observer could use that data.

Sherkow: Would this institute be located in this area, do you think? Or do you know?

Jones: There were a couple meetings of a lot of the X-ray astronomers from around the country, and they wrote a letter to NASA saying that the institute would be a good idea and should be at a place where there is already active X-ray research going on. Two of the most active centers in X-ray astronomy are Harvard and MIT, so it would be very likely be in Cambridge.

Sherkow: And then it sounds like you would be interested in working there.

Jones: I think so. I don't really have great desires to go totally into academics. I really like the research. I would not mind teaching. I am interested in involving students in projects; that's part of why I'm involved in this high school summer program. I think that the most effective teaching can be done on a one-to-one basis. I don't want to be at a large university where you have to teach large classes of people. So being at the X-ray institute, there would be a chance for students to work there with people, and there would be very good chances for doing good research; that's mainly what I'd like to do.

Sherkow: When do you think this might come about?

Jones: It's unclear. Sometime in the next few years. It's not an immediate sort of thing, but sometime in the next few years.

Sherkow: But they would have to build a whole institute. Or would they?

Jones: It would grow slowly. It's very unclear if it would mean renting space in another building or exactly what. It's not decided, as far as I know.

Sherkow: Do you think your husband might also be interested in working at such an institute if it exists?

Jones: Yes.

Sherkow: You would be working together again.

Jones: Yes. Of course.

Sherkow: In most of the articles that you have written, other people have been involved in doing the research with you, and I was just wondering what part each person plays when there's a multiple authorship. These three articles for Sky and Telescope are all written by three people.

Jones: Right. Professor Liller, Bill Liller, is sort of unique in his view of life, I think. When we wrote these articles and when we also worked with him on the optical studies of Uhuru sources, especially on the one source which we did a couple papers on, Hercules X-1--he primarily motivated the studies of Hercules X-1--we worked very much with him; we analyzed a lot of the data and were certainly involved. I

think he probably wrote the first draft of the Hercules X-1 paper. When we got the draft from him, he had the authors on the paper; he had W. Forman, C. Jones, W. Liller. We said, "No, this is not right. This is your project; we really insist that you be the first author on this." We talked to him, and he said, "No, I've got a tenured position here; I'm not going anyplace; I really refuse to be first author on it; I want one of you to be."

It was sort of the same thing with the Sky and Telescope articles. Actually, what happened with these was that we each wrote one of them, the three of us, and insisted that Bill Liller be the first author on the one which he had primarily written, although, even though one had written them, the other two had made substantial changes and contributions to the writing of them. And he again refused. We were going to just send it in with his name on it, and he sort of threatened his secretary with firing her, which I'm sure he wouldn't do, if she, in any way, participated in changing the order of the names on these articles. He is really unique.

With the X-ray observations, in doing an X-ray satellite experiment, there are people who spend a long time, many years, developing the experiment and really basically building the experiment; first getting the money to build it and then actually constructing it. When the satellite was first launched, and for, I guess, the first couple years, there were four people whose names always appeared on papers, whether they were actively involved in the paper or not, because they had spent years of their lives developing this satellite. I think we were lucky in that, most of the time, most of the people were also interested in the project and made very useful suggestions, either while the project was going on or when they received the manuscript to read.

But that accounts, in part, for the large number of people because these four people were always included.

I think the one thing that we greatly benefit by, though, is first having not only those people, but whenever a paper is about to be submitted for publication from our group of people, it's sent around to every scientist in the group, which is about twenty people--be they Ph.D. scientist or not. They're asked to give comments on the paper, within a certain time, to the authors. A fair number of the people in the group do actively read the papers and criticize them, so I think that the papers generally come out with very little wrong with them because of all the internal review that's been done; that's really very helpful. They come out being better written, and if we've overlooked anything, any other analysis that should have been done, it's generally suggested.--[interview interrupted]--

The people in the group are also tremendously supportive of the science that we're doing. Especially, I think, the two people, Ricardo Giacconi and Harvey Tananbaum, both of whom were very involved in the Uhuru project, developed it from the very beginning and have continued to be interested and to be involved, when they have the time, in the scientific developments. They're both very accessible people. They're both tremendously busy people. Often people find that they can put a secretary between you and them, and this happens with people at almost any level; you have to schedule an appointment or set up a meeting to see them.

