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Contextualism in the history of the evolutionary theory throughout the 20th century: an interview with Betty Smocovitis

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ABSTRACT In 1996, American historian of biology Vassiliki Betty Smocovitis published a must-read book for 20th-century history of biology: *Unifying biology: the evolutionary synthesis and evolutionary biology*. Although the subtitle indicates the cut of the historical event of the 1930s and 1940s, which led to the so-called modern synthesis or synthetic theory of evolution, the book covers several sub-areas of biological sciences, including those that were left out of the aforementioned theory. Also more than the already trivial account of the achievements of the "architects" of the synthesis, Smocovitis offered a historiographically new interpretation. Instead of the apex of an almost spontaneous, cumulative and linear process, the author places the synthesis as a "moving target", but long-desired, that is the unification of science, nourished by the "positive sciences" of the 19th century and definitely marked by the logical empiricism of the first decades of the 20th century. After contextualizing the interviewers' starting point in the midst of the COVID-19 pandemic and summarizing the aforementioned matters, this article brings an interview carried out virtually with the author on November 17, 2021. In addition to the topics covered, we were able to know a little more about how the author conceived the work and how the writing process of her *Unifying biology* took place. We were especially interested in her talking about the strong contextualism that renewed

the history of science in the 1990s and today is sometimes ignored by young researchers in the area. Our interest was to explore how she combined her deep knowledge of the history of biology and its historiography with new trends in science studies. Other topics ended up being brought to the conversation, such as the theoretical paradigms underlying the history and philosophy of biology, the current state of institutionalization of the history of science in the US, the obstacles to the popularization of science and the impact of authoritarian governments on academic activity.

Keywords: Evolutionary synthesis – History of Biology – Historical Contextualism – Evolutionary biology.

Introduction

In the dramatic first two years of covid-19, the increasing amount of scientific information available in the Brazilian media brought many benefits to people facing the pandemic. It helped to fill the void related to consolidated news and data. Even more, science-related digital influencers in media had the important role of leading the active reaction to the counter-campaign headed by the federal government. Scientific discussions in the mainstream press and social media was almost the only source of encouragement in the dark years from 2020 to 2022.

However, it also brought attention to another problem, one that was discussed only in the restricted professional circles in two areas of knowledge and research: science education and "meta-scientific studies" of science –an encompassing term regarding the disciplinary areas of history, philosophy, and sociology of science, as well as more recent developments, such as the so-called cultural studies of science. The problem on focus is the impregnation, in the contemporary public discourse, of mixed conceptions of science, with a preponderance of aspects of a certain "positive science" from the 19th century and the logical empiricism of the beginning of the 20th century.

Not that the influential expression of this "traditional", logical-empiricist view of science was anything new. It is part of the conceptions about the scientific activity not only by the general public, but also by specific groups, such as scientists, professors, and students. It has been verified, for four decades, in surveys considering people in different countries (Abd-El-Khalick, 2014). Of course, there is a lot of variation between these surveyed groups and even within them. Empirical research over the last thirty years has also collected perceptions of science more in line with contemporary views advocated in science education. It was detected, especially in the last decade, the recognition of variation in methods and inferences in the interpretation of data, two aspects of relevant consequences in scientific practices (Schwartz et al, 2012). However, this alignment was more the exception than the rule. The systematic questionnaires for surveying conceptions of science show that an empirical-inductivist view of science prevails. Some authors (*e.g.* Chalmers, 1993) characterize this view of science as naïve: it excludes any determination resulting from theories. From this naive perspective, for example, it is considered that sufficient and robust sets of data are sufficient for scientists to reach a single conclusion, with no controversies. It was also seen that the belief is maintained that "good" science is absolutely "objective", that is, it is impersonally and socially "neutral", free from subjectivities and values, being moved solely by and for the common good (Gil-Perez et al., 2001).

Perhaps there has never been as much talk as in 2020 and 2021 about the "scientific method" (unique, universal, infallible). And this "method" was soon singled out in what constitutes a

particular type of research procedure among many others, with a control group, high sample number, double-blind, etc. This kind of procedure is legitimately adopted in medical scientific investigation and differentiates it from the clinic. All the scientific enterprise was assured as unequivocal, absolute truth, reached exclusively by this (single) "scientific method".

