Bona Fides

Meg graduated summa cum laude from Tufts University with a Bachelor of Science degree in physics and mathematics. She received her M.S. and Ph.D. in physics from Johns Hopkins University, completed postdoctoral fellowships at the Massachusetts Institute of Technology and NASA's Space Telescope Science Institute, where she became a tenured Astronomer and served as Head of the Science Program Selection Office before moving to Yale. Currently, Meg is the Chair of the Department of Physics and the Israel Munson Professor of Physics and Astronomy at Yale University, as well as the Director of the Yale Center for Astronomy and Astrophysics. She is the first female tenured faculty member in the history of the Yale Physics Department and is a Fellow of the American Academy of Arts and Sciences, the American Physical Society, and American Women in Science. Meg has received several prestigious awards and honors throughout her successful career. She is a leading advocate for increasing the participation of women in science, which she refers to as her "second career."

The Early Years

My profile isn't typical for physicists. I liked science but not more than any other subject – I liked everything. I was smart but not a classic geek. I loved math, which is very important for doing physics, though that wasn't part of the calculation. I never liked science fiction, which many of my colleagues (and my husband and kids!) read. I did read like a fiend, and I loved writing; I think this has helped me in writing scientific papers and in communicating science to my colleagues and to the public.

My parents – a zoologist and a chemist – really prepared me to be a natural scientist. Growing up in the Midwest and then on the East Coast, my sisters and brother and I naturally absorbed my parents' logical, methodical way of thinking. I thought everyone thought that way! I thought it was normal to ask: What do we know? What are the options? What further information do we need to find out in order to figure out the problem?

For example, on long family road trips to California, it was part of the drill to observe the natural world. After a picnic lunch, my mother would poke around in any available stream, turning over rocks and looking for worms, which she had studied in college. That was normal for us. It was part of looking at the world around us and trying to figure it out.

When I was quite young, in 3rd grade or so, I read a lot of biographies, including some of famous women - doctors, scientists, and pioneers, like Jane Addams, a political crusader for poor people, Amelia Earhart, the heroic pilot who broke gender barriers, and Victoria Woodhull, a leader of the American women's suffrage movement. Some of the biographies introduced me to scientists, including Elizabeth Blackwell, the first woman to graduate from a U.S. medical school, Clara Barton, founder of the American Red Cross and crusader for women's rights, Marie Curie, the discoverer of radioactivity and recipient of two Nobel prizes, and Maria Mitchell, a pioneering U.S. astronomer. These women were incredibly inspiring, and I yearned to

do something significant, something pioneering, as they had done. But I still didn't imagine I'd do that something in science.

I credit my chemistry teacher, Miss Helen Crawley, at Winchester High School in Massachusetts, for getting me excited about chemistry. Before that, science was probably the least favorite of my classes. Later, as I started college, my parents, and particularly my father, himself a professor of chemistry, were extremely influential, suggesting that I take physics – even suggesting that astrophysics was an interesting field – and always, always encouraging and supporting me.

Astronomical Inspiration

I turned to astronomy much later than many colleagues, who as children were amazed by the cosmos. I was more likely to have had my head in a book than wonder where stars came from. The turning point was a summer internship at the National Radio Astronomy Observatory in Charlottesville, Virginia, the summer after my junior year in college. There I learned how interesting and how much fun astronomical research can be. The scientists were fun, too. They made science seem less solitary and more friendly – something to be done with colleagues, something to talk and argue about.

My senior year in college, I applied to graduate schools in astronomy and physics and ended up going to the Johns Hopkins University Department of Physics and Astronomy (then it was the Department of Physics). In the summer before graduate school, I worked with an X-ray astronomy group at the Center for Astrophysics at Harvard. More interesting science, more fun! This confirmed that when I would go to Johns Hopkins, I should look seriously into doing astronomy. I later landed a summer job at the nearby Goddard Space Flight Center working with their X-ray astronomy group. This led directly to my thesis research on blazars, an unusual kind of galaxy characterized by a relativistic jet pointed directly at us. (Blazars pointing elsewhere were identified as radio galaxies.) The jet appears brightened by many orders of magnitude thanks to aberration predicted by Special Relativity. The notion that I could figure out what was happening billions of light-years away in the cosmos, from just a few particles of light gathered by our detectors – well, this was too cool to be believed. The combined scientific excellence and low-key friendliness of the Goddard high-energy astrophysics group is probably the reason I loved graduate school and that the stresses and pressures never seemed too much to bear.

Trials of a Trailblazer

When I started college in 1973, women's liberation was under way. Women were admitted to the elite colleges, federal statutes outlawing gender discrimination were passed, women's roles broadened; we all thought it was just a matter of time until women caught up with men, until the numbers of men and women in public and professional life were equal. Although there were stories of women being excluded from "male" spheres, those seemed like anachronisms. Egregious discrimination, like that endured by Barbara McClintock (according to Evelyn Fox

Keller's 1983 biography, A Feeling for the Organism), was uncommon, or at least, buried behind closed doors. Sadly, more subtle forms of discrimination have taken much longer to diminish.

From college on, being a woman in science was rare, and I remember being identified by my gender. One professor used to address the graduate quantum mechanics class as "gentlemen and Meg." I once found pictures of naked men on my desk in the graduate student office. Later, as a young faculty member, when I told my graduate thesis adviser I was pregnant, he responded not with the traditional "Congratulations!" but with saying, "So, you want to have it all!" I smiled at the time but later wondered, why is it "all" for me and "normal" for you?

