

# Oral History Transcript — Dr. Robert March

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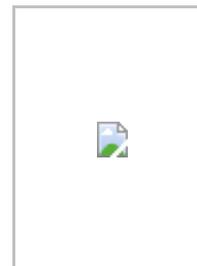
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Interview with Dr. Robert March  
By Patrick Catt  
At University of Wisconsin, Madison  
June 26, 1995



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## Transcript

**Catt:**

It is June 26, 1995, and this is with Professor Robert March at the University of Wisconsin in Madison. Before we begin, I would like to start off by asking if it is alright that we tape record our interview?

**March:**

Yes. Sure.

**Catt:**

Great. I must also have it on record that when it comes time for me to write my dissertation,

any quotes I will use from this interview I will check with you for any inaccuracy, or if you do not want them to appear in print. Also, if you would like, I will also send you a copy of the transcript.

**March:**

Sure, I would appreciate it if you did.

**Catt:**

Okay. My first question deals with your family's biographical information. Do you or your family have a history of activism, I mean your parents, brothers or sisters? Is there anyone in your immediate family whom you would consider having a history of radical activism?

**March:**

Well, I would say... in general, you could describe my family as political activists, on both sides. My parents met at a Young Communist League convention after my maternal grandmother had volunteered to take in some out-of-town delegates. My father was at that time 19-years old and organizing actions by the unemployed and distressed farmers on the Great Plains. My mother got involved through a brother who became entranced with communism while on shore leave in the USSR as a merchant seaman. For most of his mature life, my father was involved in the trade union movement, but my mother more or less dropped out by the age of 40 out of general disillusionment.

**Catt:**

What was your father's and mother's religious backgrounds?

**March:**

My mother was raised Catholic, and my father Jewish, and both went through periods of deep religious feeling while in their early teens, only to turn atheist by the time they graduated high school. I was not raised religious but was not discouraged from exploring religion either. But I decided fairly quickly that I had no use for it.

**Catt:**

What were your parent's occupations?

**March:**

My father was born in Brooklyn, New York. At the age of 21, he began organizing in the Chicago packing houses and quickly rose to leadership in the union. He was considered one of the top labor leaders in Chicago, and in World War Two even served on a Presidential labor panel. After Taft-Hartley, the fact that he had been an open communist barred him from trade union office. He stayed on a while as an organizer, then moved to California where he was a construction worker for several years until he went to law school. The last 10 working years he was a labor lawyer. My mother was born in Yugoslavia and immigrated to the US at age 9. Her family was middle class and emigrated because local politics diminished their status and opportunities in their home town. Though politically active in her Chicago years, after our move to California, my mother started a business (market research) and was only active on local issues.

**Catt:**

Where did you grow up? When did you first become interested in science?

**March:**

I became interested in science through an uncle who had been trained as a chemist in Yugoslavia who became a pharmacist in the US. He gave me his copies of Scientific American and Hygeia starting when I was about 6. I had been a spontaneous reader at age 3, so these were no problem for me. At the age of 9 I transferred from the Chicago public schools to the University of Chicago Laboratory School where for the first time I met the children of scientists on the UC faculty, and decided that's what I wanted to be. And I stayed at Chicago all the way through to the Ph.D.!

**Catt:**

When and where did you do your undergraduate degree, and in what field? Were you active politically in this period?

**March:**

While getting my BA at the University of Chicago, I was active on the student newspaper, The Chicago Maroon, and in the Labor Youth League chapter, which controlled the paper! These were high McCarthy days, so there was very little opportunity for open left-wing activity.

**Catt:**

What was your impression of the general public's view of science and scientists at this time? How about the Cold War? By that, I mean nuclear weapons research and development? And lastly, what of the security cases of E.U. Condon, J. Robert Oppenheimer, and the Rosenberg's?

**March:**

I knew so many scientists who were parents of my friends that I had a pretty accurate and largely favorable impression. Most had high moral ideals, and were very leery about the Cold War, the nuclear arms race, and were appalled at the execution of the Rosenberg's, even if they were guilty. I happened to believe they were innocent, an opinion I have of course long since changed. The Oppenheimer and Condon cases came when I was in high school. Coincidentally, one of Condon's appearances before HUAC was in the same hearing as my father! I was upset at what had happened to Oppenheimer, as were all my fellow graduate students regardless of political beliefs.

**Catt:**

Since your parents, especially your father, was active in left-wing activities, did he, or perhaps anyone else you may have known, get blacklisted or persecuted during this time?

**March:**

My parents were harassed by the FBI, as were other members of my family, including me. I was bounced out of my research assistantship while in graduate school at the request of the FBI. But the University of Chicago found other ways to support me. At the same time, another physics graduate student named Elias Schnitzer, who later invented the neodymium glass laser, got the same treatment.

**Catt:**

What effects, do you think, did McCarthyism have on American scientists?

**March:**

Most scientists I knew developed a deep distrust of the government, and especially of Republicans, because of McCarthyism.

**Catt:**

What effect did Sputnik have on you? And following that, what was your attitude towards communism and socialism at this time?

**March:**

I was pleased at the Russians' achievement with Sputnik because I felt it provided a measure of balance on the international scene, even though by then I was no longer pro-Soviet and had ceased to even consider myself a Marxist. My education as a scientist had given me a distrust of ideology. However, I still felt that Marx's analysis of capitalism was largely valid.

**Catt:**

With whom did you do your graduate work? Did you ever discuss the growing dependence of physics research to national defense-security applications? Did you ever discuss what is or what should be the social responsibility of the scientist?

**March:**

In graduate school, I turned to particle physics because, while roughly a senior in undergraduate physics, I got a job in Enrico Fermi's research group as a nuclear emulsion scanner. I felt that if Fermi could separate his pure science from his weapons program consulting, I could have a career. But I knew I could never get a security clearance and I had no desire in any event to work on weapons research. Of course the Cold War completely distorted the science-government relation in ways we still are striving to overcome. I, most of my peers, and our professors accepted that government would support our research for motives that included military research, but we felt that as long as we were doing pure research, we had no compunctions about taking their money.

**Catt:**

What were your career plans for after graduation?

**March:**

After graduation, I took a postdoc here at the University of Wisconsin, which led in two years to a faculty position. My career plan had been to teach and do a little research at one of the high-quality liberal arts colleges, like Reed or Swarthmore, but these were not hiring in 1960, so I sort of drifted into a major research university.

**Catt:**

What scientific societies were you a member of during this period, I mean, before 1965?

**March:**

At this time, I had long been a member of the American Physical society, and was somewhat

active in the Federation of American Scientists.

**Catt:**

Were you active in campaigning or canvassing for any elected official during the years 1950-1960, or for someone who was running for office?

**March:**

The only elective politics I participated in, in the 1950s, was some work on Vince Hallinan's run for president as a Progressive in 1952.

**Catt:**

Do you recall your political views then?

**March:**

I would call myself a left, social democrat by the end of this period, and I would say my views have pretty much remained the same.

**Catt:**

Okay, could you say a little more about the Test Ban Treaty, and about the political climate here in Madison when you arrived?

**March:**

Well, Art Rosenfeld and I and another guy went to see the two senators from Illinois in their Chicago offices. Douglas, who was supposedly a liberal, well he was a hawkish liberal, and so when we came in we told him we were lobbying for a test ban. And he proceeded to give us a lecture about how important the defense of the nation and how dare we as physicists compromise national defense and so on and so forth. We were sort of disheartened by that. But we went in to see Everett Dirksen who's as conservative as they come, he made it sound like he was all on our side without committing himself to anything. He was so good, they used to call him the "Wizard of Ooze." I mean he was this polite, southern gentleman with a southern accent from southern Illinois. He was so good, we came out feeling all warm and cozy and then realized Dirksen wasn't going to do anything Douglas wasn't.

