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As a historian, I keep turning the problem to explore new dimensions

A conversation with Londa Schiebinger

Patricia Purtschert

About the many futures of gender

The aim of the project is to tell and reflect the different histories of feminist theory. To this end, conversations are held with protagonists who had and have a formative influence on feminist theories. In engaging with these scholars, we wish to delve deeper not only into the ideas and concepts that form the key basis of these theories but also to explore the historical contexts, collective thinking, political practices, and historical controversies that enabled them at the time. The conversations bring forth exigent questions around power, inequality, and violence, intersectionality, the relation of sex, gender, and sexuality, or the critique of binary thinking. We discuss the contributions of feminism to analyzing and challenging significant differences other than gender, such as race, class, nationality, religion, and caste. The project is rooted in oral history and philosophical exchange. It has value for those of us interested in the history of feminist theory and in feminism as a resourceful way of challenging dominant knowledges and creating different ones.

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As a historian, I keep turning the problem to explore new dimensions: A conversation with Londa Schiebinger

Patricia Purtschert

I meet Londa Schiebinger at lunchtime at her Stanford office in California. She arrives after three hours of teaching and will be off to another meeting just after our conversation. While I set up my audio recorder, she takes out a box of sushi, today's lunch, and we start our conversation.

Patricia Purtschert: Thank you so much for taking the time to talk to me during such a busy day. I would like to start the way I always do: Can you remember when you came across feminism for the first time in your life?

Londa Schiebinger: I grew up in Nebraska, and I was not at all involved with feminism there. In graduate school, I was doing a dissertation on Hans Vaihinger's *Die Philosophie des Als Ob*,[1] which is deadly, really. I might have been interested in it except that the person who took over his journal gradually became a Nazi, and I thought, "Okay, where is this narrative going?" So that was no good. Then the women's movement was gathering speed—also in the academy—and I decided to do something on women's history. My subfield was intellectual history, and I thought I might do something on women philosophers; I had done a quarter of my Ph.D. exams in philosophy. Around this time, there was a conference at MIT [Massachusetts Institute of Technology], just a small meeting in the evening, where women scientists talked about their experiences. This must have been around 1980. I listened to them and thought to myself: "They are all telling a similar story. As a historian my contribution could be understanding the structure of those narratives, the institutions behind them, the broader political contexts, the economics; in short: the reasons these stories were strikingly similar." That was when I started working on the topic.

You were then in Germany for a while during your PhD?

Yes, I was in Hamburg with a Fulbright scholarship. My boyfriend at the time, now my husband of over 40 years, also had one. I think he went because I was going. He was in Berlin. We wanted to live in different cities so we would learn more German but that did not work out so well. All we did was commute back and forth.

Were you in touch with German feminists there?

1 Hans Vaihinger, *Die Philosophie des Als Ob: System der theoretischen, praktischen und religiösen Fiktionen der Menschheit auf Grund eines idealistischen Positivismus, mit einem Anhang über Kant und Nietzsche* (1911).

I was. I met Frigga Haug and the people at the journal *Das Argument*, and that was very interesting. I also met Barbara Duden, a marvelous intellectual. I think it was during that year that I wrote a paper about the views of women in the philosophy of Locke and Kant. When I came back to the US, I told my doctoral adviser, who was a real misogynist, that I had switched topics and gave him my paper, which I thought was pretty damn good. His response was, "Well, I do not see any history here! How is this history?" I turned on my heels and did not go back for four years, which was when I handed in my dissertation.

And your supervisor accepted your dissertation?

He signed off. The four readers had a meeting; they thought it was really good. But I could never use my adviser's letters. I happened to see one of them, and where it should say "She's brilliant and you should hire her," it just did not. So I had to find other people to recommend me, which was very difficult. But I immediately got a postdoc here at Stanford.

What did it mean to switch your dissertation topic to women's history at the time?

Well, the word on the street was that if you did anything on women, it was professional suicide. I just thought, "What the hell! I will live my life." I had no plans anyway. And then I wrote *The mind has no sex?*,[2] my dissertation. There was no book on women in the Scientific Revolution at the time. Originally, I was not a historian of science, but I wanted to write a book about the women scientists and their experiences, and history of science is part of intellectual history so it was not difficult to make the transition. To understand women and gender in the science, I kept going back and back in time until I got to the origins of the problem, which is how things were structured in the Scientific Revolution, how women were excluded, and how that exclusion was made to appear "natural"—which means based on natural law—and therefore "just."

At Harvard, at that time, we went to cocktail parties. The question I was asked as soon as I changed my topic was "Well, were there any women scientists in the 18th century?" Then the next comment would be "Well, why not?" Biological determinism was a big deal at the time. I was looking for the origins of biological determinism and the arguments that women did not have the heavy and high-powered brains to do science. As part of that search, I went to the Harvard medical library and began going through the card catalogue looking for medical things on biological determinism and females. I started with "A" and eventually found the Sommerring skeleton, a separate three-page publication in Latin that purported to be the first image of a female skeleton. I thought "Really?" And I followed that story, which turned out to be extremely interesting …

… and became the core of your research! But between your supervisor saying that was not really history and you handing in your dissertation four years later, who were you talking to?