Classes on TV and the internet, on an almost daily basis, about viruses, their forms of dissemination, prophylactics, and the development of vaccines were, invariably, shaped and justified by the elevation of the authority of science to a level originally engendered in the 19th-century environment, when organized knowledge in the emerging field of philosophy of science and the logical empiricism of the first decades of the 20th century and their large number of popular works for the non-specialized public (Richardson, 2012).

The perplexity, it should be repeated, was not due to the manifestation of permanence of the old models of science in the public debate. Perplexity was due to its monolithic display. At the same time, the horizontality with which the old model of science crossed different social segments was verified. From doctors to biologists, from traditional media journalists to network bloggers, from sociologists to politicians of all political spheres and levels of government. It was the main line of the discourse of educators and scientists, many of whom were hastily raised to the humanitarian barricades of disseminating the findings of science in defense of life and the fight against the anti-science movement.

Even though a statement such as "in the 21st century no one is a logical empiricist" may be considered overly optimistic, the consensual and horizontal sharing of this model of science was added to one of the many civilizational setbacks of the beginning of the century. After all, what was done with Karl Popper's alternative of the late 1930s, recognizing, for example, the transience of scientific knowledge? And what about the watershed of Thomas Kuhn's critique of logical empiricism in the 1960s, almost universally cited to the point of introducing the term "paradigm" in practically all fields of knowledge and even in common language? The essays gathered in *The Sociology of Science* (Merton, 1973), the macroanalytic analysis of the Strong Programme of the Sociology of Scientific Knowledge by Barry Barnes and others, the micro sociological studies by Bruno Latour and many others in the 1980s were completely forgotten? There has even been a fashionable nonsense (Sokal and Bricmont, 2001), accusing postmodern philosophers of an abuse of Science. The overcoming of the old model intended in the most current Cultural Studies of Science, in the Feminist Studies of Science, as in the works of Longino (2019), has simply disappeared. These developments familiar to scholars in the area need to be reminded of young people, seeking to understand the history of the philosophy of sciences and even providing reasons for the reliability of the scientific enterprise (Oreskes, 2019). In this sense, the old uncritical and unproblematic model of science can be understood exactly for what it was: a model already deeply discussed by the "long 20th century", being supplanted by several others.

This very brief history seeks to explain, albeit partially, the virtually absent criticism of scientific communication during the pandemic. The little that was said about it, beyond the interpersonal scope, was restricted to some of the most troubled scholars' forums.

The motivation for this near silence was largely based on something that we can call "social responsibility". It was not possible to give any micro space to the anti-science movement orchestrated by the far right-wing in charge in Brazil and in other countries – including heirs (deluded and anachronistic) of some of the reactions against the unquestionable authority of science in the post-war and anti-system movements of the 1960s. Faced with the concrete threat,

daily reiterated, of civilizing and democratic retreat, we had to further corrode this among the bitterness of the pandemic.

This context seemed significant to us to introduce the account of the very timely conversation, in the afternoon of November 17th, 2021, that we had the pleasure of establishing with the American historian of biology, born in Egypt, Vassiliki Betty Smocovitis. Currently professor in the Departments of Biology and History at the University of Florida, Betty Smocovitis was the author of the book selected for full reading and discussion in monthly seminars of Laboratory of History of Biology and Teaching (LaHBE-USP)[1]: Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology. Published in 1996 by the Princeton University Publishing House, the book was never translated to Portuguese, featuring another gap in the very limited literature in the area available to the Brazilian public.

Unifying Biology's place in the history of biology

The result of the reading and discussion of Unifying Biology instilled in the group the perception that we were facing a mandatory reading of the history of biology of the 20th century. Firstly, although the subtitle announces a particular theme, the history of studies on biological evolution, the book aims to think about the biological sciences as a whole, forcing itself to cover multiple disciplines. Secondly, because although focused on a particular theme and aiming at its synthesis, the work demanded the coverage of a wide time span – whose relevance is not always well understood by defenders of microhistory. Third, for academic quality. The approach involving various disciplines and decades did not cause the slightest loss of methodological commitment with the very extensive search for sources, accompanied by their rigorous and very precise citation. And in that perspective, Smocovitis's book reflects the most genuine tradition in the history of science, abundant with notes that contextualize, question or expand the ongoing discussions. Fourth, the work brings together authors and contributions from different approaches, materializing an epistemic-methodological pluralism that was already being designed in the historiography of biology - this youngest area of the institutionalization of the history of science, which only became part of its community in journals and journals specific associations in the 1970s. In this sense, Betty Smocovitis's book represents one of the most mature manifestations of the meta-scientific studies of the biology of the contextualism of the history of science at the end of the century, leaving in the past heated debates from the middle of the 20th century, which opposed internalism and externalism.