I think that both of them have remained fairly accessible. Ricardo Giacconi is often busy, or away, and if he's tremendously busy or seeing people, he'll close his door; you go through his secretary's office to get to his office. But as long as that door is open, and

there's nobody in the office, he has never objected to an interruption. They're both just very easy people to work with, and also they're very encouraging people, encouraging of both the science and of trying to get projects done; [they] will take an interest and will help in any way they can to try to solve technical kinds of problems.

Sherkow: I had a few additional questions on some aspects of the women's rights movement, and I just wanted to know your personal opinion. Do you feel that there's any real trend towards positive changes for women?

Jones: I go back and forth. [laughs] It depends on what day of the week it is. I think that the development of day-care centers, and the awareness that people have developed that women ought to, at least, be considered for jobs or for appointments, those two very different kinds of things have been important. The fact that a woman can go out now and can get a job and not feel guilty about neglecting her family or her husband or her house or be made to feel guilty by the people she works with or by the other housewives in the neighborhood who don't work or by her family, I think that that's helped. I think just for women to know that having a family--or just getting married--doesn't necessarily mean that their role is going to be in the home, that's an awareness which has been developed, and that's been very helpful. As far as the hiring of women at high levels, I think business may be better off than academics; I'm not really certain. There has been more pressures put on business. The only reason I'm aware of business things is that my stepmother was a senior research chemist for NCR. I think I told you that.

Sherkow: Yes, you did. Right.

Jones: They moved her division away--she was the highest ranking woman at the time at NCR--and was then rehired later by NCR to head the personnel hiring, and, in fact, to try to recruit women and minorities and to try to convince men who had never hired women that, "Yes, they really should hire women." At the time, there are a lot of managers at NCR; every small division has a manager, and none of the managers [are] women. The women really had the lower ranking jobs. But she said that they have felt pressures to hire women.

In academics, I think that there is a tendency to not put as much pressure on groups, to believe that somehow they have more integrity, or because they are in these high-ranking professorial positions, they know what should be done. It's a subjective feeling. I don't really know how people in government are deciding that "yes, this institution is doing a good job on the Affirmative Action program, and this one isn't. "I don't really know how they view things. From my step-mother's experience, I have seen what I would say would be more forced--not forced, but more persuasion used in business than I've seen in academics.

At the present time, there have been--it's been true for a long time--about ten percent of the astronomers are women, at Ph.D. levels. And there have been studies which have shown that of the women who remained active, they published just as many papers as men did. But at the top schools in astronomy, which is Caltech, Princeton, Harvard, Chicago--I'm not sure who comes next--Berkeley, Cornell--they're all very good schools, there are no women professors.

Sherkow: Of astronomy.

Jones: In astronomy. It was true last year. I'm not sure what's going to be true for the coming academic year. It's true there are no women on ladder positions as assistant professors or associate professors. All the women have other kinds of appointments. They're not in the real academic ladder-type positions or professors.

Sherkow: Why do you think this is?

Jones: A lot of astronomy, and a lot of all fields, works on an old buddy system, where a person at another university will call a person-- always a man at both places--and say, "I have this student; he's great, and he's tremendous; he's leaving here, he's been an assistant professor here, and you ought to hire him." This has a lot of weight. It's easier for a man to get close to another man, working for him or as a man's student, and to really know this person. I talked with some of the other women at the observatory, and it's hard for many men with the pressures they feel, to really support a woman. There's always the unasked question, "Are you having an affair with her?"

Sherkow: If you support her?

Jones: If a man professor supports a woman student.

Sherkow: In terms of--

Jones: Of her career. Yes.

Sherkow: That question comes up?

Jones: I think in subtle sorts of ways. It's not blatant. It's much easier for a man to talk to another man. He can come in; they can be informal; you can use foul language.

