Today on Across the Fence a human and scientific love story. We’re going to explore a new book called: Love, Sex & Mushrooms: Adventures of a Woman in Science. It's a book that recounts the difficulties of a woman pursuing her dream of becoming a scientist at a time when women are not supposed to seek such a profession. Good afternoon and thanks for joining us I am Judy Simpson my guest afternoon is a mother, a scientist and now an author. Her career has taken her to Hartford and later to the University of Vermont where she served as a research professor in microbiology and molecular genetics from 1983 until retirement in 1994. Throughout her career she has been an avid speaker at numerous international symposia and her work was awarded and recognized by the National Science Foundation and the National Institutes of Health. I want to welcome Cardy Raper. Thanks so much for being with us. I have to take a breath after reading all your credentials. Congratulations on the book; its part memoir, part love story, part science-how do you describe it to people and why did you decide to write it?

Cardy.: It is essentially a memoir and I decided to write it because I think by and large the non-science public does not really understand what the life of a scientist is like and how you do science. That was part of my motivation because the book is written so non-scientists can understand what I’m talking about.

Judy.: I appreciate that.

Cardy.: I hope you are able to. The other thing is that I was brought up long ago not in the Victorian age but my mother was brought up in the Victorian age. I had a passel of older brothers. I was the only girl in the family and the youngest. My mother and father both always valued education but they had a different aim for the boys and for me. We were all supposed to be educated the boys were supposed to grow up to be Dr., Lawyer merchant chief and the gross post and find a good man Marry him raise educated children. Failing that you could be in those days may be a secretary or an elementary schoolteacher or a nurse.

Judy.: So mother was going to college for you was not unexpected but was expected that you perhaps would get a degree but certainly get a husband.
Cardy.: They would hope so.

Judy.: So when did you first know that you want to be a scientist because you knew that for a long time.

Cardy.: I did, I started in third grade. I was born and brought up across the lake in Plattsburgh New York and I attended what was called the practice school of what was then Plattsburgh State Teachers College. We called it the normal school. There was a professor of science on the staff there, who came to our class every once and while and taught sciences’ grand adventure. He would describe volcanoes and how they spit forth their fire and ashes from the center of the earth. For those of us were brought up in this part of the world that was an astonishing thing to learn about. He also had us modeling volcanoes so it was my first week to choose the materials we wanted to use to make a volcano and make it look real. That was my first experience of hands on learning about science.

Judy.: Mentioned you were the only girl you have five older brothers and the family. How did your parents react when you told them that you wanted to grow up to be a scientist.

Cardy.: My brother; there’s a picture here. The brother sitting on the lower right was the one closest to my age we were good pals and we both love science mainly from the influence of this professor named Dr. Rosterholt. I remember sitting around the dining table one day and saying to my mother when we grow up Johnny and I want to be scientists. She said that’s nice dear, Jonathan can be a doctor and you can be a nurse. And I said but mom a nurse? I don’t want to be a nurse I want to be a scientist. That was her attitude about and my father’s as well that girls are different from boys they have different expectations.

Judy.: And that was obviously the norm of the day. Despite that encouragement did you ever stop thinking you might want to be a scientist and how did she take that next up as far as going to school and picking out a school?

Cardy.: I was encouraged and science all the way through high school. The teachers never thought of me as growing up to be a scientist but I did love the courses they taught it in such a way that I was very intrigued by it. Then I went to college and early in college my first college was Syracuse University. Science disappointingly was taught like a litany of facts that you had to memorize and regurgitate on a test with little time for thinking on how these organisms function. We have to learn their Latin names and had to memorize all that and I found that rather boring. The courses in other fields that I took like sociology, political science, anthropology, arts interested me very much. At that point I was thinking I’m either going to switch fields or switch universities. The latter won out.

Judy.: You went to Chicago.

Cardy.: I went to the University of Chicago which identified as being quite different than Syracuse University at that time.

Judy.: Very different so that rekindled your interest tell me how it happened.
Cardy.: There were two professors and one of them was Sewall Wright he was a famous geneticist. He was known for being the first geneticist trying to integrate the findings of Mendel into the story of evolution from Darwin. He integrated those two theses and he also studied it was really interesting to really want to grow up and be a baseball player but he didn't make it.

Judy.: So plan B.

Cardy.: He studied the color coding of Guinea pigs that involves many genes some of which supersede each other with respect to expression and I found that utterly fascinating that he should be able to do that. The other professor that influenced me was John Raper. A mycologist a new professor at the time at Chicago. His specialty was studying the sexual lives of fungi.

Judy.: There are a lot of us that don't realize that fungi have a sexual life. Maybe you can walk as through that a little bit.