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2 Londa Schiebinger, *The mind has no sex? Women in the origins of modern science* (1989).

Nobody. None of the tenured professors at Harvard at the time knew anything about women's history. Then Evelyn Fox Keller and I—I was a graduate student at the time; she was already famous—started the Boston area feminist colloquium. We included people from MIT, Harvard, Northeastern University, and anybody who wanted to come who was more or less interested in feminist theory and women in science.

What did you do in the group—you gathered, met and discussed texts?

Yes, and we gave papers. I gave my first paper ever. Afterwards, I asked, "How was that?" and I think it was Ruth Hubbard who said, "We assume you are just starting." Well … So, I was involved with this group, and I read books. We lived near the Harvard bookstore—and every time a new book came out, it would be there. There was not really anything on women in history of science. I remember, I read a book published in the 1930s on women and work by Ivy Pinchbeck.[3] And it was so illuminating as to how work is divided in Western culture. These were the early days. There was not much to rely on.

So, you had these few books and you had your informal group?

Yes. And the other graduate students. And my husband was very helpful. We are intellectually very connected, and used to read and discuss each other's writing.

And did you do political work as well? Those were the days when many feminists were marching in the streets …

No. I went to one demonstration in Berlin and a policeman hit me, very gently, on the head with a baton and I thought—"That is it for me."

Your activism ended in Berlin?

I do not think this kind of activism does anything. You will see that I work on deep social change—I am changing funding agencies, peer-reviewed journals, and how scientific research is done. That is where I can contribute. Me marching in the street has nothing to do with these things. It is not helpful.

That was not your career path—to be a revolutionary …

Mine was an intellectual movement. I was interested in women's history—what eventually became gender history—and how that developed. I read everything that came out. In those days, it was possible to read everything. The *Women's Review of Books* run by Linda Gardiner covered all the books. If you missed one, you could read that. She really did us all a great service.

Did you know her personally?

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3 Ivy Pinchbeck, *Women workers and the Industrial Revolution 1750–1850* (1930).

Yes. She had a manuscript on Madame du Châtelet, which I do not think she ever published, and Madame du Châtelet shows up in my book, though not in a big role. So I read her work as background for that.

This was also the time when the term "gender" entered the feminist stage. Do you have memories of when you started to use "gender"?

Well, I used it in *The mind has no sex?* I would say that it came on the scene fairly quickly—but I would have to do some research to date it. I always feel that it came more from anthropology than history. But it was immediately useful to me because such inquiry goes beyond traditional intellectual history to look at social roles and bodies in the room, how gender shapes thinking, consciousness, and ideologies. So I immediately sucked it up.

Many people refer to Gayle Rubin when they talk about the introduction of gender into feminist research. Did you read her writing?

No, I did not read her work. I am interested in science and philosophy and not in sexual violence. I appreciated what she did. But it was not my thing.

So it was more like the concept of gender was around and started to be used?

Yes, it was a useful tool that historians used at the time.

Back to your history—you came as a postdoc to Stanford?

I came here as a postdoc for a couple of years. My partner got a postdoc here first. And there was a postdoc position in what was called VTSS at the time—"values, technology, science, and society." I am sad that they dropped the "values," it is now just STS. They were looking for a postdoc, and so I applied. The very nice man, Jim Adams, who was head of VTSS at the time, thought I was the "squeeze" of one of the Harvard people. He did not know whose "squeeze" I was. He told me this later, and it was quite funny.

What is a "squeeze"?

A "squeeze" is a girlfriend. I also did not know that term, but it is the term he used. He was a mechanical engineer. This is before partner hiring at universities was possible. He knew several Harvard men were coming and thought, "She must belong to one of them …"

While I was in Stanford, I met Thomas Laqueur, who was at the University of California, Berkeley, and who took on the job of sponsoring me. He is a very kind person. Plus, he understood what I was doing with my skeletons. I had trouble getting a first tenure-track job because people did not know what these skeletons were about. Body history was just starting—they had no idea. Some people thought they might be pornographic; after all, these females are not dressed! Tom was very helpful. He offered to write letters of recommendation for getting a

permanent job. And then I also got to know others at Berkeley like Carolyn Merchant, who did a very important book, *The death of nature*.[4]

Your work and that of Thomas Laqueur have a lot of commonalities and are often read together. I have asked myself whether you have been in conversation when you developed your analysis of what happened in the 18th century—what he calls the transformation from a one- to a two-sex-model and you call the emergence a complementary gender system.

No, we had not. I was already done with my dissertation, and he was pretty much done with his book. He was editing the journal *Representations* at that time, and I wanted to publish my skeletons work. I remember sitting on the bench right in front of the history building, and he exclaimed: "Oh, we are doing exactly the same thing." I was so pleased that someone recognized what I was doing. He helped me get connected to publish this first piece on the skeleton.[5] That was very exciting. Then I was working on Winkelmann,[6] and he invited me up to Berkeley to give that talk. It was nice because I came from Harvard, where none of the professors were interested in women's history, to the Bay Area, where Laqueur and Merchant were doing work on gender, sexuality, history of the body—a much better situation.