It's funny, I work totally with a group of men, and they have meetings occasionally with most of the people--[they] especially have meetings on the Uhuru satellite project. And at one of these meetings the director of our group said something which he shouldn't have said. He said one of the variety of four-letter words; I don't even remember which. I was sitting almost directly across from him and was listening but wasn't--he said something, and then he said, "Oh, I'm sorry." I looked up, and I couldn't imagine what he was apologizing for. [laughs] Then somebody else said No, that I was used to that, it was okay, he could use any language he wanted. But I hadn't even realized what he was apologizing for-- I hadn't realized that he'd said anything wrong, and certainly nothing he should be apologizing for.

But I think that you go in and talk to somebody, and he's not going to tell a woman personal feelings or personal problems or talk about baseball or those kinds of things, which he might do with a male colleague. It's harder in that way, and that's why it's harder with no women at those levels; it makes it doubly hard to get women at those levels.

Sherkow: I guess that's why they have Affirmative Action at universities because this buddy system just continues the same cycle of men as professors, assistant professors, associate professors, and women just find it difficult to break their way in.

Jones: When a group gets together, the final group who chooses professors, anyway, is the professors. The recommendee for the professorship has to be approved by the present professors; that's totally a group of men.

They do try at the observatory now to put a woman on as a member on all committees, either choosing assistant professors, post-docs, graduate students, professors. But I'm not really sure that it matters--I was on one such committee. I was asked to be on the committee to represent minority views. It was clearly to say whether or not there was a woman who was qualified. But that position had been defined pretty much, and it's fairly narrow field of astronomy; it's in a theoretical astronomy field in which there are few women. And the primary reason there probably are no women is because most of the people who are in that field come from Princeton or Caltech, and these schools have not been coed. There just have not been women in those fields. It's very hard.

Sherkow: Yes. Depressing.

Jones: Yes, it is. But sometimes I think that looking back, older women would have had trouble getting into graduate school, and would have had trouble finding their first jobs. I think now women are not having trouble finding their first jobs as postdoctoral appointments or whatever. I still think that breaking into the academic ladder, especially at the professorial level, is going to be hard.

I take the statistics and I say, "Okay, ten percent women for the last twenty-five years." That means that there are ten percent of the women in astronomy who are forty years old, fifty years old, as well as twenty-five years old. I know the women who are twenty-five to thirty to thirty-five. I know a lot of women in this age. Where are the women who are forty and above? Where's that ten percent of the astronomers who are supposed to be that? And why don't I know where they are? Have they dropped out? It's just peculiar. I wonder

if I'm being allowed to do all these things now, and wonder, what's going to happen when I get older? Is this door suddenly going to be shut? I don't understand. It's a little bit scary.

Sherkow: Isn't there an astronomer Margaret Burbidge?

Jones: Margaret Burbidge and Vera Rubin. They're two women optical astronomers, and [they] are two of the very few who are over forty.

Sherkow: Are they at university positions?

Jones: Vera Rubin works for the National Bureau of Standards, and Margaret Burbidge is a professor at Santa Cruz, University of California.

Sherkow: Margaret Burbidge was at the AAAS. [Boston, Feb. 1976]

That's why I remember the name.

Jones: Right. She is one of the very few, though, and there should be a lot. These Ph.D.'s have been given, and, in fact, the percentage of women at the better graduate schools has been higher than at larger state graudtate schools. So if anything, the women have had as good preparation, if not better, than the average male astronomer. It's hard to realize what's happened to these women; I haven't known of any studies on that.

Sherkow: On the older women in the field?

Jones: Yes. The older woman and where in the field she is, if she's in the field.

Sherkow: That might be a good thing for us to pursue. There must be women in this area.

Jones: Right. I guess you could just take Ph.D.'s and try to find out where they are; all the Ph.D.'s which have been given by departments at Harvard and MIT maybe.

Sherkow: It would probably be hard to track down.