Cardy.: Was going to say most people think of fungi as being maybe pathogens or being edible or being poisonous home or maybe hallucinogenic or being in food preparation such as cheese beer and soy sauce. In reality fungi represents a tremendous variety of lifestyles. They live almost everywhere. They are all in the atmosphere right now as spores. Most of them won’t hurt you at all but they are extremely important to our environment. If it were not for fungi we wouldn't have forests. Many roots of trees and plants are associated with fungi in a microbial sense. The fungi help them out and they help out the fungi. It’s a combination of things that’s very important to what we see out there in our environment. Most people did not realize that they do reproduce both asexually and sexually. It was the sexual reproduction process that my husband was an expert on.

Judy.: So you became an assistant to him.

Cardy.: Actually he was not my husband at the time. I’m getting ahead of myself. I was a student. He interviewed me and I was his first graduate student at the University of Chicago I was also a technician in his lab so I got some support that way. What he had worked out at that time and he was quite well known for it, and was featured in Time Magazine was the sex life of a little water mold called Aclia Ambisexualos. There's a picture of a right now. This is a hand drawing-- he preferred to be called “Red” rather than John. He had red hair. He had drawn hand drawn with a camera seeing something through the microscope. This is two individuals who are getting together and making little sexual organs wherever they meet. They actually get around in small ponds freshwater ponds by swimming spores self-propelled. Once they settle on a piece of nutrient like a dead fly or something like that they grow into a colony that consists of hyphae, those loose thread-like cells. Here’s a picture of them trying to get together. They are not yet connected. What happens is interesting is that I could be either sex male or female depending on who it meets.

Judy.: And it can even change.
Cardy.: It's relative sexuality. When all individuals in the species tend to have the potential to be either male or female. But if that happens to meet an individual that's more male than itself then it's a female. In this picture the organism on the right is the female and the one the left is the male. What happens when they first get together is the female produces a hormone which later was discovered to be a steroid which is similar to what we find in humans for instance. It sends a signal to the male on the left the male in response to that produces these fertilizing organs called anthroridia and then and only then does the male produce its hormone to which the female responds by producing these little egg-like sacs. The next picture shows them getting together and actually finally through this hormonal exchange because the egg sac produces more of its hormones and attracts the fertilizing organ from the male to wrap around it and deliver its nucleus.

Judy.: With all of this going on the lab you ended up falling in love and marrying Red. Which was somewhat controversial because you were his student.

Cardy.: Very, and furthermore he was married already. That was devastating. It just wasn’t done it was taboo. Somehow or other we couldn’t help it there it was. Following a period of turmoil of about three years he finally got divorced and we got married.

Judy.: So you had two children. Quit science to become a primary parent for six years and then you went back to science studying at your husband’s lab at Harvard. How did you manage homemaking parenthood and getting back to science?

Cardy.: It was a gradual process. There I am being a primary parent. I was a stay at home mom for about five or six years while the kids needed me fulltime then. Fortunately we lived in a neighborhood in Lexington where we had many stay at home moms and we help each other raise our children. When the children were both in school I thought I’ve got to do something to keep this brain alive. I wondered if I should be a writer or politician or scientist again. My husband really really wanted me to go and work with him in the lab at Harvard. I would ride in with him in the morning and take a bus home early in the afternoon and be home in time for the children when they came back from school.

Judy.: We have just a couple minutes left so I want to skip ahead. Your husband I died at a relatively young age which left you in a pickle what do you do. Do you continue the research that you worked on with your husband? And you decide to go ahead and do that.

Cardy.: Well Harvard was very very helpful they appointed me a research associate which was never done for somebody who didn't already have a Ph.D. And they let me keep lab space. I was working on the button mushroom; the edible grocery mushroom at the time and we were trying to figure out if it has a sex life. It does, and it’s a difficult one. We’re working on that and all of a sudden he’s gone what do I do? Ultimately I did get what I call the union card and I became a molecular biologist because I realized in order to figure out all the genes involved and regulating the sex life of this wood rotting mushroom that I showed earlier, I went from the old fashion methods shown in the previous picture with lots of Petri dishes and a microscope to the new methods. A micro pipette and radioactive materials and then got a job after the degree. This was the fungus we're working on at the
time called skies of filament. It is a wood rotter. It's found all over the world. It has 20,000 sexes and you can imagine why you might want to know how does it do that?

Judy.: I would say so. Before we run out of time can you tell people how to find your book?

Cardy.: You can check it out of my website which is shown here or e-mail me as the e-mail is on there and you can order it from my web site.

Judy.: I want to leave folks with just one thought because this is something that somebody wrote about you and your husband after husband's death. A friend of yours said the two of you brought us so much joy that must've been because Red and you knew the secret of getting the very sap out of life and savoring it fully. I think that is truly something to live by.

Cardy.: I am still enjoying it.

Judy.: That's wonderful thank you so much for joining us today.

Cardy.: Thank you Judy.

Judy.: That's our program for today I'm Judy Simpson we'll see you next time on *Across the Fence*.

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