Later, you wrote Nature's body,[7] *a book that I like a lot. Would you consider this an extension of what you did in* The mind has no sex*?*

It is all new research. One reviewer said that there was no context for *Nature's body*. Well, it is all in *The mind has no sex?*, and I was not going to repeat it. In many ways, it is an extension of *The mind has no sex?* I went from the larger social picture to looking specifically at gender bias in science. We had very few specific examples of how science was biased and how it emerged from the society. There was Emily Martin's article,[8] which is marvelous, the egg and the sperm story. I taught that until fairly recently. But apart from that, we had very few concrete examples, so that is what I wanted to work on. Then you take somebody like Linnaeus …

… which touches upon my next question: Why Charles Linnaeus? And why the 18th century?

Well, it is the beginning of the Scientific Revolution. Things are being set up.

You show in this book how a complementary understanding of men and women emerged. The establishment of this bourgeois gender order was scientifically legitimated by people like

4 Carolyn Merchant, *The death of nature: Women, ecology, and the Scientific Revolution* (1980).
5 Londa Schiebinger, Skeletons in the closet: The first illustrations of the female skeleton in eighteenth-century anatomy (1986).
6 Londa Schiebinger, Maria Winkelmann and the Berlin Academy: A turning point for women in science (1987).
7 Londa Schiebinger, *Nature's body: Gender in the making of modern science* (1993).
8 Emily Martin, The egg and the sperm: How science has constructed a romance based on stereotypical male–female roles (1991).

Linnaeus. That is how I read the story that you give us, as the story of a crucial moment of social transformation.

That is why I went to the 18th century in the first place. I was trained as a 19th-century historian. Typically, historians do not change centuries, but the transformation that I was interested in was not there in the 19th century. So I kept going back until I found the story about the Scientific Revolution that I was interested in: How modern science was founded and how the exclusion of women was made to seem natural and just. But it took me years to formulate it like that.

You were going backwards in time not really knowing where you would end up …

No, I did not know where I was going!

And do you remember the moment when you realized: "That is exactly where I need to be"?

I think finding the Sommerring skeleton was really it. I always start with a find and that was it.

One unique aspect of your book is your discussion of the life of plants. You show how different ways of reproducing are squeezed into a specific heterosexual model during that time.

Most plants are hermaphroditic. Sex is so interesting, and we humans boiled it down to this boring thing!

Yes, exactly. I just wanted to ask if you could elaborate a little on what you think the role of these plants is in the creation of the heteronormative order of modernity.

Well, the plants were doing their best not to get shoehorned into those categories.

Yes, but they were put there by the scientists. This way, their research was helping to strengthen social hierarchies, in this case, heterosexual ones.

Of course, all of these structures were being put in place in the 18th century. The 18th century was an open time when many alternative ideas and social structures coexisted, but gradually things got solidified and narrowed. I never write anything about the 19th century; it was a horrible century for women. And a horrible century for everybody, apart from normative white males—that, of course, is a thesis I would have to prove. But I was never attracted to the 19th century. Whereas in the 18th century, there is lots of cool stuff going on. And you can see current European social norms being formed.

In the book, you talk about race and gender sharing an intimate history—scientific, social, and political. How did you come to realize that race needs to have a central place in your research?

Nature's body I wrote rather quickly because I had all the background already in place. I should note that the first book took 10 years. However, those last three chapters of *Nature's body* on race and gender, and how they intersect, took a really long time because there was not a lot to rely on. But again, there was Blumenbach's skull, the Georgian woman. And there was my find! He has the pictures of five skulls, and one is labeled "female." What does that mean and why? All the other skulls were unlabeled by sex—and therefore assumed to be male, which they were because race is about males: Black men were challenging white men for social power. Black men were not given the rights of citizens in the Americas. When you talked about females, it was all about the power between men and women. But when you talked about race, it was about men. I found the structural interactions of race and gender fascinating. In the US civil rights movement in the 1960s, the analysis also was: All the women are white, all the Blacks are men. There was this book, *All the women are white, all the Blacks are men, but some of us are brave*, which no doubt influenced my thinking.[9]

Were you sensitive to those questions because of what happened around you politically, because of the civil rights movement?

Because I found it in the sources.

Yes, but you need to be able to see it.

I know, but you cannot *not* see it. We call this the unmarked category. All the male skulls were unmarked, only the female skull was marked, right? When you are aware of this sort of thing, you see it. I find iconic things, and then I tell a whole historical story about them.

How did you find the Blumenbach pictures?

They are in his book *On the natural variety of mankind*.[10] The Anthropological Society of London translated his book in the 1860s because it fit the racism at the time even though Blumenbach is not the kind of racist who came into being in the late 19th century. Anyway, somebody found the book and gave it to me. There are a bunch of used bookstores in Cambridge, and I guess someone had sold it off. And here I could have it in my hand, I did not have to go to a rare book library and read it. I had it in my hand, and I am pretty sure that is where this skull is shown. There is so much of this comparative anatomy in anything you read from the 18th century. And I saw immediately that the image was important. I then dug deeper into Blumenbach's published work and papers to get the full story.