As highlighted in the reviews published at the time of the book's release, which were complimentary even when punctuating some criticism, the most obvious singularity concerns the work's distance from the traditional representations of the so-called "architects" of the Modern

1 LaHBE has promoted meetings, usually weekly, since November 2008, during the two academic semesters of each year. In 2018, a monthly meeting was reserved for reading and discussion, in its entirety, of a relevant book in the area. The selected book, among those suggested in a list composed by the members of the research group (undergraduate students from PIEC, graduate students, mostly from the Interunit Graduate Program in Science Teaching at USP, post-doctoral students and collaborating professors from other universities), is defined by voting. The materials prepared at LaHBE are available on the website and on the YouTube channel: < https://www.youtube.com/channel/UCMHd90rEyus1GgSPF5Lpttg>

Synthesis[2]. Breaking with the whigghist and progressive linearity of the narratives available until then about the episode, the professor shifted the axis to an analysis based on the diachronism of the history of science. The synthesis appears then no longer as the most advanced point reached by the interconnection of evolutionary and genetic knowledge, but as the desired target by a movement of unification of the biological sciences, obedient to the positivist ideal - which leads us to the recent problematization exposed at the beginning of our introduction. This ideal had already seduced physicists and chemists to operate their theoretical synthesis since the 17th and 18th centuries. More than that, a moving target because the synthesis efforts did not end in the 1940s, but continued to significantly recompose evolutionary theory in the following decades. Along with the dynamics among the disciplinary fields, Smocovitis dedicated an effort equally grounded in a vast bibliography, detailedly referred to, revealing "underlying philosophical foundations" and exposing the tension between opposing forces that, in general, accompanies the construction of unifying narratives (Cosans, 1999, p. 507).

At the end of the book, the author exposes her personal position against any quest for unification in biology, so that direct quotations to her book should be corrected as showing biological evolution as the central axis of biology. This was the ideal of the architects of the modern synthesis and possibly continues in the mind of thinkers of the living.

The "moving target", the construction of evolutionary theory throughout the 20th century, was approached in a narrative that was at the same time profound and didactic, detailed and thought-provoking. It was guided by the wide amplified range of elements and aims of the now called "practices" of science, as if debuting historiography of biology that did not cease to develop and expand in the first two decades of the 21st century.

The woman, historian of Science, Vassiliki Betty Smocovitis

This is not the first time that Betty Smocovitis interacts with Brazilian historians of Biology. In the beginning of the century, she was received, along with Michael Ruse, in events organized by the philosopher and historian of Biology Anna Carolina Regner, in the Interdisciplinary Group in Philosophy and History of Sciences (Grupo Interdisciplinar em Filosofia e História das Ciências – GIFHC) coordinated by Regner in the Federal University of Rio Grande do Sul (UFRGS)[3].

Professor Vassiliki Betty Smocovitis earned her bachelor's degree in Biology from Western Ontario in 1979. She graduated, simultaneously, in two Ph.D programs: one, in Ecology and Evolutionary Biology, and the other, in the emerging History and Philosophy of Science and Technology Program, both at Cornell University. Smocovitis joined the Department of History of the University of Florida in the same year that concluded her Ph.D. courses, in 1988. In 2004, she also joined the Department of Zoology in the University of Florida (now the Biology Department, after its fusion with the Botanics Department). Characterizing its innovative acting, professor

2 Exclusively laudatory reviews were those by Christopher Cosans, in 1999, and by Maria Lúcia C. Wortmann (2000), published in the old Brazilian journal of philosophy and history of science, Episteme – whose complete collection finally received a well-deserved online publication at <https: //sites.google.com/view/anna-carolina-regner/revista-episteme/2005-2009?authuser=0>. Equally positive, although it raises some points of disagreement, is the review by Michael Dietrich (1998).

3 Pictures and informatives of these visits can be seen at the new website created in order to honors professor Anna Carolina Regner: https://sites.google.com/view/anna-carolina-regner/home?authuser=0.