So I had that role model. But again, those guys disappeared in about 1955, or '56 they went off to their jobs and I was left with nobody in Chicago, except Nina Byers who I told you about got her Ph.D. a couple years ahead of me. There was nobody around who was political in the Chicago physics department. Then I came up here. There certainly was no activism up here to speak of. Although there was a liberal tradition and Bob Sachs, who was the guy who provided the leadership and started as a nuclear theorist but he really started the high-energy experimental group here, he was the one who insisted they had to hire such people. And in the late 1950s he had taken some strong stands against McCarthyism. Of course as it turns out Wisconsin was the safest place to be anti-McCarthy because he was very leery of touching the University of Wisconsin. That could have backfired on him in a serious way. So in some sense this place was a haven during that period. I came here in 1960 when all that was pretty much over.

**Catt:**

From your time as a student to you becoming a faculty member of the physics department, was science what you expected it to be when you got here and started to work in the tenure track system?

### **March:**

Yes, of course. Remember I'm part of this incredibly fortunate generation that got their Ph.D.s just as the Baby Boomers were about to hit campus. So between Sputnik, which upped the research budgets, and the Baby Boomers, who were about to come...1957 was Sputnik and about 1962 the first of the Baby Boomers started to hit the campus, if you had a Ph.D., were situated at a research institution, and your breath fogged the mirror, you couldn't miss. I mean you've got the money to do research if you had any ideas. Also in my field, which is particle physics, and I can't say I had good judgment I just came because this is where the job offer was and I liked the University of Wisconsin as a place, the bubble chamber was just about to hit. And doing interesting research with the bubble chamber was so bloody easy that getting tenure was a snap. I had five or six different ideas, all of which worked out, and in three years I had tenure.

Well, after I had two years of postdoc and three years as an assistant professor, that is. You see, this university had a practice in some departments, especially in the science departments, of making the tenure decision after three years. The excuse being that people put in postdoc time and so you've really got about a five or six year record at that point beyond the Ph.D. whereas over in English they're hiring fresh Ph.D.s which they needed the six years. But yes, it was what I expected it to be. I enjoyed it immensely in those days. I got to be in on this very exciting business in the development of the standard model in particle physics. But then by the late 1970s, I could see the hand writing on the wall and it became clear to me that the field was going in the direction I didn't like for purely technical reasons.

Plus with the money for research not growing as fast as the number of scientists the squeeze and the bureaucratization of the whole business started in the early 1970s. It became much harder to get funding, you had to join... this is for purely technical reasons, the kind of research that started to be done had to be done by huge collaborations. Not because it took huge numbers of people to do it, because it took the research funds of huge numbers of people to build the equipment, especially colliding-beam particle physics. That's how I got out of it. I just...which has hurt my career. If I'd stayed in it, I'd be a high muckety muck doing nothing but attending committee meetings and getting my name on important papers and things like that. But it wasn't my style. I probably should have been a theorist if I had the chutzpah for it because I don't like working in large groups, I like working mostly alone. And in the bubble chamber business where I made my mark here, you could almost work alone. I mean a professor with a couple of grad students could get a hell of a lot done in the time scale of a year. And now you are part of an organization of 400 to 1,000 people, and you're making commitments for what you're going to be doing 15 years from now. It is ridiculous. That ain't fun, that ain't science, not the kind I like. I am deeply envious of some of my biological colleagues who...now I know a lot of biologists, in recent years I've gotten involved with some. It's nice. A lot of them go into a laboratory and they have an idea and three or four months later they've got an answer.

### **Catt:**

Would you say that your activism, if I can call it that, emerged during this time? Or did it come later, in the late 1960s?

**March:**

My activism came...well, it was just a coincidence of when the Vietnam things hit, the start of my activism was a year or two after I got tenure here. Now, obviously the fact that I had tenure made it possible for me to become an activist. I think I would have thought twice about it if I was still a candidate for tenure. Oh another important role model although a more remote role model for me was Philip Morrison. He had always been politically active, he was quite left but part of the Establishment, that's the amazing thing. He's probably the left—most respectable, establishment physicist there is. One of the things I was involved in just about the time I got tenure was setting up the course "Physics for Poets" and I got a lot of help from Morrison on that. He invited me to a conference that he had set up in Boulder with the usual sort of Morrison people. Journalists and a strange assemblage of people to talk about humanizing science. That really had a big influence on the manner in which I created "Physics for Poets."

**Catt:**

Now "Physics for Poets," was that envisioned as a course for non-science majors to help them understand physics?

**March:**

Yes. It's a one-semester course for non-science majors because that fit our curriculum here, that is all the physical science they were going to take is the one semester. And so the fact that the only other course we had that they could take was two semesters and also full of pre-meds who were going to get all the B's and A's drove people off. The other thing about it, the basic idea of "Physics for Poets," was that I was offended by the fact our introductory courses didn't tell anything about the 20th century. And so I was going to do a course in which two-thirds of it would be about 20th-century physics with just enough classical physics for them to see the contrast, so it's all about relativity and quantum theory. It was considered quite radical when it started out, but then three or four years later it had plenty of imitators.

**Catt:**

Did you ever teach a course within this department for students within the department, or perhaps from other sciences, dealing with science and values, or science and ethics?

**March:**

No, not for scientists. I had briefly, I think two or three times, oh, say from 1969 to 1972, I had a course on science and society but it was for non-scientists and it didn't work out very well; so I dropped it. And I also was sort of peripherally involved in setting up another non-scientist course we have here, sort of a sound-and-light lab for musicians and artists. So science education has been an important cause for me. I have now also an appointment in the Integrated Liberal Studies (ILS) program here, and I serve as chair of that program. So I would say as far as my activism was concerned, I was more concerned with science teaching. And of course the science and society dimensions embedded with it.

**Catt:**

Perhaps you have had some interactions with the history of science department?

**March:**

Well, a lot of interaction with history of science. I know everybody in the history of science department. I consider two or three to be friends. They're very involved with the ILS program. It's an absolute set up for them because the approach ILS takes to each of the three major curriculum areas. Each has a sequence of four courses. The first two of them which are historical. And so history of science teaches science from ancient Greece to Newton and then Newton to Einstein. And then I take over with modern physics, and then we have a biologist who does that side of the 20th century. In fact, I've been very, very tempted at several times in my career to switch to history of science and I still intend when I retire and have time to write books. I have four books in mind, two of which are historical. I want to do two books, both a popular and a scholarly history of my own discipline. But I think it's fully impenetrable for people who haven't worked in the discipline. There is only one guy here on this faculty who is interested in other things that could do it, but he does late 19th century and I can't seem to get him interested in it. Maybe after I retire I can sucker him in because I need somebody who has a historiographic skills, I'm aware of what it takes.

**Catt:**

Getting back to just a couple things off the list here. Did you participate in any 'March 4' activities here at Madison? These would have been in 1969 and 1970.

**March:**

No, that doesn't ring a bell.

**Catt:**

'March 4' was the nationwide research moratorium that occurred at MIT and some 30 other universities in which scientists.

**March:**

On March 4 of 1969?

**Catt:**

Yes, it was the first one organized by MIT scientists, the Union of Concerned Scientists and.