Was there a discussion on what we would today call intersectionality at the time? Alternatively, were you involved in circles where race or racial injustice was an issue?

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9 Akasha (Gloria T.) Hull, Patricia Bell-Scott, and Barbara Smith (Eds.), *All the women are white, all the Blacks are men, but some of us are brave: Black women's studies* (1982).
10 Johann Friedrich Blumenbach, *On the natural variety of mankind* (1865, original work published 1775).

Not really. My husband, Robert Proctor, wrote a lot of books on Nazism, which is all about race. So it was around, and I knew race was important. I just kept seeing these parallels and non-parallels between gender and race.

Were you also in touch with the Black feminist movement at the time? Did you read Audre Lorde's texts, for example, or the Combahee River Collective's statement?

Not really. I wish I had been. I read about these things in the *Women's Review of Books*, the *New York Review of Books*, and the *London Review of Books*, but I was not reading all the literature myself. I read a fair amount of bell hooks's writing. I liked her. Otherwise, I sat a lot in my own room. You are in touch with the broader world, it does not have to be in your own community or your own experience. You can absorb it from the wonderful things that people write.

What I particularly like about the book is how it shows the controversies that took place in science, for example around classification. A key term of the book is Linnaeus's "mammal." Can you say a little bit about that term and the role it plays?

Yes. So, I had just had my first baby, and it was my first day out in the library. I was leaking milk, and I had ordered up Georges Buffon's *Natural history*.[11] It was not accessible online at the time, it was so different then. I was reading the page, and Buffon was calling me a quadruped, and I said, probably out loud, "I am not a quadruped, I am a mammal!" I went home and asked Robert: "When did people start using the term 'mammal'?" He said he did not know. I thought, there must be a story there! It was a marvelous story, one of my favorite stories, all these multi-breasted Dianas, all the iconography is fabulous. Then one of Linnaeus's students wrote a dissertation against midwives. There is your political story right there! Because we know that this was the time when aristocratic women were being encouraged to breastfeed. Everybody was being encouraged to breastfeed because women's place was in the home.

There is this ambivalence of "mammals" becoming a key term to describe human beings taken seemingly from a female world, but at the same time it was used to naturalize women. That is where you bring in Homo sapiens *as an opposite term that is, of course, linked to the male human.*

Yes, the "man of reason" distinguishes us from animals while *Mammalia* connects us to animals.

And the connection of humans to animals is made through the breast.

Yes. I went to my colleague in classics and together we coined alternatives to the term *Mammalia*. The class that we call mammals have numerous unique features that could have

11 Georges Louis Leclerc, Comte de Buffon, *Histoire naturelle, générale et particulière* (1749–1789).

been featured in the name, for example, we could be the "hollow-eared ones," *Aurecaviga*, or the "hairy ones," *Pilosa*. I got the cover of the *American Historical Review* for that article—I was very proud. I was an assistant professor, it was early on, and one of the reviewers said, "Aha! Not all mammals have hair!" and brought up rhinoceros. Well, that was an easy one because the tusk is made of hair. I just loved answering that question. You cannot let them get you. As someone who was not established, working in this area, I always had to be 500 times sure that whatever I said was correct.

I remember Dick Lewontin, who, sadly, just passed away recently in his 90s, was at our breakfast table. My husband had taught with him at Harvard, and Lewontin was visiting us in Pennsylvania. I had this discussion about mammals with him: Okay, so how important are the *mammae* to this class of animals? You know, he was a real biologist, and I wanted to get it absolutely right. If you are writing about these things that are new, sure you want to be challenged, but you do not want to leave yourself open to simple errors that destroy what you are doing. So I always check, and then I recheck, and I check again.

This included a lot of interdisciplinary work.

I do not recognize disciplines. I am not disciplined by my discipline.

Okay, yes. But you talked to many colleagues who were looking at things from different angles.

Yes. That is what human knowledge is, right. We should put the university back together.

Did you encounter open doors or was it sometimes difficult to have these conversations?

As you know, we are an academic couple. That gives me access to my husband's networks, and he has access to my networks, which I do not think are as developed because women did not have that many networks back in the day, but being his partner makes me a "safe" woman. I have access to his people and can easily email and ask them questions. One of his advisers, I. Bernard Cohen, gave me two tapes with comments on *The mind has no sex?* just because I asked. They were very useful because he was erudite and open-minded enough to take it seriously. So, you can go through networks, either your own or your colleagues'.

Talking about networks … in the book, you mention the work of Donna Haraway, Helen Longino, Sandra Harding, and Anne Fausto-Sterling. Were you connected with them at the time?

Sandra Harding is very important to me. I really like her work; she works bottom-up and connects everything. I did not think standpoint theory was quite right, but Sandra and I have been friends for a long time.

Did she read your manuscripts?

No, she did not. I read her books; she probably read my books. But we did not exchange writing. I did not really do that with anybody.