Jones: Ask for all the Ph.D.'s awarded between 1940 and 1950. I was concerned, partly because of that and partly because I work with my husband. I had decided that I was going to continue using my maiden name on publications because I didn't want people to think that I disappeared. I wanted them to know that this person, C. Jones, who is on these publications, is still publishing; publishing under my husband's name, I thought I'd lose some of that, and I really wanted to maintain that sort of professional independence.

Sherkow: I was wondering if you had ever experienced differences in salary with coworkers who were men and/or women.

Jones: No. No. Of the only two paid positions, except for summer employment, that I've had, one was a Center post-doctoral fellowship; there were six of us, and all six of us were paid the same. And the other is the Harvard Society of Fellows, and we are all paid the same, depending on whether or not you're married; if you're married, you get, I think, five hundred dollars more. It's very peculiar. I'm sure that grew out of the old system where, up until four years ago, there were no women; so if a man got married, you paid the man five hundred dollars more so he could support his wife. It's very peculiar to have me and my husband working, and because we're married, they pay me five hundred dollars more than somebody who's not married.

[laughs]

Sherkow: The rationale is gone, but the--

Jones: The rationale is gone, but the tradition is still there.

Sherkow: Other than Affirmative Action, how do you feel we can tackle these particular areas of discrimination on the academic level and on any other level?

Jones: It's really hard. I think that good women need to be encouraged throughout their academic careers. I don't want to sound prejudiced; that's a problem. I think that the better women, especially in science, usually do not go to women's colleges. So this goes back to what we were talking about before. I don't want to say that they do not have very bright young women at women's colleges. I honestly believe they do. But I think that at least as bright women and at least as motivated in the sciences, are going to coed schools, and they have not been receiving the encouragement that the women at women's colleges have been receiving. Women's colleges make an effort to hire women on their faculties, and the coed schools are going to have to do the same. In order to correctly encourage undergraduate women, they're going to have to have women on their faculties, at least teaching the classes, if they don't want to call them professors. I think that would help. I think that there is a growing awareness that this is the case, and that there ought to be women on the faculty. But I think even having token women would be enough to encourage more and better undergraduate women and then graduate student women to go into the field; it might tilt things enough that they would just naturally have to select these women because they were so outstanding.

Sherkow: You mentioned that when you went to Harvard-Radcliffe, you were often the only woman in class in most of the science courses that you took.

Jones: Right.

Sherkow: Were all the teachers male?

Jones: Yes. All the teachers were always male. All the teachers [and] all the teaching fellows in the sections.

Sherkow: Has there been a change now?

Jones: I'm not really certain. In the physics department, there is one woman who's an assistant professor. But beyond that, I really don't know. In astronomy, since I was an undergraduate till now, there hasn't been a woman as an assistant professor or professor. There have been a couple of women who've taught graduate-level seminars, who are appointed as lecturers to do that.

Sherkow: Does it sound, then, to you--it sounds this way to me--that Harvard is obviously not making an effort to get women astronomers and other scientists into teaching?

Jones: Yes, I think that's true. It's funny, Yale was advertising this year for an assistant professor in astronomy, and I received, and I think almost all young women in astronomy received, a letter saying, "We're looking for someone." It was essentially the notice that was posted on the bulletin boards too, but it says, "We have this position available, assistant professor in astronomy. These are the qualifications. We encourage applications." But it was sent to women so that women were aware of this, and were aware that they were making some kind of active effort to attract women.

Sherkow: That was Yale.

Jones: That was Yale. I suggested to the chairman of our department that they do that in astronomy, and he thought it was a good idea. But I don't know if anything was done. I think there are women around, and I think that the women now are fairly good. But it is still ten percent.

Sherkow: But you would agree with the statement that women are just not being promoted to professorships and assistant professorships and associate levels at most of these universities, for one reason or another? I don't know. You mentioned the buddy system as--

Jones: Yes, I don't mean to slander anybody. I think that it is fair to say that if ten percent of the astronomers coming out of good graduate schools are women, therefore they're available and have been available for a long time to be hired at these positions, then some kind of discrimination or pressure has caused women not to be hired, because they're there. They are there.

Sherkow: Because there then should be ten percent women on the faculty, and there aren't.