**March:**

Oh now I remember. No, nothing happened here. Zilch.

**Catt:**

The whole time between 1968 and 1974, was there any concerted effort by students or faculty to organize as radical scientists?

**March:**

Well no, basically the amount of radical science on this campus was negligible. We were nothing like MIT. MIT was a veritable hot bed of activism. Even places like Illinois had more than we had. I don't know why. I guess the people who were inclined to be political activists here for some reason weren't active at that time, scientists I mean.

**Catt:**

One thing that does come out is an article in Science for the People, called "Calculus for Conquest." That's it, the one you've got right there. [Interviewer indicating "Calculus for Conquest: SESPA vs. Army Math Research Center," Science for the People, 5 (No. 2, March 1973), 34-38.] It talks a little bit about SESPA activities here at Madison. It says that after the bombing of Sterling Hall in 1970, those faculty who would speak out against military research on campus were essentially fired, and that those that remained over with few exceptions were, I think, called "sheep." I mean, of course, this was probably written by students. What was your reaction to that?

## **March:**

Well, in this period from the early 1970s to the late 1980s, the administration was largely conservative. Conservative in the sense that they tended to be Cold War-activist types. Ed Young, the next chancellor of the Madison campus and who was then president of the Wisconsin system after the trouble started, was a labor economist who had been very much involved in the effort to build up non-communist trade union movements in Europe, as a foil against the communist stranglehold on trade unions. Then the next chancellor we had was Earl Shane the chemist who was very much of the school of thought of close involvement of university with industry. And so these were people from a conservative point of view. But I can't say there was any purge in left-wing faculty that I'm aware of... Now wait a minute... now it is true. It's not in the sciences but the English Department had four left wing activists in it who came up for tenure all in the same year and I'm trying to remember when it was. It must of been about 1969 or 1970. It was very dramatic because they had exercised their option to have the tenure decision made at a open meeting which was part of our rules and regulations.

So the English Department met on the stage of the Union Theater with an audience of thousands of left wingers and proceeded to purge the four, as they were called "crazies," these four English professors, two of which I'm sure they'd love to have back as they went on to quite distinguished careers. But one of them remained in town as the director of Hillel Foundation. In that sense, the administration made it clear that it was not happy with political activism among faculty members. Maurice Zeitlin in sociology. There it wasn't the administration it was the Regents who came down on him and made life uncomfortable enough for him so that he went away to Santa Barbara. So there were a lot of left wing, old left faculty around that time who did leave. It must have looked to the students like it was a purge but it was more of the case of a bunch of people who saw opportunities elsewhere and took them. And I think what they, the faculty that is, realized was that we now have a conservative administration and left wingers were not going to be prominent in faculty politics anymore. That may have been one of the things that made them want to leave.

There is an historian by the name of William Appleman Williams, who's left wing, and who left about the same time during this period. I also know of a guy who was not only non-tenured but non-tenure track in the Institute for Environmental Studies who was sacked for a very successful job of torpedoing the ELF, the "Extremely Low Frequency" submarine communication network up in northern Wisconsin which got built but on a much smaller scale than was originally intended. His name was Mike McClintock, who later went off to Clark University. I don't know what happened to him after that. Anyway, he just did a good physicist's analysis on the damned thing and found that it was going to consume an enormous amount of power to do the job they claim it's going to do. As a result of that kind of activism he

got sacked. So there was somewhat of a... it was more an attitude of some conservatives in the administration who said it's time to circle the wagons and not have prominent left wingers on our faculty too visible to the general public. And about that time, Harvey Goldberg started spending half of each academic year in France, he did European largely French cultural history, so that was natural for him. So the left, the faculty left, became much less visible after that point. But I can't say that I was ever given any trouble by the administration. It was more that my physics colleagues for a variety of reasons came down on me, for my left-wing activism.

**Catt:**

Were you also involved in, or what were your sentiments towards other movements that were going on at the time, civil rights, women's liberation...?

**March:**

My instincts always favor these. I didn't personally get involved in the Civil Rights movement simply because I didn't have a point of contact with it that much. My younger brothers, whom were still students in the 1960s, did get much more involved than I did. But it wasn't an issue up here that much. Gee, I remember once attending a demonstration in favor of an open-housing law in Madison and that's about it for Civil Rights activism. And I've always kept some contact with people who are active but I myself have not been that active. Feminism, while it was still possible for males to participate, I did a little. Then feminists got so radicalized that males were not supposed to be involved at all and then that ended that.

**Catt:**

How about the movement, if you will, that was beginning within science around this time for more inclusion of minorities and women in science?

**March:**

Oh that's always been a campaign of mine. In fact half of my graduate students have been women. I always considered that a...I was very upset that the small percentage of women. That's another thing that got me in trouble with my department. In fact at one point we didn't hire our first two women faculty members, both in the same year. One they wanted to hire, she's a big muckety muck, the other they didn't. She'd been here...

**Catt:**

Do you know when this was?

**March:**

This would of been in 1975.

**Catt:**

Okay, so it was after 1974?

**March:**

Right, it was later. And I was on the new staff committee when this whole issue came up. And we wanted to hire three new assistant professors and I was campaigning for this fourth person, Bernice Dyrand, whom we would hire here as a postdoc in the mathematical physics. The department considered her marginal and didn't want to hire her. But under affirmative action

guidelines we were in an embarrassing situation cause we had a person here in a non-tenure track position who was spousally-trapped, she was married to one of our faculty. And at that time the affirmative action guidelines said that whenever your position comes open you should look at the qualifications of anybody in that situation for it. And I was on the new staff committee and one of the high muckety mucks in the department, who was very conservative, said, "Well, we don't have to do that, and we don't want to have to take her!" which is true. But we had to give her a certain kind of consideration. And so I was very upset by all of this and I drafted a memo giving my understanding of what the rules were. He proceeded to acknowledge that but said, "No, it's nothing like that!" Well one of our faculty members, who's always rather conservative on women's issues, he is very strong because his wife was feminist, and she was vice chancellor at that time, and he took my memo to her, she passed it along to the dean, the dean said, "My God, this is a correct statement!" and proceeded to reprove this guy. In the meantime we had a department meeting at which several members of the department had made really disgusting sexist remarks about this woman that meant that if she wished to go into court she would probably be forced on the department. So the dean in fact forced her on us but the department holds me responsible for that. She's a very fine teacher, though she's a marginal researcher. I think there should be a place on a faculty like this for a very fine teacher.

**Catt:**

What was your impression of the students' activism, in particular, of Students for a Democratic Society?

**March:**

There were a couple left-wing graduate students here who from time-to-time came to me for advice but I'd never gotten organized. I never... About the time I developed some contacts with people who were in the SDS was about the time the SDS decided that the faculty left was too stodgy and conservative for their tastes. So I never really got involved with them. I had a couple contacts, three or four students I knew not in physics but in other fields, actually there was one in physics too, who were SDS. Within a matter of months after this, the radicalization of everything made it impossible. My colleagues always assumed that somehow the faculty left had the ear of the student left, and that simply wasn't true, here at least. The student left pretty well dismissed the left-wing faculty after the students radicalized, once it came to violence. Because it's clear the faculty didn't commend violent demonstrations no matter how left wing they were.

**Catt:**

And I guess the last big component of "The Movement" would of course be the antiwar movement.