Who reads your writing?

My husband reads it, and we discuss.

Is he your main interlocutor?

Yes, I would say so. After our Stanford postdocs, we went to New York. Robert had a job at the New School for Social Research, and I was on research grants. I asked Joan Scott to read my book manuscript. My big question was about the organization of the book—the first part is about women and the second part is about ideology, skeletons, and the history of science. I asked her if I should have them both in the book. She said, "Oh no, you want to take out the women because these other parts are so much more important." I re-did the whole book to do that but eventually, I went back to my original organization because that was what I wanted to say. She was an important person to me and kind to read the manuscript, but I would say that was a year-long detour.

She favored a different approach.

She liked ideology and ideas. She was really on the gender stuff at that time and did not want to complicate it with women's history, I guess.

Did you go to feminist conferences?

I do not remember going to conferences—I did go to the Berkshire Conference of Women Historians and, of course, History of Science Society annual meetings. But by far, reading was more important. You can read and get what you need from that. I think it is much more efficient to work like that. I only really started traveling a lot when I was asked to give lectures; now I regularly go on lecture tours. And now it is also Zoom. But in general conferences can be a waste of time. I usually go to keynote conferences now, or I organize workshops myself. A friend of mine from graduate school, Joan Cashin, and I started "Women's History Week" while we were graduate students at Harvard. That was fun, but it distracts you from your work.

Now I organize Gendered Innovations,[12] where I work with many, many people. So I have changed from being a more solitary scholar to collaborating. I really like collaborating, but you have to remember that history rewards you primarily for solitary work—for single-authored things.

12 Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, https://genderedinnovations.stanford.edu

Has feminism changed science?[13] *is like a hinge between your historical research and gendered innovation approach. The book does an analysis and critique of women's position in science, but it already turns to prospective questioning of how we can make change happen.*

Yes. The real story is that I had children and I could not go to archives any more. So I needed something I could do from my home study. We went to Hamburg, where I taught feminist theory at Göttingen for a semester. I needed work that I could do in my office at home. Earlier on, I used to disappear into archives or rare book rooms of libraries for six months at a time. I loved doing that, but I could not do that with little kids. So that is the true story of that book.

Did you not have childcare during your stay in Germany?

Oh sure! We had this man babysitter, William, a hand model. He was very good with the two boys. They adored him. We always had babysitters seven days a week. There is no screwing around with us. Seven days a week because we are working on our stuff.

No weekends?

Weekends were shorter, we worked from 9 a.m. to 3 p.m.

What about work-life balance?

I love work. I do not consider work "work." I consider it life.

You never ran into one of those famous academic burnouts?

No, what is there to burn out from if you are having fun? I would rather write a book than take care of small children. I did not want children. My husband did. My husband loves babies. So, there you go. And I am very pleased with my children. And very glad we had them. They are wonderful people—and now, themselves, both professors. Robert was right—having children is part of the human experience.

How we gave the children last names was important. When we decided to have children, we decided to have two. And so that girls would not be named after the mother and boys after the father, we decided to cross-sex our names before the children were born. The first was a boy and so he took the name Schiebinger; the second was also a boy and took the name Proctor. We told them that at age 18 they could change their names if they wished. They are both very invested in their names and seem happy with our solution.

It worked out for you to have kids and be an academic?

13 Londa Schiebinger, *Has feminism changed science?* (1999).

Yes, because we could pay for it. We could pay to have our house cleaned twice a week during our time at Penn State. This is in central Pennsylvania, an inexpensive part of the country. We could pay to have babysitters seven days a week because, again, it was inexpensive. We paid them well, for the area, and we were very close with them. I had lunch with them and the kids. It was a great time, but you have to remember that people have to be able to pay for these things.

What about the analysis you make in your own work that having a babysitter is not the end of the story, because women do all the managing around it?

Of course, I did all of that. I am an extremely good manager. It is no problem.

Back to the book Has feminism changed science? *You gave me some of the background of your life at the time. How important was the focus on social change that you start establishing more in this book?*

I have always done my history with the current situation in mind and asked "How do we make social change?" The publisher for *Has feminism changed science?* really wanted me to call it *Have women changed science?* It would have sold many more copies, but the question was not about women. The question was feminism, really. That was an important bridging project for me; it led to Gendered Innovations.

Did you know at the time that you were heading towards new shores?

No, because I had not yet come to Stanford. Gendered Innovations was possible because I was brought to Stanford to direct the Center for Research on Women, which, under my leadership, became the Clayman Institute for Gender Research. Then I had money to start a project where I had no idea where it was going or how it should be organized. The first year was a total failure. I just had the wrong model. I had research assistants who were not experts. Then the European Commission arrived in my office one day; I almost did not take the meeting because I thought, "What do I want with these bureaucrats?" They liked my approach to gender in science and wanted me to lead an expert group. They funded the possibility of having collaborative workshops where we brought experts together to prepare case studies for the website. That really worked. Without the European Commission, I would not have hit upon or had the money for this expert group model.

What did Stanford expect from you as a gender expert?