Jones: Right. And there aren't. The two major people I work with are Ricardo Giacconi and Harvey Tananbaum, and I've felt no discrimination from these people; they've always been very encouraging and have, I would guess, written fairly decent recommendations for me, or else I wouldn't have received the fellowships that I have. So honestly, I don't think that either of them in any way believe that women are not as qualified or can't do as well as men.

Sherkow: But you had mentioned earlier that at the Center, you were the only woman in this group of people.

Jones: In the group I work with. Right.

Sherkow: A group of twenty?

Jones: Well, there are other women there, but not at a full Ph.D. level.

Sherkow: Right. But the fact is that there are other women who have Ph.D.'s that perhaps could be there, but you're the only one in your position in that group of people.

Jones: Okay. Yes.

Sherkow: I'm not trying to make you feel bad about your job.

Jones: Okay. No, it's a little bit peculiar because most of the people in the area I work in, did not begin as astronomers. They came in from physics departments, where the percentage of women is much, much less.

Sherkow: I see.

Jones: They did, this year, try to hire a woman, who is, instead, going to Vassar. I actually know very, very few women in my own field. It's a very new field, and there are not very many women in the field; most of the women I know of, are foreign. A few aren't.

Sherkow: You mean in **your** specialty?

Jones: Yes.

Sherkow: In terms of women's rights, have your ideas evolved over time?

Jones: Sure. I don't think that I ever felt that women were in any way limited in what they could do; I always felt that women were as capable. Certainly if they were as capable, they should be paid as much. I think I've become increasingly aware of the problems of women. Before, it never occurred to me that someone would really actively discriminate against women. I find that still difficult to comprehend, but at least I am now aware that that can happen. Before, I would have found discrimination very surprising.

Sherkow: "Before", do you mean five years ago or something like that?

Jones: Yes. Five years ago.

Sherkow: There's more documentation, there's more research, and there's more media coverage of some of these issues.

Jones: Right. And more personal experience.

Sherkow: Earlier, you mentioned being interested in the idea of teaching on a one-to-one level. But basically it sounds to me like your interests have always been in the area of independent research. Was this always your expectation, once you decided, somewhere along the line, that you wanted to be a scientist, that it would be in the area of research, as opposed to teaching or something else?

Jones: I've always really enjoyed the research, and I've felt that, personally, I learned a lot more from doing the research than I did from attending classes, where you had to do homework assignments and

you had to learn things in order to take tests; I felt that I learned more, and I learned it much more pleasurablely from doing it, than from having to learn it for a class. And I felt that a motivation for teaching was sometimes for the power involved, that you could require things from students, and it wasn't always because you really loved something, and you really just wanted to tell them about it and they would love it as much as you did, they could see the whole beauty of how things worked. I really didn't see that kind of enthusiasm in the teaching that I had, in the class--

BEGIN SIDE ONE, TAPE TWO

Sherkow: One of the things that I wanted to ask you about was if you felt that there was a real lack of self-confidence among female college students. I know you haven't been to school for awhile, and you did mention that there weren't very many women in your classes.

Jones: It's hard to talk about other people. I think that as far as my own feelings, I felt fairly confident in high school, but lost a lot of that confidence in college, and then gained it back in graduate school and later. It's hard, coming from high school, where you've done well, and going into a college where everyone has done very well; you find out that you're not at the top any more, and that, I think, hurts confidence.

Sherkow: What caused you to have more of a confidence problem in college as opposed to high school?

Jones: I think what I just said.

Sherkow: Didn't you mention the fact that because there were all males, that that had something to do with it too?

Jones: That certainly didn't help, but that was because the people who did better and who, I think, had better high school backgrounds, were men coming, like, from the Bronx High School of Science. And I think that it wasn't just me losing confidence; I think that a lot of the men who had come from similar kinds of backgrounds, which weren't supertechnical, also lost confidence. I saw a lot of them changing fields and getting out of the sciences because of that.

Sherkow: I wasn't aware of this, but apparently you can go to high school and specialize in science?

