

Searching the Sky: Jill Tarter

by Allison M. Martin

Allison M. Martin practices public relation in her native Chicago, specializing in the technology sector. She earned her BA in journalism and Spanish from Butler University, where she also completed a minor in science, technology, and society. Since much of her time lately has been spent applying for graduate school in science and technology studies, Allison distracts herself by stargazing or learning French. Contact her at allison_meredith2004@yahoo.com.

In 2004, Dr. Jill Tarter was selected by the editors of *TIME* magazine as one of the world's 100 most "influential and powerful people." This selection was based on her prominent role in the search for evidence of life beyond earth, as well as her efforts promoting scientific literacy.

"Getting into SETI was an accident,"

comments Dr. Jill Cornell Tarter from her office in Mountain View, California. "I thought I would be an engineer."

It may be a surprising statement for ardent SETI (Search for Extraterrestrial Intelligence) fans who consider Tarter to be the face man — or rather, face woman — of the organization. After all, Tarter serves as director and holds the Bernard M. Oliver Chair for SETI Research at the SETI Institute in Mountain View, Calif., and spends, on average, a third of her time on the road talking to stu-

dents, professors, donors and fellow scientists about the work she and her colleagues do out in the Bay Area. She's referenced in several non-fiction books about space science and extraterrestrial intelligence. Jodi Foster even played a character loosely based on Tarter (and comrade Carl Sagan) in the major motion picture "Contact." But growing up, Tarter had things on her mind other than aliens and astronomy.

"I grew up as a tomboy, going hunting and fishing with my dad every weekend," she recalls. "My mother and father must have had some conversation, because my dad set me down, and said, 'You should spend some time with your mom learning how to do female things.' I burst into tears. I couldn't understand why I couldn't live in the world of both genders — why I had to choose. And my dad said he couldn't understand either. As long as I worked hard, [he told me], I could do whatever I wanted to do."

That attitude, manifesting itself when she was only eight, has been a through-line to Tarter in her academic pursuits, eventually leading to her position as an endowed chair of arguably one of the most popular contemporary non-profit science organizations.

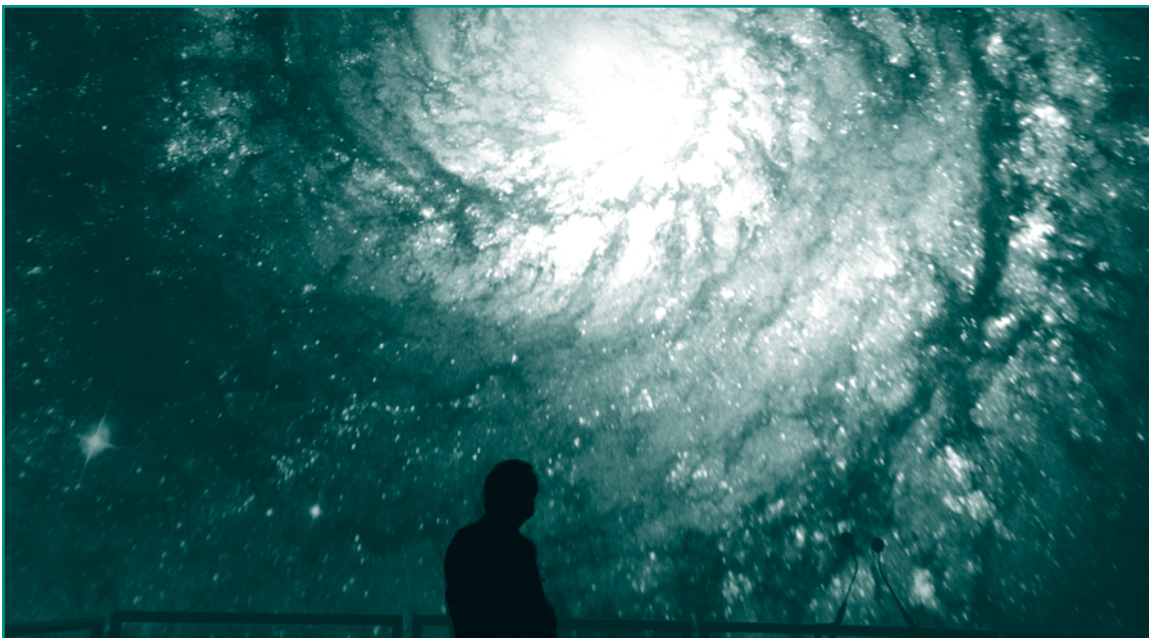


Photo Credit: NASA, Renee Bouchard

A Quick Look at the SETI Institute

Founded: 1984

Mission: The mission of the SETI Institute is to explore, understand and explain the origin, nature and prevalence of life in the universe.