Smocovitis has created varied courses turned to biology and society and to the philosophy of biology, and graduation seminars devoted to the history of biology and to cultural history studies of the scientific thinking. She won several teaching awards, including honors from the UF faculty, having been nominated *Distinguished Alumni Professor* from 2009 to 2011, and the *Joseph H. Hazen Prize* from the History of Science Society (HSS) in 2012.

Her interests in the history, philosophy and social studies of the biological sciences in the twentieth-century range from evolutionary biology to genetics, systematics, ecology and American botany. By now, she is devoted to the biography of one of the architects of the evolutionary synthesis, the botanist G. Ledyard Stebbins (1906-2000), as well as the centennial history of the Botanical Society of America. She has also been dedicating her efforts to a biographical study of Japanese American geneticist Masuo Kodani, a project that blends migration studies with studies of race in the history of the United States.

Beyond the *Unifying Biology*, which was one of *Choice's Outstanding Academic Books* of 1997, she published two other books, like one co-edited with Daniel J. Crawford, *The Scientific Papers of G. Ledyard Stebbins, Jr. (1929-1930)*, in 2004. She published a great number of articles, chapters, commentaries, review essays in outstanding journals and other kinds of materials.

Professor Smocovitis is a Fellow of the American Association for the Advancement of Science. She also is a member of the Society for the Study of Evolution, the Botanical Society of America, as well as the History of Science Society, and is incoming President of The International Society for the History, Philosophy and Social Studies of Biology.

In the interview, professor Smocovitis discussed the topics addressed in the book, how she conceived the volume, and described her process of writing Unifying Biology. She discussed paradigms of the history of the biology and historiographical aspects of the history of science, like contextualism. She commented the actual state of institutionalization of the History of Science in the USA, speculating about the future of this field there and in other parts of the world. Other debated topics were the recent worries about the role of scientific popularizers and the expansion of political regimes that, among other aspects, are strongly impacting the academic research in a great array of countries.

Beyond all, the interview provides in shiny and vivid colors the insertion of Betty Smocovitis in the community of the North-American "moving target", the way that she refers to the evolutionary thinking. Her coexistence with major exponents like Ernst Mayr and William Provine makes her an eyewitness and also a playing actress of one of the most important developments of modern biological thinking.

Below follows the transcription of the interview.

Authors: First of all, thank you for your virtual presence here and your availability to talk with us.

Betty Smocovitis: Let me just quickly thank all of you for reading so carefully what I wrote. When you are young you think everybody is going to pay attention to what you're writing and you're so careful. Then, every year as you get older, you realize you're just lucky if people even know if it comes out…

Authors: Besides what we mentioned in the introduction of our interview, could you tell us more about your academic background? Why did you choose to research History of Sciences?

Betty Smocovitis: I was a graduate student at Cornell University and I was studying paleobotany with Karl Niklas[4], who is a very prominent botanist and theorist. I was working with Karl, and then I took a course on evolutionary synthesis taught by [William] Provine. It was so exciting to me, and I realized, in about a year, that I really didn't want to be in a laboratory, I didn't want to be in the field. I felt restricted, I felt that my interests were theoretical and all my life I had an interest in history. I have loved the history of science; I was born in Egypt with the pyramids and a sense of history dominating my personal narrative, it is my family background. I've had a sense of history and philosophy that were personal, cultural. So, I faced a struggle: do I want to be a scientist? It just seemed not enough, if that makes sense. When I took this class, I said "I love this class". Provine and I got along really well, he was very gentle with women, and you know, 1981-82, there weren't that many of us out there, and I slowly transitioned into a historian. Within about a year after I switched (Cornell was a graduate school where you can move from one advisor to the other without any problems). Graduate students had the power to shape the committee, the courses, your project… it's a graduate specialty of Cornell University, and they teach you to be very independent. That's what Will Provine especially did well. What I then did was to study historiography, with Pearce Williams[5]. He was (you know, Will is gone, Pearce is gone…) a historiographer of science (Smocovitis, 2017). That's where I learned about Kuhn, Popper, Lakatos, the history combined with the philosophy of science.

So I was able to train in this area and Provine said to me: "Work on the synthesis", I said "Of course, I'm going to work on paleontology". But what happened is that Ernst Mayr came to give a series of lectures and said to me "You were trained in botany, you need to work on botany". So, I began to shift to it; my first interest was in botany and the evolutionary synthesis, that was my dissertation. As I was completing it, you know that, if you're writing a dissertation, that you don't necessarily know what you're doing until the very end; I wanted to understand the synthesis, and it wasn't until I got to the last two chapters that I went: "oh, my God, I understand the synthesis: it's a community!". It's not about plants only, it's not about Stebbins, because I was working around Ledyard Stebbins. I said: "there's a community that emerges. They are coming together in an agreement, right? They are coming together in some kind of an agreement!"