Jones: In New York City you can. [At] the Bronx High School of Science, you have more advanced science classes than at other high schools. It's like a magnet school, but it was big. There's also a Boston Technical school, which I really am not familiar with, but I think it also has a lot of classes in the sciences and technical areas that the normal high schools wouldn't have.

Sherkow: All along, I've tried to ask about your expectations as you were growing up and as you went to high school, and I have also asked about your parents' expectations: did they expect you to become a scientist, did they expect you to get married, and so on and so forth. Since we're all finished with those kinds of questions, how do you feel now, in terms of your personal expectations, and what really happened?

Jones: I think that I've done as well or better than I had ever expected to. It's hard to say if I've done as well or better, as my parents expected me to, but I would guess so.

Sherkow: Your expectations were of becoming a scientist, right?

Jones: Pretty much. I think that I always expected that I would have some kind of career, at least to the point where I could support myself. I don't think I ever clearly formulated what I would be doing. I've tried, instead, to take advantage of opportunities if they'd come along, rather than have any sort of rigorous thing that said, "I was going to do this, and I was going to do that;" instead, just as opportunities arose, I would apply to do things or become involved in areas that there was good science going on in, rather than have predetermined everything that I was going to do. So it's hard in that way to judge if I've come up to my expectations because I didn't ever make set goals for myself.

Sherkow: What about your parents?

Jones: They never really pushed in any way for me to go on, [and] I think they were always very happy when I did; that's sort of a positive reinforcement, but there was never a negative kind of feeling if I wasn't going to. I think had I wanted to quit high school or quit college, they would have been somewhat distressed and would have tried to encourage me not to. But because I didn't, they never tried to tell me what to do.

Sherkow: It sounds like the life that you are leading must have matched their expectations of you in some way. Didn't you mention before, that when you were going to get married to Bill, they were worried that you weren't going to finish your Ph.D.?

Jones: Right. It wasn't so much a worry. The only thing which my

father asked was, "Was I planning to finish my degree?" When I told him, "Yes, I was," he didn't say anything. He didn't say, "Oh, that's good," or, "I was worried that you wouldn't." That was it. [laughs]

Sherkow: But it sounds to me like he wanted to you finish.

Jones: Sure, he wanted me to.

Sherkow: This is an overall question, but how do you feel about the way things have turned out, in terms of your career, your training, your marriage, everything? I know you're still very young, and you'll probably be going through more changes, but...

Jones: Yes. I'm really pleased with things. I think I have been tremendously lucky, first of all, to be married to Bill, second, with the people that I have an opportunity to work with, and third, with the kind of science that I've had an opportunity to do. It's all been very, very rewarding and fulfilling and exciting. I don't think I would change much of anything.

Sherkow: That's nice.

Jones: It really is. It's very, very nice. I think I've been very lucky. The only thing I would like would be that there would be more opportunities for women. I don't think that I've been limited at all, but I think that having seen or having had other women around would have been nice. And they were not there, in the classes, or to offer guidance as a professor or someone to go to. That would have been nice. I would have enjoyed that.

Sherkow: I have a few nonprofessional work questions that I talked to you about earlier.

Jones: Okay.

Sherkow: One of them concerned your reading activities. I was just wondering what kind of reading you do. The choices were professional reading (and you could have one or more); nonprofessional books, journals, or novels; women's magazines; then, what one source calls opinion magazines, and in that category they have, for example, Harper's, New Republic, Reporter; and then general magazines, daily newspaper and news magazines. It's basically everything that you read.

Jones: I think that I tend to have to do reading in my field just to keep up. In addition to that, the reading I do is usually pleasure reading: Agatha Christie mystery novels and science fiction. I like Carl Sandburg a lot. I really am tremendously fond of his poetry. I've just started this book Macaulay by John Clive. I think that the books primarily are fairly light. They're certainly not in my professional field in any way.

Sherkow: Do you read any newspapers?

Jones: I read the Boston Globe and the Sunday New York Times. More often the Sunday New York Times than the Boston Globe.

Sherkow: Do you subscribe to any magazines, other than your professional journals?