Status: Private nonprofit organization dedicated to scientific research, education and public outreach.

Leadership: Dr. Jill Tarter directs the Center for SETI Research, while Dr. Frank Drake directs the Center for the Study of Life in the Universe. These two centers make up the SETI Institute, which employs more than 100 scientists, educators and support staff.

Sponsors: Past and current sponsors include NASA, the National Science Foundation, the Department of Energy, the Argonne National Laboratory, Sun Microsystems, and many more.

(Information courtesy of the SETI Institute.)

Starting Out

Like many women scientists, much of Tarter's determination to become an engineer came from two dominant factors in her life: steadfast determination and an intense desire to make her father, who passed away when Tarter was only 12, proud of her.

"I said I wanted to be an engineer because I knew men were engineers, but I didn't know any women who were," Tarter says. "The combination of my dad's death and my stubbornness allowed me to ignore the gender-based, stupid guidance I was given growing up."

In high school, Tarter's teachers encouraged her to fulfill the typical role that society had allocated to her gender. You can't take shop class, they told her. You have to take home economics.

"So I took home ec. and then I took shop," Tarter says.

Even when the bright young woman wanted to take calculus, she was told it would be futile, since she was just going to "grow up and have children." Defying the stereotypes, Tarter entered Cornell University in 1961, majoring not in home economics, but in the five-year engineering physics program. She was the only woman in her class.

But Tarter's entry into Cornell University was not without its roadblocks. Once again, the gender card was played against young Jill, who was a descendant of Ezra Cornell, the university's founder. Tarter was refused the scholarship intended for Cornell descendants because she was a woman. A few days later, however, to her delight, Tarter received a full scholarship from Proctor & Gamble, an award given only once each year in the engineering department. Thus began Tarter's academic career.

Stumbling Onto a Future

"I got good grades [at Cornell] because I was locked in the girls' dorms each night after 10 o'clock," Tarter laughs, "and I got a better education as a result. But I was so nerdy — I was the world's worst grind!"

Despite her stellar academic record, keeping her nose to the

book and following silently into a career in academia wasn't Tarter's idea of a grand time. The field as it was taught in the 1960's was dull, dry, and boring to her, and she felt uninspired to be another tired old professor rewarding routine answers year after year.

"You didn't get brownie points for a creative solution to a problem," Tarter recalls. "You got them for solving a new problem with an old solution. Innovation was not rewarded."

Thus, at an impasse in her education, Tarter remained at Cornell after receiving her undergraduate degree, taking graduate courses that allowed her to use her problem-solving skills, which she knew were sharp. Purely by chance, Tarter enrolled in a class on star formation, and her entire focus changed.

Tarter left upstate New York for sunnier West Coast scenery, enrolling as a PhD student in astrophysics at the University of California, Berkeley, in 1968. There, she was responsible for coining the phrase "brown dwarf" star, a now widely-used term that describes small interstellar cloud fragments that never become hot enough to fuse hydrogen in order to become a star. Instead, they cool down and become compact, dark collections of unburned matter.

"Some people think that's an awful name," Tarter says of the phrase, "but we couldn't get a good idea of the object's color temperature. Since brown isn't a color, we named it that."

Tarter continued her work on brown dwarfs as a National Research Council Fellow at the NASA Ames Research Center in Mountain View, CA. There, her role was to develop a way to detect and study brown dwarfs using an infrared telescope mounted on a space shuttle, a technology finally launched last year as NASA's Space Infrared Telescope Facility (SIRTF).

Female Solidarity

Perhaps not surprisingly, Tarter's experiences in the separate-but-equal mentality of gender discrimination began to influence her own perspective of the scientific field.