**March:**

Yes, and of course every chance I got I did the antiwar thing. I mean I was very very upset by the Vietnam War. So without actually joining any organizations, I participated in peace marches. There must have been a dozen peace marches here at least. The typical Madison style, this town is one of the... if not the founding place, one of the founding places of the Women's International League for Peace and Freedom. Catherine Clarenbach was the grand dame of that movement, sort of a towering figure. The style of that movement was candle-light vigils and things like this. So that's the sort of political activism I feel more comfortable with. Throwing rocks at cops is not my idea of how you change anybody's opinion in this country.

**Catt:**

So I take it you were never arrested?

**March:**

No, but I came close once. One night, I was doing the most establishment thing you could possibly imagine, this was at the time the decision was being made as to where to locate Fermi lab.

**Catt:**

When is this?

**March:**

1968, in March 1968. I was working late in my office preparing the cultural document for Madison... see, we were one of the six finalists for the lab, and so I had to explain the cultural advantages of living in Madison, all plus the infrastructure, the airport and how many flights a day we had and all this stuff. Anyway, I had to mail it to the then-Atomic Energy Commission, so I finished up around midnight, drove down to the post office, and got in just in the nick of time to get a special delivery off to Washington. Well, I was driving back home, down State Street in front of one of the movie theaters and there had been a demonstration on State Street and there were a couple of kids groping around trying to flag down a car. It seems they'd stepped out of a movie, they were a couple of kids living in the dorms, and they'd stepped out of a movie right in the middle of a demonstration and got tear gassed. And now they just wanted to get back to their dorm. So I told them to hop in.

I had a girlfriend at that time who lived within a block of their dorm, and here they were just crying to beat the band, so I decided to stop at my girlfriend's house and let them wash their face at least and get the tear gas off. All of a sudden somebody informs me, "Hey..."—you see, this house was in a funny location next to a parking lot—"...it's surrounded by police cars!" So the cops came over and knocked on the door and said they were looking for the older guy with the long hair. That was me! And I think by this point the kids had left on foot, gone back to their dorm. Anyway, they accused me of delivering demonstrators. Somehow I was some sort of evil genius who was driving demonstrators around and having them start demonstrations in various places. The cops never understood the dynamic of how these things happen. Well, I talked my way out of that one and I used...I happened to have with me the tape recorder, part of my AEC document was written and part of it was dictated on tape, and it was a portable tape recorder with an "Atomic Energy Commission Property" sticker on it and so that was an establishment credential that got me out of it.

**Catt:**

Being a professor of physics probably didn't hurt either, no?

**March:**

Oh, they didn't have a clue as to who I was. The cops were so...nuts! The Madison police quickly got riot training and got a new police regime after a while. But the county sheriff's police were just truly awful. Most of them were guys of rural origin who despised everybody who lived in the city anyhow. There was a poor old guy, an old drunk artist who had an injured leg and walked with a cane, he came staggering out of a bar into the demonstration on State Street, all

he wanted to do was cross State Street and get to his apartment and he didn't notice that he was crossing a police line. Damn cop took the old man's cane and beat him with it! Unbelievable! That is really losing your cool! He was one of the sheriff's cops and they just... they refused...all cops in the state were offered riot training by the state patrol. Well, the Dane County sheriff refused saying in turn he's going to use whips, that riot training was trying to teach people how to control a crowd with the minimum of violence when the whole objective of crowd control in his view was maximum violence, to teach the kids a lesson.

**Catt:**

Well, I guess you knew where you stood with him.

**March:**

Yes. One of the riots in the student housing area was over the refusal of the city to give a parade permit for a street party, the tradition in the area had gone on for years before there was political activism, the spring street party is essentially all students. So they banned it this year and the police turned out in force, jeeps with barbed wire on the front and all this militarism. The biggest show of force you ever saw. So the students understandably stayed in their apartments. But the damn cops had come there for a riot so the sheriff's police proceeded to go right down the street lobbing tear gas grenades into every apartment building to force the students out onto the streets. They're going to have their riot and beat them up. I never saw anything like it. Then finally people woke up to what was going on. Unfortunately that sheriff and one other bad habit and that was he was a hopeless alcoholic. Well, one of the local newspapers got a hold of that, after he totaled three squad cars driving them while drunk, and that was the end of him. This happened in the middle of the election, so his opponent who was a sacrificial lamb—he was a gay bartender from a local gay bar—wound up sheriff. A complete reversal. This town has had some of the strangest politics you'll ever see!

**Catt:**

Well, it was definitely a time of dramatic change. A couple more questions on our list that I'd like to do quickly. Did you ever refuse to work on any scientific project for political or moral reasons during this period?

**March:**

Well, I would never have had the opportunity. I couldn't have been security cleared with my background, so the issue never arose.

**Catt:**

Along these lines, did you feel that with the time constraints of being an academic scientist, doing research and the administrative duties of teaching, mentoring, and the like, that you never had enough time for both your politics and your science?

**March:**

I never took my career that seriously. I always felt that part of my time should be devoted to and spent on socially-responsible activities. That to concentrate exclusively on my career was... that would be immoral, and that's of course what the university ethos is, that you're supposed to be concentrating exclusively on your career. But I think that is going to change. The end of the Cold War also spells the end of the gravy train, and universities are going to have to

rethink just what it is the research universities should do.

**Catt:**

We are seeing a lot of trends in academia, analogous to what was going on in the 1970s in your field, positions available for new Ph.D.s are declining daily. Enrollments up, jobs down.

**March:**

Oh it is terrible! I just saw an analysis for physics that was really astounding. That is that half of the Ph.D.s who graduate in the next five years will have to leave the field. That's totally astounding for a field like physics where throughout its history you got practically zero unemployment. Even in the Great Depression people got jobs. That doesn't mean there are going to be all that number of unemployed physicists and what is going to happen is at the same time 40 percent of them are foreigners and so most of them are going to be going home rather than seek employment in the U.S.

**Catt:**

There is a lot of correlation I can see between what's going on today and what happened especially in the early 1970s, when you have things like the Mansfield Amendment that starts to reexamine the relationship between the government and science, government and universities. That there is too much free flow of federal money in the pipeline.

**March:**

This department really got hurt by the Mansfield Amendment. We had one solid state physicist here who lost his research support because of the Mansfield Amendment. After a year without support, he managed to pick up support from NSF. But by 1971, when the Mansfield Amendment expired, he had two or three DOD contracts. I have no moral objection to that. I think what I do object to is, in fact, the fantastic overbalance, even today, of how much money is spent for military research. I do have some views on that. I'm involved in a project out in Hawaii and we consult with people from the Naval Ocean Systems Center out there. And when we were preparing our proposal for this project, which is a big cosmic ray detector on the ocean bottom off Hawaii, we went to talk to some of the people there and I was asked how much is it going to cost us to build these thing, and I said, "Oh about 10 million dollars." Well, they said "Shit, 10 million dollars is what we spend on a dog-and-pony show for visiting congressmen!" So I was able to build and operate a telescope up on Mount Haleakala, a gamma ray device. Curiously, our immediate neighbor was the U.S. Air Force Maui Observing Station where they were doing all the experiments with active optics and things like that.