They wanted someone to take up the theme of gender and women in science. That is all they wanted. Over the years, I put in place the Faculty Research Fellowships, where we brought together faculty from all across the university. Gender studies had mostly been cultivated in the humanities. But we wanted the engineers—Stanford is a big engineering school—we wanted the medical school and the natural science faculty. I was brought in to bring all those people together. I ran many things. When I stepped down from the directorship, I started Gendered

Innovations in earnest. Just getting that term was very important. I knew I needed something positive. I could not go into a room of 500 scientists and say: "You are biased!" I was looking for something positive, and "innovations" was it. In 2009, when we started, it was the right word, and still is. When I say "innovation," I can go into a room of scientist and engineers and invite them to work with us as collaborators.

You reach out with the common goal of making science better.

Absolutely. We have a common mission.

Let us go back to your historical work for a moment. I want us to talk about Plants and empire,[14] *published in 2004, which is a wonderful book on the circulation and non-circulation of knowledges, about a very specific history of agnotology.*[15]

It is a fabulous book. Let us start with the find. What did I find? It was the time when voyaging was the big theme. In addition, history was moving from nation-bound history to larger areas. So I knew I wanted to get out of Europe, but I needed a story. I was reading everything, and I do not know why but I was reading Maria Sybilla Merian, whom I adore—she is almost in very book of mine. In her book on insects, she recounts how the Amerindian women and enslaved African women use what she called the *flos pavonis*, the peacock flower or *poinciana pulcherrima*, to abort, so their children will not become slaves like they are. I read this and said, "Too much information!" It is a book on insects and their relationship to plants, a natural history book. What is this information doing there?

That became my topic, and I wrote a book about a great plant. Not a great man. Not a great woman, but a great plant. And I learned all about this plant. I took my family to the Caribbean, where we looked for the plant. It is a funny story—we went to Martinique, which is a former French colony and still part of France today. I had written to the botanical garden to say that I must see this plant: I absolutely have to see it. I wrote in my very best French, but they did not answer. We arrived in Martinique, my children were small at this point. We ran off to the botanical garden, and nobody was there. We looked everywhere for the plant. It was not there. I began to think, "Am I misinformed? This is becoming a little strange." Later on, we bailed and went to the banana museum for some fun. And there, in the parking lot, was the peacock flower. It is a beautiful plant, but very common and grows everywhere. It is a weed! Wanting to see it is like asking someone in the United States to see a dandelion. I can imagine that the people at the botanical garden thought: "Oh, this earnest North American woman wants to see a peacock flower." Can you imagine?

Then I talked to people very gently about fertility control because abortion is not legal in many places. We took tours of medicinal plants. I really got the feel for the places that I was studying, which is what a historian does. Of course, when I studied Germany, France, and

14 Londa Schiebinger, *Plants and empire: Colonial bioprospecting in the Atlantic world* (2004).

15 Robert Proctor and Linda Schiebinger, *Agnotology: The making and unmaking of ignorance* (2008).

England, I knew all about the places. So I started with the peacock flower and followed the story. I set the story in the Atlantic world to explore the circulation of knowledge between Africa, the Americas, and Europe and how flows of knowledge were blocked by agnotological barriers, and how they were influenced by political and economic environments. This is the type of research I adore doing. I still teach that course! It is called "People, plants, and medicine," and attracts a number of Stanford's indigenous students. I have become close to several Navajo students over the years.

We had talked about how in your other studies, Black women and women of color did not appear, because in the dominant understanding, women were white and non-white people were male. I was wondering whether that project was a way in which you could turn to Black women, women of color, and indigenous women and study their *knowledges?*

Yes, that was a very conscious decision. As a historian, I keep turning the picture, I keep turning the problem to explore new dimensions. I see what Maria Sybilla Merian did. This is the European story, it is her story. But what about the African women, the displaced and enslaved people Merian was working with: What was their story and experience? And then the Amerindians—how did these women influence each other, and how did they communicate? I am extremely interested in indigenous knowledge. I consider European science as a form of knowledge indigenous to that culture—so we can put everyone on the same level. When I saw Maria Sybilla Merian's comment, it jumped out at me because I knew: This is the knowledge of those African and Amerindian women, and Merian recognized that it was important. The men saw it too, but they did not value it. They were physicians and saw women die from abortions because they were called only when things went wrong. Birthing, contraception, abortion, and fertility were women's spheres, women's knowledge.

In order to get this other perspective, did you have to change your methodology?

You cannot. Africans who were enslaved in the Caribbean did not write anything—they were often punished if they learned to read. So we do not have sources from them. The Amerindians in that area, Arawak, Tainos, and Caribs, did not leave written records either. They left artifacts, but they did not have writing systems that have survived in any way. The French were very good anthropologists, and I was able to glean a lot from French sources. So that is what we have, and we just have to rely on it. Which means that we see everything through a European filter, right? That is the problem. Historians have written brilliantly about that. They use inquisition records in Colombia and South America. We have numerous transcripts from inquisition trials, but these are embedded in Spanish and Catholic frameworks because the scribe wrote in Spanish, not in the Indian languages. Keeping in mind these frames, the historian tries to see through them as best we can. It is all we have.