"At Cornell, I had bought into the old boys idea, and I was

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more critical of women’s work than that of my male colleagues,” Tarter recalls. “It was a bias I had unconsciously built up.”

That changed, however, when she attended a meeting sponsored by the American Association of University Women (AAUW) in Washington DC in the late 1970s. There, she was part of a study on female scientists, and found herself in a room of 80 peers — all women. She describes the meeting as “one of those ‘Aha!’ moments.”

The meeting was organized partly in response to a bill introduced by Ted Kennedy to get women back into science and technology after leaving their work to have children. The AAUW invited a group of young women who had earned their PhDs to come to the nation’s capital to discuss the problem and potential ways to solve it.

For Tarter, the meeting was an affirmation of her own career choices, but it also provided a sort of personal comfort as well, for she discovered a breed of women not entirely unlike herself. Tarter recognized in these fellow scientists the same perseverance and wrought-iron determination that she herself possessed. But she also discovered a deeper connection, for many of these women considered their fathers the center of their universes — fathers who, like Tarter’s, died when the women were just young girls.

Hooked on “Little Green Men”

When asked to sum up in one word her journey to become involved with SETI, Tarter replies, “Lucky!”

The adventure began while Tarter was at Berkeley. A faculty X-ray astronomer, Stuart Bowyer, asked Tarter to participate in a modest experiment inspired by Project Cyclops, a scheme developed by Hewlett-Packard Vice President Bernard M. Oliver and NASA Biology Chief John Billingham (at NASA Ames) to detect extraterrestrial technology using a radio telescope array. Bowyer handed Tarter a copy of the report in the hopes of soliciting her participation, partly because she could handle the material’s scope, but largely due to the fact that she knew how to program the outdated PDP8/S computer that the team had been allocated to use. Tarter needed little convincing to join up with Bowyer.

“I was fascinated by the report,” she recalls. “I realized I lived in a special time — I was in the first generation of humans that could actually do a search [for extraterrestrial intelligence] to try to answer the ancient ‘Are we alone?’ question. For millennia, humans had just been asking the priests and philosophers what they believed.”

Taking on the research assistantship, Tarter programmed the computer to run a spectrometer that piggy-backed on UC Berkeley’s radio telescope. In the late 1970s, she moved on to her postdoctoral studies at NASA Ames Research Center to continue studying the brown dwarfs she had helped characterize as a graduate student. At Ames, she sought out the Cyclops team members, knocked on their doors, and asked what she could do to participate in the project. NASA had recently created a program that eventually turned into the High Resolution Microwave Survey, and Tarter

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(Left) the Allen Telescope Array; (right) the huge radio telescope at Arecibo Observatory.

was a team member virtually from the start. She learned how to do radio astronomy (observing the universe and its radiation at radio wavelengths) specifically for SETI purposes, honing her skills from a colleague at NASA's Goddard Space Flight Center, the radio scientist Tom Clarke.

Unrelenting Challenges

That was 1978, and Tarter is still searching for her signal. She realizes the odds stacked against SETI, but it does not deter her from doing the work she loves.

"One secretary described my move from brown dwarfs to SETI as moving from 'difficult to find' to 'damn near impossible to find,'" she recalls.

Perhaps just as difficult to locate, however, has been funding for the SETI Institute, especially in the past few years since the "tech bubble" burst. The SETI Institute, which became disassociated from NASA in 1993 when the government cut the program, is a non-profit organization, and thus relies heavily on corporate and individual sponsorship in order to survive, as well as government-funded research on topics in astrobiology. The task of soliciting corporate giving fell into the open, capable hands of Bernard "Barney" Oliver, one of the originators of the Cyclops project and for whom Tarter's endowed position is named.

"One journalist described Barney as a 'gruff, corporate warlord,'" Tarter laughs, "and he was pretty aggressive. But he had enormous intelligence and integrity. He instilled in us strong lessons that if you were going to do something, you had to do it right."

Like the radio waves she studies, Tarter has also seen the scientific community's interest in SETI crest and valley over time. Though there is no longer an official SETI project within NASA, the SETI Institute and NASA intersect in the same scientific space of astrobiology, broadly defined as the study of life in the universe. The funding challenges faced by NASA have the potential to affect SETI Institute's own survival, but Tarter thinks her organization is safely positioned to endure.