It was sort of amusing. I went over there one time and I liked their sense of humor. Over the Xerox machine there was a sign saying, "No copying of classified documents allowed here," and then underneath it they had its translation into Russian. They're the ones that pulled that stunt of bouncing a laser off the shuttle which I considered a ridiculous feat because right next to that the third active scientific group up in the mountain was the lunar ranging experiment which was something that was originally set up to exploit the corner reflector that the astronauts put on the moon in the second Apollo mission and by measuring the range to the moon by timing laser pulses. And by then they'd gotten to a new project there, this is the least publicized bit of space research that I know, they have a bunch of totally passive satellites in about 3,000 kilometer orbits that are just big masses of corner reflectors so whatever

direction you hit them from you get a beam back. And they do geodetic measurements this way, simultaneously ranging them from Hawaii, Japan, California and Australia. And they were measuring continental drift and the real time so to speak. It was amusing when I set up the observatory, I had to get the latitude, longitude and altitude for barycentric purposes. So I went there and it was the first time they ever give me my latitude and longitude and altitude plus the time derivative of each and it was very impressive. And then the Air Force with all its damn resources—and by the way before a PR team was assigned to the project—does this highly publicized thing on the shuttle, which was much less impressive than what the laser rangers did every night!

**Catt:**

That gets to the question about the Apollo project. There was a lot of concern that much of the money was being thrown into project Apollo could have been used for more socially-relevant research. How did you view Apollo, or the US space program in general?

**March:**

I'm not so much one who applies the criteria of social relevance to these things. In fact I remember it was a very poignant moment for me, as much as I opposed the Apollo project. Nonetheless, when those guys went to the moon I was very excited. And that day, the time when the landing occurred, I was supposed to be at a party over at a large Westside mansion that was a fund raiser for a sharecroppers cooperative down in the Mississippi Delta. Both I and my wife were sufficiently excited about the moon landing that we actually wanted to see it. And all these good Westside liberals were raising money for sharecroppers in Mississippi thought we were appalling for insisting of going into a little den there and watching the moon landing on TV. That shows how you could mix feelings about things. Now I was against Apollo not so much on the question of social relevance but for scientific reasons. For the same amount of money you could of done a hell of a lot more in science. And indeed the whole history of NASA has been... they've always got some huge project that's bringing in all the money, but then when that project runs into a glitch, they use a little budgetary adjustments that wipes out a third of the science they're doing and then... Effective use of orbiting instruments is something I'm very much in favor of, I think it's worthwhile. But manned spaceflight is something that I think should be done on a minimal basis. Just enough to keep the art and science of it moving forward but not to make keeping people in space a major objective.

**Catt:**

Did you feel, especially in the early-to mid-1960s, that those within the establishment, from the Presidential Science Advisors and the National Academy of Sciences on down to the university level, posed in a position of leadership, that they were making good decisions regarding the funding of science overall?

**March:**

I'd say by-and-large to the extent to which scientists themselves were making decisions, they usually were the right decisions. They were usually decisions that I agreed with. It was when for political reasons commitments were made to other things that I think bad decisions were made like the Apollo program really was Kennedy's dream and Kennedy's promise and it really defined and in my opinion distorted the whole effort that NASA... I think the first time an establishment decision was made that I disagreed with was a decision to build the SSC. And the reason for my objection to it were two-fold. One is I think the whole field of particle physics

has become one of diminishing returns. Spending more and more money to find out less and less knowledge. We're exhausting the potential of that method of research to uncover really deep, new ideas. But the other one was political. And the scenario that I talked about has come true and the projects are going to take a long time, it's going to cost a lot of money, it's going to be very politically vulnerable of being turned off at any time. At some point about halfway along the government is going to ask us to make sacrifices in the rest of the program they funded. And then when the thing gets cut off the field will be left high and dry which is precisely what happened. Exactly the scenario that I worried about. I remember Leon Lederman wrote me a nasty letter when I gave my interview to the New York Times on that subject. I told Leon, "Look this is going to kill particle physics, not help it!" He hasn't sent me a letter acknowledging that I was right, but he has been more cordial to me ever since.

**Catt:**

I take it you read Science: The End of the Frontier?, his [Leon Lederman) rebuttal of Vannevar Bush's, Science: The Endless Frontier?

**March:**

Yes.

**Catt:**

And it starts around 1968 that you see for the first time, since 1945, a decline in federal support for pure scientific research.

**March:**

Yes, the federal "blank check" ended in about 1968.

**Catt:**

Well, one could almost call that the beginning of...but of course in the 1980s with Reagan it [federal spending for science] goes back up again. However, from roughly 1968 to 1978 we have an era of limitations and of limits...

**March:**

Right, that's right. The period which I built my career was the period where research budgets were going up 10-15 percent a year. How could you miss? Incredible growth. And then in 1968 the Vietnam War started to take it's toll and science budgets became constrained. From 1968 to 1978 we didn't really see a loss. What we did was we saw just barely keeping up with inflation or maybe a little more than inflation. But certainly the rapid growth ended. Then the Reagan period was very funny because pure research did very well under Reagan, really "pie in-the-sky" stuff. And of course military research got tons and tons of money. But what was killed because it was ideologically not in consonance with the Reagan philosophy was civilian applied research funded by the government. And that is where I think our national research profile is weakest is that we should have much, much more funding. Early research on new technologies has to be done by the government. It cannot be done in industry.

To top it all off, we've got a period in which all our major business schools are teaching their graduates that funding research that isn't specifically product oriented is not cost effective. And it's true because you can just as well wind up benefiting your competitors as yourselves if

you're finding stuff which is the early stages of development in the new technology. So with the exception of Sematech, which was done during the Reagan administration, most of that kind of stuff on the part of the government disappeared, and it's really hurting this country. We need more applied research. I have always been in pure "pie-in-the-sky" fields but I consider them a luxury. I've always defended particle physics saying well it's 3-4 percent of the federal research budget and it's on par with what we spend on symphony orchestras and that's the level it should be supported at. Let us say with the astrophysics I'm doing now, it certainly can't be defended in practical terms. In terms of my social conscience, I am in favor of spending more money on applied research.

**Catt:**

Well, sticking with the "defense of science" theme in the late 1960s and early '70s, we see the rise of the counterculture and its criticism of science.

**March:**

Oh yes, they were very anti-science, and here I was a defender of science.

**Catt:**

How did you react to this criticism of science? I mean, they were against the war and you were against the war, but then they go against science.

**March:**

And I had a lot of them in my "Physics for Poets" class. I remember being called a fascist by the editor of The Cardinal in my class.

**Catt:**

The Cardinal?

**March:**

The Cardinal is our student newspaper which has always pretty much been under left wing leadership from the time I've been here. In fact the Daily Cardinal it's called. But this woman, who was editor of the Cardinal, got up and announced I was a fascist for something I said defending the idea of scientists working for the government.

**Catt:**

One of the things I am interested in my research is the whole notion of rationality. Specifically, the counterculture's argument that scientists could not be objective. How did you view that argument?

**March:**

Right, right. I don't believe in the neutrality of science either. So to that extent I agree with them. You are always serving someone or another. And the pose of ethical neutrality is a false one. It was just that their idea of just what the connection is between scientific activity and social needs is a naive one.

**Catt:**

Well, they pushed the argument. Even today some people in the science studies disciplines

make the claim that those that fund science, direct it, and by doing so they also direct the production of scientific knowledge itself. I'm talking about social constructivism.

### **March:**

Which is very true. But actually to a great extent, in the areas of applied research, I mean one perceives a thing that somebody wants done and one hires the people to go out and do it. So you have something like Star Wars which is a beautiful example of the President wanting something and even though there wasn't any compelling technical or scientific basis for doing it, they went out and did it anyhow. And as a result they spent twice as much money adjusted for inflation as the Manhattan Project and wound up with nothing but a bunch of artist's conceptions of possible future weapons that we don't have the science to build. But in more pure areas of research, really the people who funded don't make the decisions. The peer review system, all these peer committees and advisory committees, they are the ones who make the damn decisions. And the major flaw of that, as I see it, is that the inherent conservatism of the system, no sub discipline can put itself out of business.