Can you say something about the reception of that book? Was it widely read by people working on alternative knowledges and non-Western knowledges? Have there been discussions around your book?

Well, it won lots of prizes—I got a prize in the history of pharmacology, in Atlantic world history, and in French colonial history. It was very well received. But as one book comes off, I am always onto the next project.

Later on, you wrote Secret cures of slaves,[16] *which does not focus as much on gender.*

I looked for gender stories. I looked and looked. Sadly, there is little on gender to report; the race story is the important story.

Let us get back to the Gendered Innovations project—you mentioned your arrival here in Stanford, where your institutional place became an important condition for this project.

I had the resources to experiment kind of wildly, which was great. The European Commission was important, and they required that I have collaborators. So I worked with Ineke Klinge in the Netherlands. She was co-director along with Martina Schraudner in Berlin, and Inés Sánchez de Madariaga in Madrid, and later Marcia Stefanick at the medical school at Stanford, Hee-Young Paik in Seoul, and, now the next generation, Mathias Nielsen in Copenhagen and Sabine Oertelt-Prigione in Nijmegen and Bielefeld. And, I should add, our webmistress from the very beginning has been Rosemary Rogers at Stanford. Without her, we would not have our wonderful website.

I worked especially closely with Ineke. We organized the workshops together. Some years later, we talked about why we like collaborating so much and decided it was because we each do what we say we will do. I hate collaborations where people do not hand in their stuff; Ineke and I are both very reliable. And Martina has been great because she brings the whole industry perspective. And of course, Inés has been wonderful because she is an architect and city planner. Marcia and Sabine bring in important aspects of health and medicine, Mathias is a sociologist and keen thinker on gender, and Hee-Young tied us into Korea and the Korea Center for Gendered Innovations for Science and Technology Research she eventually founded there.[17] There is also now an Institute for Gendered Innovations at Ochanomizu University in Japan.[18]

Together, we set topics for the case studies. Each case study demonstrates how the methods of sex, gender, and now intersectional analysis lead to discovery and innovation. We chose the topics and then chose the experts, who could be from anywhere. I had a research assistant, Addison Arlow, a brilliant guy, for a couple of years; he and I would work up the basic case study. We would do all the literature review and give the experts a draft which they could demolish, if they wanted to. But it was somewhere to start. If you are not very practical, you are not going to get collaborative work off the ground.

16 Londa Schiebinger, *Secret cures of slaves: People, plants, and medicine in the eighteenth-century Atlantic world* (2017).
17 https://www.gister.re.kr/eng/user/main.do
18 https://www.cf.ocha.ac.jp/igi-en/index.html

Your way of working was to pull the existing knowledge together, bring it into a forum, and let the experts discuss and revise it.

They are like peer reviewers who also created the product. I chose the topics with ideas from all four of the original co-directors. I read a lot to see what was hot in different areas. And here is one that failed—we tried to do a case study on sex/gender in the brain. The workshop was in Paris, we brought in the experts, and by the end of the second day, there was not even eye contact between them because of the differences in opinion. We eventually abandoned that case study.

I do not know what happened in Paris, but I guess one of the hard questions in that field is to deal with the question of the binary as well as intersectionality …?

Yes, these are hard questions. So we left out neuroscience.

But these are questions that come up in other areas as well …?

I know. We define all basic terms, including sex, on the Gendered Innovations website; you will not find a binary definition there. In our second round with the European Commission in Brussels in 2018–2020, we included marine science—and all the fabulous hermaphroditic combinations that marine organisms include. We have a whole method on that. We infused our definitions of sex with some of that perspective as well. It is important to remember that for humans we use the term "intersex," and for non-human animals and plants we use the term "hermaphroditic." Nothing is binary in our definitions.

Still, dealing with the binary seems to be a divisive issue in many places. There is the problem of needing to bring women into the picture. One of your case studies is about how medication is tried out only on male animals and men, and that there is a need to include female animals and women. At the same time, we have to make sure that we do not get stuck with a binary understanding of sex/gender, which is in many ways inadequate to understand human and non-human life. There is a real tension there, epistemologically as well as politically …

I know, but there is a cost issue too. Intersex, for instance, is a very tiny portion of the human population. How do you include that group when starting drug discovery with animal research? To my knowledge, we do not even have an animal model for it. These questions are endless. Sarah Richardson, who studied with me and is at Harvard, now recently published something called "Sex contextualism."[19] It is a wonderful article except she heavily criticizes the National Institutes of Health (NIH), the European Commission, and the many people who have spent their lives getting "females" into medical research. The knee-jerk reaction is still to include only males because researchers want to compare their results with past research. I felt bad for Janine Clayton, who worked so hard at NIH to bring each institute on board with inclusive research, and Cara Tannenbaum, who accomplished similar things at the Canadian Institutes of Health

19 Sarah Richardson, Sex contextualism (2022).

Research. They have worked so hard, they have made so much progress, and they would be the last people to think that sex is binary.