"If any science survives the crush of shuttle, ISS [Internation-

ational Space Station], and the Exploration Initiative in NASA's funding, then I think astrobiology has a chance," Tarter wrote in an email correspondence. "We can see how well the public relates to it, and our best and brightest are flocking to it in grad school and for post-docs."

In fact, one of Tarter's personal enjoyments is her annual return to Ames, where she speaks at the Astrobiology Academy, a summer program for undergraduate and graduate students interested in the field relating to astrobiology and space sciences.

"SETI is a subject the students are interested in, and I'm interested in them," says Tarter. "Their presence at the Academy attests to their willingness to work across historical disciplinary boundaries and get their hands 'dirty.' Somewhere among the academy students, some day, I hope to meet my replacement."

Fostering Women in Her Field

Tarter's personal experiences with gender exclusion and discrimination are indicative of a field that is still, despite efforts, less than welcoming for women.

"I can remember, as a grad student, sitting with two other [female] grad students," Tarter recalls, "and this jerk welcomed us to Berkeley and told us how lucky we were to be admitted because 'all the bright young men' had been drafted for Vietnam."

"The field is getting better," Tarter conceded, "but it is not right yet. We have done a good job of reaching the youth, but the field is not equitable as you move up in the ranks."

One organization, the American Astronomical Society (AAS), of which Tarter is a member, has established a committee on the status of women. Perhaps a signal of their success, the ratio of young women to young men becoming members of the AAS was roughly 50-50, in spite of a four-to-one male-to-female ratio of astronomy and physics PhDs earned in 2003.

"It's hard to deal with," Tarter says of the gender inequality. "I know that before that AAUW meeting years ago, my feeling was that we didn't have to do anything special to help women gain acceptance in science and engineering, because the women who

More Information on the Organizations Mentioned in this Article:

- American Association of University Women — www.aauw.org
- American Astronomical Society — www.aas.org
- International Astronomical Union — www.iau.org
- NASA Ames Research Center — www.arc.nasa.gov
- Search for Extraterrestrial Intelligence (SETI) — www.seti.org

were getting through the cultural filters and courses were the best. So, when they got through to the workforce, it would be obvious that women are talented, and that would break down the barriers and discrimination would be eliminated. But of course, it didn't happen. The vocal protests against women in science went away, but not the discrimination."

Righting the Wrongs

Tarter believes that one of the key actions women scientists can take to foster female participation in their fields is to get organized and take a critical look around. She suggests examining scientific organizations, like the AAS, and internationally, the International Astronomical Union (IAU), to not only determine if they have a high female membership percentage, but, just as important, to be sure that women — and other minority groups — sit on the scientific and local organizing committees and are invited to give prestigious lectures, and the like.

"You usually don't think of being proactive, but we have to organize ourselves," she says. "If you think about these kinds of things conscientiously, it helps. The lack of a role model is incredibly significant to young people. If they don't see someone they can emulate, they drop out."

Also, Tarter recommends that established women scientists be on the lookout for talented women who deserve membership in professional organizations, and ensure that they receive the invita-

tion. Take on interns, or simply open the discourse with girls who are interested in your field, she suggests.

Looking Ahead

There is little doubt among space enthusiasts that Tarter's commitment to and passion for her field of study has made her stand out from the crowd. Author Marina Benjamin, in her 2003 book *Rocket Dreams*, wrote that "Tarter is a force of nature in her own right, a woman who combines breathtaking scientific brilliance with great eloquence, an easy charm, and a smattering of personal quirks." Indeed, the ease with which she explains challenging scientific concepts coupled with her realistic but hopeful outlook on the existence of extraterrestrial life could give any skeptic pause to reconsider his or her position.

For her part, Tarter does not consider herself particularly revolutionary in the scientific community. But she does recognize that the SETI Institute and its overarching mission statement — to explore, understand and explain the origin, nature and prevalence of life in the universe — continue to gain interest, both from the public and from young scientists.

"I've become a big frog in a small pond," she wrote via email. "In the process, I've managed to make the pond bigger, and, if I have done my job well, increase its credibility."

If there are more "frogs" like Tarter out there, we can only hope that her pond, one day, becomes an ocean. □

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