So you have had a certain area of research, nuclear physics is the most outstanding example, nuclear physics to be quite honest about it, has been almost totally sterile since the early 1960s. They pretty much... they know it isn't fundamental science because we've uncovered a deeper layer that is responsible and nuclear forces is just an epiphenomenon of particle forces and the descriptive information, the energy level structure, all this and nuclei, they're all mapped out by the middle 1960s but the field goes on. It has to go on because those sub disciplines are run by peer review committees and the peer review committees advise the bureaucrats and the funding agencies and you can't turn off a sub discipline. I think that's what is happening in particle physics. I think particle physics should wither on the vine a little. Far too much effort is going into it.

### **Catt:**

Do you see or do you have a feeling that between the late 1960s and early 1970s, that American physics, the federal support for physics I should say, had had its golden days?

### **March:**

Well, certainly my area of physics did.

### **Catt:**

Certainly one indicator that I know, in a few universities that I've looked at so far, are enrollment trends. You see physics undergraduate and graduate students' enrollment starting to decrease at this time coinciding with an increase in the life sciences and especially in the social sciences. Could we, perhaps, see this as the period where biology began to surpass physics as the preeminent of American sciences?

### **March:**

Of course I have a distorted point of view of being here at Wisconsin where biology is so dominant. But to me I go and look in at the labs of the biologists I know, and what's going on there is exciting. People are doing things on a day-to-day basis which I can understand, and I say, "Gee boy! I wish I would have done something like that!" Now I wouldn't go into that field myself because it's a technique-bound field. And your success in research depends on mastery

of laboratory techniques. I don't like that. I chose the field I did because the laboratory technique was not dominant. But that's where the brains are going today. Physics is now getting weirdoes, which is as it should be. There are some areas of physics, like laser optics and things like that, that are contributing in the practical sense. And there's astrophysics, which I'm in now, which is doing very exciting things because new possibilities in surveying the universe in new ways have opened up. But the main thrust of fundamental physics and particle physics is stalled out and I don't think the stall is temporary, I think this is one of these things that's going to remain a plateau for 50 years or so until we find a new way to attack the next layer of the onion. Building bigger and bigger accelerators has reached the stage of diminishing returns. We have to spend 8 billion dollars to build an accelerator that will basically run two experiments in its life time, that's what the SSC would have been. It's a waste of talent too.

**Catt:**

So regarding the transformation of physics research into so-called "big science," I take it you have some reservations about doing research this way?

**March:**

Yes. I started to feel uncomfortable. The last experiment I did in particle physics we had 30 people. And I saw the next one was going to have 100 and that's when I got out. I was always comfortable with a group of a dozen or so people. We would all sit around a table and talk to one another, faculty and graduate students. That was something active. Furthermore if you could commit yourself to something that would be a done deal with papers within two or three years, I could accept that time scale. But joining a team of 1,000 and committing the next 15 years of your life to one project, forget it! That's not my idea of what to do for a living.

**Catt:**

Okay. Now, regarding the term "radical science," how would you define it?

**March:**

Well, basically we have a paradigm today is the "particle and field" paradigm in which the fields are what is real and particles are manifestations of these fields. We've got satisfactory theories of all the fields that function on the subatomic level. There are attempts to turn this into a unified field theory but they have failed because they don't have enough information. And most important is the scale on which we need the information is such that it can't be reached by today's accelerator technology. We might make some progress in it from astrophysics. But I think it's just stalled out for a while. The standard model works pretty good and we ain't going to have anything noticeably better than the standard model theory in my life time or probably the life time of people now in graduate school. That's my belief. But that's just a hunch. Maybe the startling new discovery is just around the corner, but I doubt it.

**Catt:**

In historical terms, how would you define it if there was a movement within American science in the late 1960s called the "radical science movement?" Or should I ask if you felt there was such a movement?

**March:**

Oh, not really. It was a brief flare up. Now people with those sentiments, they're still there in

science, and in the current generation of young scientists, there are probably more of them now than there were back then. But unless some occasion happens to bring out this activism, I don't think you will see it very much. Scientists mostly like to stick to business. They have to really feel provoked before they will become politically active. Now of course there's ongoing established activity like the UCS and the...what's the St. Louis organization?

**Catt:**

SIPI?

**March:**

SIPI, yes. Those things will go on. As I say I am peripherally involved with UCS. It didn't hurt that Henry Kendall got the Nobel Prize...there's nothing like "Swedish holy water" to anoint any activity! So that element will always be there. There is a certain number of people who in science will consider themselves socially responsible. The culture of the discipline is apolitical and says that you should not get involved in these things. But there are some people who for one reason or another feel they should be socially responsible. Now what's happening is this young science students who want to be socially responsible like going into fields like environmental science, which has become well established. Again, we have graduate programs in environmental science here at Wisconsin and even in the engineering school which is where some of that we now call civil engineering, civil and environmental engineering, and it is that. Because these days the civil engineer is somebody you hire to help write an environmental impact statement. And they're getting people who have the social conscience in these fields.

**Catt:**

So do you see this consciousness raising, as you mentioned it's always been there within science, but that it really comes to the forefront in 1968?

**March:**

Yes and the Vietnam War catalyzed it. I think a lot of it had to do with the fact that a field like physics, an abstract field like physics and mathematics, dominated by urban liberals, a lot of them Jewish, with the kind of social conscience that goes with that, and that's how you get a Martin Perl into this kind of activity, or a Marc Ross, who come out of this kind of background. But in general, the abstract sciences aren't going to attract the social activists. The social activists are going to want to go into something that is socially relevant right on the surface of it, like environmental science. An interesting parallel here is medical students. There are an awful lot of very socially conscious pre-meds who are out now. I think the medical profession is shifting. It's no longer...Well, what's happened is that the guys who are just in it for the money discovered that for the next generation the money ain't going to be there. So they're all going into business school. That's where they belong.

**Catt:**

Dealing with students, did the events of the late 1960s and early 1970s, did it change in any crucial way your interaction with your students? Did you feel like you should tell them okay, when you get into physics these are some of the do's and don'ts, or did you...

**March:**

As it turns out, two of my...

**Catt:**

...because while you were at the University of Chicago, social responsibility was taught to you. Did you in turn teach that to your students?

**March:**

I don't think I taught that to my students but it just turned out the kind of students I attracted included some who were that way. And yet one young woman who went off and became very politically active. Another one who...her thing was not so much social activism as counterculture...Jane English is her name, and she went off and... the best graduate student I ever had, one of the best ever to come out of this department, but after three years of doing physics she thought, "Well I've done enough of that!" and went off to become an art photographer and was part of the physics and consciousness movement.

**Catt:**

When was she.

**March:**

She was here in the late '60s. And so I don't feel I was a mentor for anybody to become a socially-responsible scientist. I just attracted people who already were that way. They came to me because they knew my reputation and wanted work with somebody who shared their values. I am not a real good mentor for anybody. My biggest failure as a scientist, as a matter of fact, is that I train very few graduate students. I don't feel comfortable with the role.

**Catt:**

Okay. Now with respect to SESPA, obviously you were a member?

**March:**

Yes, yes, whatever that meant.

**Catt:**

What did it mean to you?