We have to see what is possible to do practically. And we should all be working together to do that. Janine Clayton struggled to include sex as a biological variable at NIH. She had to go to every single institute and talk with people, bring them on board, offer extra money for this type of research, and deal with skepticism from the scientific community, just to get females included. So, yes, it is very complicated and, yes, we need to open everything up.

I am reporting something now on how sex and sex interact. One of the Stanford labs has shown that if the male and the hermaphrodite of *C. elegans* are in the same gel in a petri dish, the hermaphrodite will die at a younger age—i.e., the presence of males shortens the life span of hermaphrodites. In addition to analysing the sex of an individual, you have to see how the sexes, however many there may be, interact. There is also the sex of the researcher; think of Jeff Mogil's interesting research.[20] In pain research, animals, mice and rats, do not show their pain when a man researcher is in the room; they do show their pain to a woman researcher. Why? The animals smell the men; they smell male pheromones. According to Mogil, this phenomenon may throw into question all prior results from pain research. So, sex is dynamic and depends on lab conditions.

Let me ask a final question—what do you think is the future of gender studies?

I am going to talk about Gendered Innovations. We have set up the website with over 40 case studies of how to achieve excellence in science by including sex and gender analysis in research design. This we have now expanded to include intersectional analysis—to consider the intersection of sex, gender, race/ethnicity, socioeconomic status, education background, disabilities, language, geographic location, sexuality, among many other factors. I did not change the website title to "Intersectional Innovations" because this is not yet well understood. But the Gendered Innovations methods now include intersectionality. We have also revised a number of case studies, such as our first one on cardiovascular disease, to be intersectional. We cannot revise them all, but all new case studies will take an intersectional approach, where relevant. And we are always expanding into new areas, such as AI. We did a comment in *Nature* in 2018 based on a Gendered Innovations workshop on bias in machine learning and AI.[21] That went viral; I do not think I have had that much influence with books. It seems to me that people do not read books any more. I love and value books. I lived for the books that could teach me everything. I have written a lot of books. But I am just doing other things now where I feel I have more influence. Gendered Innovations has been extremely influential. Our website has had two million unique users across 185 countries. It includes over 220 collaborators. We will have a National Science Foundation-funded workshop in August and will be preparing several new case studies. It is all very exciting—and important work. One of our case studies is on domestic robots—robots to clean up the kitchen! We want to make sure that those enter

20 Robert E. Sorge et al., Olfactory exposure to males, including men, causes stress and related analgesia in rodents (2014).

21 James Zou and Londa Schiebinger, AI can be sexist and racist—it's time to make it fair (2018).

society in inclusive and responsible ways. We published a perspective in *Nature* in 2019.[22] It was great to see gender analysis take its place in one of the top science journals.

We are also working on the science infrastructure. Lilian Hunt at the Wellcome Trust in London, Mathias Nielsen at the University of Copenhagen, and I have just done a global study of national funding agencies and their policies for incorporating sex, gender, and diversity analysis into research content. National research agencies are funded by taxpayers' money and, as such, responsible for promoting excellent research that benefits all of society. When researchers apply for funding, they are now required to include the sex, gender, and intersectional analysis, where relevant. We surveyed agencies across six continents; it is a big study. It is important to keep moving the funding agencies along. This study will be published in *Science* in September 2022.[23] On the Gendered Innovations website, we present our five-part conceptual framework for what the process would be to include sex, gender, and diversity for a funding agency—along with emerging global practices.[24] With this, if an agency wishes to implement such policies, it does not have to reinvent the wheel.

Our next step is to do a similar study for peer-reviewed journals. If you want to do sex and gender and intersectional analysis in science you have to encourage it at the beginning, with the funding agencies, and at the end with peer-reviewed journals. Peer-reviewed journals can require sophisticated sex, gender, and intersectional analysis when selecting papers for publication to ensure the quality of research. This type of analysis may not be relevant for pure math or theoretical physics, but for most other research fields, considering these variables is necessary and reviewers should review on that. Being a historian and understanding how infrastructure works, I want to help shape those structures. New ideas have to be supported by social and institutional structures, or change will not happen.

The curriculum is another one of these pillars. We need to integrate sex, gender, and intersectionality into core engineering and computer science curricula, for example. At Stanford, many engineering students come over to the humanities and take my Gendered Innovations courses. But the courses should be right where those students live. Tragically, medical schools have not consistently integrated sex and gender into their core curriculum—human health will be much enhanced when they do! We have to be smart and work to make the pillars of the science infrastructure support sex, gender, and intersectional analysis in science and technology.

How do you manage to do both, your historical research and your work with Gendered Innovations?

Life is long, and there are many hours in a day. I am a woman on a mission!

Thank you so much for this conversation, Londa.

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22 Cara Tannenbaum et al., Sex and gender analysis improves science and engineering (2019).

23 Lilian Hunt, Mathias Nielsen, and Londa Schiebinger, A framework for sex, gender, and diversity analysis in research: Funding agencies have ample room to improve their policies (2022).

24 http://genderedinnovations.stanford.edu/sex-and-gender-analysis-policies-major-granting-agencies.html

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