Jones: National Geographic. Smithsonian. My parents got so many magazines when I was growing up, there were so many scientific organizations, if you belonged to them, they got the magazines. But I think, partly because of that, if ever a magazine subscription comes up, we don't get it. There were so many magazines always piling up. I think

we tend to buy things on the newsstand, read them on airplanes. There was a time, last spring, when it seemed like we were flying more often than they could change the weekly magazines. We were seeing the same issue of Time and Newsweek and New Yorker.

Sherkow: Do you subscribe to any professional journals?

Jones: No. The only one is the Astrophysical Journal, both the regular and the letters, and we read that, but do not subscribe. We're probably about to. It seemed before that if we were going to ever have to move, we didn't want to accumulate any journal and other subscriptions. But we're about to start this year subscribing to that. We've decided we'll read it more regularly if it arrives in our mail than if we have to go look in the library.

Sherkow: The next thing I wanted to ask you about was entertainment and recreation. I was thinking in terms of a typical month, and the items included entertaining at your home, going out to dinner, movies, theater, concerts, sports, and others...So what do you feel about that? How do you feel you spend your typical month?

Jones: Oh, we go to a few movies. We occasionally go to a play. This Saturday we're going to go see The Belle of Amherst. That should be really fun.

Sherkow: Is that the play with Julie Harris?

Jones: Yes. I guess maybe movies, and we sometimes try to go to special presentations of things.--[interview interrupted]--

Sherkow: What about going out to dinner and sports and things like that? Entertaining at your home?

Jones: We tend to either have people here for dinner or go to a friends' house for dinner, often other people who we work with. We tend to go out to dinner not quite so often because we go out to lunch every day with people. Occasionally, on a weekend we'll go out to dinner in a restaurant, but I think it's more often that we'd have people here for dinner, or we'd go to somebody else's house for dinner, than that we would go out by ourselves to dinner.

Sherkow: Are you interested in any sports?

Jones: Sports?

Sherkow: Either your participation or--

Jones: Not any sort of formal involved things. I love swimming, which is hard to do in the Boston area. We did some ice skating this winter because everything was frozen.

Sherkow: Are you a fan of any of the local teams? They have so many.

Jones: I like basketball, the most. I really don't keep up. Once they're into the playoffs, I'll know how many more games they have to play and...

Sherkow: But you don't go to the games or anything like that?

Jones: Occasionally. Not often.

Sherkow: To the Celtics?

Jones: To the Celtics. One or two games a year. Really seldom.

Sherkow: Are you a participant in any clubs or activities in Arlington or the surrounding area?

Jones: Clubs or activities? No formal clubs. There were local town elections, and we did some campaigning for a person who was running for the school board. He didn't make it. We campaigned for him this time and last year when he ran. It's hard when you work. It's really hard when you work.

Sherkow: It's hard. Yes. You mentioned quite a long day, from nine-thirty to seven-thirty.

Jones: Nine-thirty till six-thirty.

Sherkow: Six-thirty. That's a long day. I was wondering, do you now serve on any government committees or have you in the past?

Jones: No.

Sherkow: What do you feel are your personal assets and capabilities of which you are most proud?

Jones: I think that I know how to choose which types of problems are going to be interesting to work on, are going to be possible to solve, and are going to, in the solving, give nice solutions to them; I mean, that other people are going to care about the answers. And I know how, then, to go about solving them. I find that to be more important than if I can figure out how to write a certain kind of computer program or do any other sort of technical skills. I think the other, which is sort of learning values, is a more important thing to learn.

Sherkow: What are your personal goals in life? In talking about the expectations, you've really touched on that, and you've talked

about the future of this institute. So, if there's anything else you want to add...,

Jones: No. The only goal I really have is that I continue to be able and allowed to do good scientific research. I don't have a goal of seeing myself in this powerful professorship or any other role, but just that I be allowed to do good science.

Sherkow: You don't anticipate any particular problems?

Jones: No.

Sherkow: I think that's basically the end. Thank you.

END OF INTERVIEW