**March:**

Oh, I got together with certain people at American Physical Society meetings. That's all it meant to me.

**Catt:**

So you weren't really active within SESPA, I mean, besides wearing buttons like "Stop the ABM," and so forth?

**March:**

No, no. Oh the ABM? Yes, I participated in that. Another brief political activism I was involved in is I did a lot of speaking against Star Wars in the mid-1980s.

**Catt:**

Then more symbolic, your participation in SESPA, I take it?

**March:**

Yes. You see, I'm at a Physical Society meeting and here are all my friends like Charlie Schwartz and Marc Ross, and they're doing this and they can appeal to my conscience and get me to do something like that too. But in between Physical Society meetings. I wasn't really being active, I wasn't licking envelopes or attending meetings of SOS or anything like that.

**Catt:**

Can you recall who was the first to approach you to join SESPA?

**March:**

It was either Charlie Schwartz or Martin Perl. We were all together there at the 1969 New York meeting of the American Physical Society. So these were people I knew. I do remember the meeting we had in Charlie's room the night SESPA was founded. That was an exciting night.

**Catt:**

When did you leave the SESPA, or at least stop attending local meetings?

**March:**

I didn't join, there was never a formal membership application, nor did I ever resign.

**Catt:**

Back here [Interviewer points to last page of March 1971 issue of Science for the People] it says that if you sent your \$5 into a certain location, you were considered a member.

**March:**

I never sent in \$5 or maybe I did, I don't know. Maybe I gave somebody \$5 at a Physical Society meeting. Basically we did things like...well, we set up a card table at the big 1970 Physical Society meeting in Washington to get signatures and petitions, on the ABM. I was at one time on the national council for one year of FAS but I left that when we had a terrible brawl over whether the FAS should take an antiwar stand. And a narrow majority of the board voted against it I lost interest because I had antiwar sentiments.

**Catt:**

And I think you mentioned that you and Jay Orear, who was the chairman of FAS in 1969...

**March:**

That's right. See Jay Orear and I are connected through family. This is very ancestral business. Jay Orear has a half brother, Les Orear, who is a retired union organizer whom my father recruited into the trade union movement back years ago. And then when I went into science, the first job I had in science was given me by Jay who was then Fermi's senior graduate student...no, I guess he was actually a postdoc at that point and was hiring scanners for the Fermi group and I got the job. The person who clued me in that the job was there was the daughter of a left-wing law professor in Chicago, Melvin Sharp, who was one of the instructors at the old Mieklejohn Experimental College up here at Wisconsin and I'm involved in the Integrated Liberal Studies program which is the successor to that whole business. There's a whole left-wing educational reform coterie or whatever you want to call it, that I...

**Catt:**

An invisible college?

**March:**

Yes, it's an invisible college that somehow touched my life... it goes even farther than that. Another Mieklehohner by the name of Robert Havighurst was the guy who got me the scholarship from the University of Chicago Laboratory School. So it's a strange business. It's not organized well enough to call it a conspiracy but all these same people keep popping up all the time. This whole business of paying... the people who pay for research, all the money to fund which research is done, but not in such a rational fashion. A motto I learned recently which I think is very apropos of a lot of the bad decisions that get made in this country is, "Never attribute to conspiracy that which can be satisfactorily explained by stupidity." And I think that is my view of American politics. The whole thing is...and I think corporate management in the U.S. is in the hands of remarkably ignorant people. They're beautifully, technically trained in the business schools and in finance and marketing and things like that, but they cannot look at social trends, they cannot see what is happening. I remember when Chrysler got in trouble back in the 1970s and they brought in Iacocca and officials were wringing their hands and said who could have anticipated Iran?, that was what got their business in trouble because they bet the store on RVs and other big gas-guzzling machines, and then there was another gas shortage. And I said, "Jesus Christ! What ignorant fools we have in business!" Here you are in the auto business and an awareness that somehow the supply of fuel for automobiles depends on political conditions of one of the most hideously unstable parts of the world ought to be part of your consciousness. So that's not how American business runs these days.

Even the Henry Ford who was a robber baron had the sense to realize that if he paid his workers enough money so they can afford to buy cars, he could jack up the whole economy that way. We don't have that kind of vision of American industry these days. We have a bunch of technicians trying to get rich in three weeks and that permeates into the political sphere because these people... The whole history of this business is that everybody underestimates the speed of which the technology will develop, but then overestimates its impact on our lives. The famous quote I like on that one is from...I think it was about 1959 and it was from General Sarnoff of RCA, when RCA decided to take a leap into the computer business which was a miserable flop then. But he made a speech in which he said, in 25 years —note that this would be in 1984—there will be 10,000 computers in America Well, he missed by four orders of magnitude, and as a result of all of these computers, he predicted cash would disappear from our economy. So 10,000 is more like a million, I mean today there are hundreds of millions of computers. And yet I'm still carrying green backs.

**Catt:**

What do you see of any long-term effects caused by radical behavior among scientists on American science?

**March:**

Well, I think the only long-term effect on the American Physical Society, and I think it's happened in other scientific societies as well, was that they jarred the profession and the professional associations out of this apolitical stance they were in... out of this idea we should

stick to the ivory tower organization and not consider the social consequences of our research. And I think that was a permanent thing. I think we helped to bring that about. And I think it was for the good. Professional, scientific organizations should be concerned with the social impact of what their science is doing, and to the extent to which it's the case that endured. But otherwise I don't think we had much impact. We helped some. For example, another guy you have to talk to who's at Harvard...these names keep coming up... is Matthew Meselson. He was the guy who with the help of Kissinger talked Nixon into the Chemical and Biological Warfare Treaty. And so he's very, very good. He's a radical, but he's very good at inside establishment politics.

**Catt:**

And for the record, Matthew Meselson is...?

**March:**

He's a leading historic figure in molecular biology, the Meselson-Staub experiment which confirmed the Watson-Crick model by showing that replication takes place, that DNA itself propagates. That was his PhD thesis. At Caltech he was a student of Linus Pauling's and now he's a full professor at Harvard. He works very quietly behind the scenes, he doesn't make a lot of noise but he's accomplished a great deal. I think that the test ban treaties and such are the work of liberal and radical scientists who are politically active and have brought those things about. I think those were for the good. But the antiwar activism that flared up within science, it died away without leaving much of the trace.

**Catt:**

Why do you think it did?

**March:**

Oh, I think once the issue was removed, the motivation for the activity was gone as well. Unfortunately science and our society are still paying the consequences of it, the polarization that took place during the Vietnam era.

**Catt:**

I see. Well, that's another reason why I'm doing what I am doing, looking at how a segment of American society had to deal with these issues, such as racism, sexism, the misuse of government power, and the environment.

**March:**

Yes, I think it's very unfortunate we never had anything happen to rally us again. I mean I'm very disturbed on the divisions in our society that I... I think America has become a polarized one. I think our democracy is in serious trouble. It just doesn't function.

**Catt:**

Why do you think it was that physicists for the most part were on the first wave, or leading the wave of the activists in 1968? And then by 1974 physicists for the most part had gone back to labs, and then it's the biologists who are leading American science's activism?

**March:**

I don't know. I would be tempted to simply ascribe it to sociology, in that you attract certain kinds of people to frontier disciplines. And a certain number of these people are going to become activists because part of the whole cosmopolitan complex that attracts people to frontier disciplines is likely to make them activists at some point. Biology attracted people of a more conservative bent. People who were not interested in frontier science up until the 1960s when molecular biology kind of exploded onto the scene. And now biology is getting those kind of people and physics isn't getting them anymore. They're the kind who... they're not all going to become activists, a few of them are activists, but cosmopolitan I think is the word.