As a postdoctoral researcher at MIT in the mid-1980s, I was for a time the only female postdoc in the Center for Space Research. I became good friends with a woman graduate student in my astrophysics group and a visiting woman postdoc in a space physics group – friendships that are still important to me today. My postdoctoral advisor, in fact, had lots of women in his group, which was rare elsewhere in the department. This ought to have made me realize that the lack of women had more to do with a professor's attitude than with the lack of talented women scientists. I sometimes felt as if I were on the wrong side of the gender divide, surrounded completely by male professors, some of whom dated or married their students or secretaries. There were acceptable roles for women, it seemed, but not as scientists.

One time a colloquium speaker in the MIT astrophysics seminar illustrated his talk about the importance of high spatial resolution in optical imaging with a badly out-of-focus slide. At his request, the colloquium host gradually adjusted the lens, revealing a topless woman in a grass skirt on a Hawaiian beach. Some (male) students laughed. The one other woman in the room and I were stunned and appalled. She walked out. I debated whether to say something but thought I'd be accused of lacking a sense of humor; I left after 20 minutes, having realized I hadn't heard another word the speaker had said. Later, at a party, I asked the colloquium host why he hadn't tried to forestall this "joke." He said the speaker was a guest, and it felt rude to chastise him. It definitely felt rude to be made to feel totally out of place.

Meanwhile, I was being told that women actually had an easier path than men, that universities were eager to hire women, that I'd be inundated with offers. This didn't happen. One young faculty member told me a long story about how a particular faculty job at a prestigious institution went to an under-qualified woman rather than the highly talented man the job "was intended for," indeed, that a Dean had insisted on adding this woman to the short list. This was horrible to hear. No one wants to be told that she will get a job unfairly. But I had the sense to ask a few questions: Who was the woman? He didn't know. What did she work on? He didn't know. I started to have my suspicions that perhaps he didn't know the story as well as he pretended. Years later, I talked to someone who had been on the actual search committee, who told me that the woman gave a spectacular talk and blew them all away, which is why she was hired.

This episode started me down the path of gender activism. I watched and listened as women around me were overlooked, undervalued, mistreated, or harassed. (Strangely, I never noticed this behavior directed at me, although in retrospect that was certainly the case.) Women's suggestions were routinely ignored, only to be resurrected and appreciated when later raised by a man. One colleague was constantly second-guessed, unlike any of her male counterparts, and when she pointed this out, was told she was depressed and should get professional help. Another woman told me it had become routine for her to cry while driving home from work. The idea that women were somehow privileged in the scientific world simply didn't hold water.

I wish I had been able to ignore all this but after a while, noticing the scarcity of women being hired into faculty jobs and, frankly, getting precious little positive feedback, I began to believe that I wasn't good enough. When I expressed ambition, I was put down. When I asked a potential employer to match a far better faculty offer elsewhere, he declined to change the salary or the position he originally offered; when I said that seemed unreasonable, he replied, "Maybe you're not as good as you think you are." (I went off to cry for a few hours. Then I accepted his too-low offer because there were other constraints.) When I suggested I was ready to be tenured, I was told, "Be patient, Meg, it's too early for you." (I was tenured about a year later.) When I mentioned I was interested in a high-level national committee, the response was, "Isn't that a bit ambitious, Meg?" (I was appointed to that committee within a year of that comment.) When I expressed interest in a promotion, my then-boss said, "You're not a leader, no one would follow you." Well, not with that kind of support, that's for sure.

Throughout this time, I was breaking new ground in my research, publishing important, highly cited papers, and raising substantial funding through grants. Fighting past the discouragement and discrimination, I built a successful career, and I now have a very satisfying position and plenty of recognition. I can still be overly self-critical, but the Doubting Thomas in my head is a lot quieter now. Most of the time, I think I am really great at my work. But believe me, I still "get" the Cinderella thing.

Reflections and Recommendations

One of the hardest parts of getting to where I am in my career has been overcoming the insidious training I had, as does any girl in our society, to be a quintessential female: to be self-effacing, to avoid "bragging," to support others even at the expense of foregoing appropriate credit oneself – all wonderful, polite things, but very much at odds with the dominant scientific culture today, at least in the U.S. Learning about a successful woman, especially in a field where she had to fight for her right to a seat at the table, was the most incredible boost. Finding a few women ahead of me and more in my peer group and even more coming up behind has been critical to my staying in astronomy. I hope that young girls considering careers in science can find the same source of strength and inspiration in my story that I took from those women who went before (in much tougher times). And that they will heed some of this advice:

All children are born scientists because they are naturally curious. Science is a very satisfying career because it engages the mind. The most interesting part of my job is learning new things, making progress toward understanding our universe. Each day, the new thoughts, the new ideas, the exercising of one's brain – these things make it all worthwhile.

It's really important to have a life besides a career. I like science a lot, but it isn't the most important thing. My family is – I have a great husband and two adorable daughters, Amelia and Sophia, and I love them more than it is possible to explain. It's tough to manage the family plus job sometimes – and, by the way, I think it's just as tough, or maybe tougher, for women who stay home and raise their children without much help. And most women with small children also work outside the home; only their jobs aren't as satisfying, flexible, and rewarding as mine.

The most important advice for young women who want both a career and a family is: marry the right person! I am really surprised sometimes when I hear intelligent young women agreeing to shoulder the greater part of the work of raising their children, agreeing to subordinate their careers and aspirations to their partner's, for no reason other than that is the way it is always done or that is the way their husbands and boyfriends have assumed it will be. I hope young girls grow up valuing their dreams and their futures as much as young boys do. The main reason I could have both a career and a family is because my husband, who is also an astrophysicist, is an equal partner in our marriage. He doesn't "help" – we share. We made it equal, from start to finish – Amelia and Sophia even carry both our last names as their middle and last names, but in alternate order.

Be proud of your ambitions--not ashamed of them. There is nothing wrong with being the smartest kid in the class. There *is* something wrong with doing less for the world than you are capable of. Our world needs every contribution, from everyone who has something to give.