**Catt:**

Sure, as the population of the field gets saturated, of course you're going to get people...

**March:**

There are people who like me think of themselves as intellectuals first and practitioners in their discipline second. Those kind of people are the kind who are likely to become activists. And there are a lot of them in biology now. That wasn't the case 30 years ago. I remember when I was in graduate school, Meselson was an undergraduate at the University of Chicago, and when he went into biology I thought he was crazy. It was such a stodgy field. Well he knew better than I did. He knew the early stirrings of molecular biology and went off to work with Pauling just about the time the Watson—Crick model came out. And he got in on this marvelous experiment to confirm the model which I thought it was stunning. And now a whole generation, starting in the early 1970s, of bright young people who are attracted to biology, and so we've got more activists among them now.

**Catt:**

Lewis Branscomb, who has just come out with a book this year in fact, *The Confessions of a Technophile*, calls this period from 1968 to 1974 "an age of transition of American science." Would you agree with that assessment?

**March:**

Well, it is true. There's an importance that transition took place there. There really were two transitions. There was the Sputnik transition a decade before which really was an exaggeration of a trend that had been going on since the end of World War II. At the end of World War II the decision was made that the government is going to continue to support science. The NSF was created, the AEC, money started pouring into science. But it was sort of fitful and not very systematic. Sputnik came along and then we got the idea the President has to have a science advisor, we've got to have a considerable push on all fronts in science instead of just selective areas supported in haphazard ways which it was up until 1957. And then in 1968 the glamour starts to wear off the role, as it were, as people started to get the feeling that this can't keep on going like this indefinitely and what are we getting for it anyway. But still right up until the current era, the Cold War ethic kept science going, kept science from collapsing completely. Now that's gone, and for a hell of a lot of people in the Congress for example, who are skeptical about the government supporting science, but would have supported it in the past for reasons of national defense, no longer have that attitude. So I think science is in great trouble. It's an easy target. As our Wisconsin Senator Russ Feingold points out, "You guys have no constituency!" And we don't. So I think academic science is not going to fare well in the future. In this society, industrial science is in terrible trouble, absolutely... Universities are scaling back a little, marginal research universities are being pushed out of the business and such. But

in industry Bell Labs, itself the strongest in the country, cut back 15 percent. IBM 30 percent. That worries me more than what's happening at universities. I think those laboratories were an enormous asset to this country, and is now just being decimated.

**Catt:**

What about a trend that's going on now that took off in 1970, a move for the department of science?

**March:**

I don't like that. I think one of the strengths in American science funding has been the existence of alternate funding. If you have got somebody centrally making decisions then the end result is going to be that nobody will fund the unconventional. Since these days I'm involved in very controversial unconventional research, I worry about that.

**Catt:**

Also it would be emblematic of bureaucracy now that you are centralizing those who are going to fund scientific research. I mean, in the period we're looking at, radical scientists are opposing such institutions in the first place, but now there is a groundswell view that this is the only way American science can survive.

**March:**

Bureaucracy is inevitable. So what you have to do is create a situation in which bureaucracy is not an impediment to what you are doing. And in the 1960s, it was... if everybody's budget is going up 15 percent a year, then the bureaucracy is no problem. Now bureaucracy what I see is the fraction of my effort that I put into simply getting the funding for my research is very large. And some of my friends over in biology it's even larger for them. If you are a full professor in biology over 50, you spend half of your time writing proposals because those guys traditionally have always been funded by multiple proposals whereas over here traditionally this is the way the old Atomic Energy Commission liked it and DOE followed up on it, you have 10 scientists all lumped into one huge grant which is funded on a year-to-year basis. But now defending that money in detail is what is called for and you do it several times a year. The idea that we bet on people as long as they're producing results, and let the money flow, it's all got to be documented. You've got to cover the ass of the bureaucrats. So if the project fails you can say well look here's the information I have. It was a reasonable decision given all this information I looked at.

**Catt:**

Now, with all of the distractions, if you will, against doing science in the late 1960s and early 1970s, if you could characterize it in any way, what was going on physics?

**March:**

Amazingly enough, see in my field of science, that was the most productive time in its history. That's when all the ideas, from 1968 to 1975, was the period in which all the ideas which became the standard model emerged and all the evidence that these ideas should be taken seriously emerged. And it was a terribly, terribly exciting time. It's one reason why as soon as the thrust of the Vietnam War business was over, a lot of scientists got out of activism like Martin Perl who went on and discovered the tau lepton. Now if he doesn't get a Nobel Prize for

that, the Swedish Academy ought to wring its hands in shame because that was an astounding piece of research, terribly difficult, and he was ready to go for it. [Note: Martin L. Perl received the Nobel Prize for Physics in 1995.] So the opportunity was there, it was just this brief period to do real good science and do it quickly, immediately. Now you have colliding beam machines with four or five detectors; and four or five detectors cost hundreds of millions of dollars, and so you need a lot of scientists at a few hundred thousand per to build four or five detectors. That's strange how these things happen. So the whole field went sour. Plus I keep pointing out to my friends and they gnash their teeth and they never deny it, in the past 15 years we've learned one new thing and that's negative: there aren't any more fundamental fermions to discover.

**Catt:**

Do you think scientists in general are more communicative now amongst other disciplines, say physicists with biologists, today than in the 1960s?

**March:**

Yes, for myself at least, but that has to do not with a change in the science but a change in where I am in my career. I've now reached a position within the university where I am part of the self-governing structure here, so I'm constantly in contact with biologists. I think that the specialization and departmentalization of disciplines is if anything getting worse with one exception. There is somewhat of a trend of interdisciplinary things like environmental science that runs counter to it. But as the squeeze is on, the natural instinct of academe is to retreat to narrower and narrower corridors of specialization.

**Catt:**

So universities don't try to expand areas of expertise?

**March:**

No. For example, the grand master strategy of our chancellor here now, the good part about it is he had to re-emphasize education saying it's got to become our meal ticket. But the other thing he says is that America now has 60 state universities that are trying to be full-fledged research universities and can only afford 30 and we're going to be one of those 30. That's his campaign. And we're going to do it by taking advantage of the fact that there's this great surplus in Ph.D.s around, hiring the best we can get. I really feel for you guys who are in graduate school now. I don't know when... Well something has got to give. I'm part of the bulge in the snake, the guys who were hired to teach the Baby Boomers, the people who were hired in the 1960s, and there's no more mandatory retirement although I'm not one of these people who's going to hang out to his 70s. I mean eventually mortality tables are going to get us. So universities are going to have to go through a round of significant hiring in the first decade of the next century because these guys are going to disappear. The problem is you got to be timed right because not everybody is going to want to hire fresh Ph.D.s. You've been sitting around in such a holding position for five or six years you're in trouble.

**Catt:**

My last question is...and I think we've touched upon it already...do you feel your career trajectory in science was hurt or was helped because of your radicalism?

**March:**

Oh yes it was hurt by political activism. There's no doubt about it. If I'd kept my nose to the grindstone, taken advantage of all the scientific opportunities I had and stayed away from the activism, I would probably have a named chair now. No doubt about it.

**Catt:**

Well, we've finished the list of questions I had, so I'd like to ask if you have anything you would like to add?

**March:**

No, I don't. But I enjoyed our talk.