Authors: Let's begin talking about your book, "*Unifying Biology*". What was your initial motivation to write it?

Betty Smocovitis: Ever since 1982, when I read the works of Will Provine, and when I met him face to face and took his course on the evolutionary synthesis, I felt that I had found a problem that I wanted to solve, so I was motivated; primarily my motivation for writing this book was to solve a complex problem in my field, and that comes from having a lot of *hubris*[6]. I thought that's what we were supposed to do as academics. I didn't realize that the humanities are very different from the sciences; people are, you know, strategic, career-oriented, they pace

4 Karl Joseph Niklas (1948-) is a botanist and professor at Cornell University, USA.

5 Leslie Pearce Williams (1927-2015) was a professor of history and philosophy at Cornell University, USA.

6 "Hybris" or "hubris" is a Greek word that describes, in a world with fixed limits and conditions (in the Greek tragedy context, fixed by Gods themselves, in a Universe organized as Cosmos), the drive that leads a person to disregard such limits when pursuing a goal or fulfilling a task.

themselves, "I'm going to write this, and then I'm going to write that"; but I was not doing that. I was thinking at that time, "I want to answer the question: what is the evolutionary synthesis, what is this thing?"

I didn't know what I was walking into. It's *hubris*! But again if you're a scientist, you have a question, you're not going to stop, right? You're going to keep asking, you're going to answer it to your satisfaction. That's actually my motivator through this whole project; to understand the problem of the synthesis.

Authors: How was the process of starting the writing of the book?

Betty Smocovitis: All of a sudden, I swear, one day I was sitting in my office and the title came to me: *Unifying Biology – the evolutionary synthesis and evolutionary biology*. I sat down and I went, "the struggle to unify biology is the central question in the history of biology." I have a weird scientific mind, still, and am very disciplined that way, and once I have the title, and the opening line, I just begin writing something. Honestly, that's how it happened. I was in my apartment for about a month wearing pajamas, like the covid lockdown, not going out, and literally burning as I wrote.

Authors: How was the process to "build" the argumentation of the book? We realized that you used a great quantity of references and conceptual contributions from many different disciplines. How was it like putting all these things together?

Betty Smocovitis: I didn't realize this when I was writing it, that I had consumed, I had eaten, devoured, about ten disciplines of knowledge, and that I was building on this. I'm a teacher, my instinct is to be a teacher and to explain. So I had some awareness, but I don't think enough, to realize how much people had to know before they could sort of get into what I was trying to do. And let me just tell you, I'm happy with it. I don't know how many years later, I asked myself: "would I change things?" I would tweak very small things. But I would do the same things all over again, knowing the dangers, the pitfalls, the failure to communicate, because in many respects, I wrote this for myself. That's the big answer. It's not as though it is narcissism or selfishness. I realize that I wrote it for myself, but also because the big questions that I was asking were being asked by multiple groups, and they were big questions. I was raised with a lot of *hubris*. It's a Greek thing, which is my background.

That was in 1987, 1988, and then I graduated, I got my job in a history department (with 50 men: you know, I need a badge, because I was the only woman at the time), and they really challenged me to think about history and historiography and philosophy of history. My office was across from the English Department, and I was talking to people who were doing critical theory in the end of the '80s. Those were extremely exciting years to be in the Humanities as a whole, or the Social Sciences. Everybody was reading Clifford Geertz[7], everybody was reading Richard Rorty[8]. It was the big postmodern, postpositivism moment. I can't describe how exciting intellectually it was to realize that I could actually use these methods to understand the

7 Clifford Geertz (1926-2006) was an American anthropologist and literary critic, working mainly at the Institute for Advanced Study, University of Princeton, USA.

8 Richard Rorty (1931-2007) was an American philosopher. He worked mainly at Princeton University, USA.

evolutionary synthesis. It was extremely head-cracking. Your mind is breaking up. That's what postmodernism does to you, and did to me. I wrote the paper for intellectual reasons, because my head couldn't help it. A big influence for me was Martin Rudwick and his book *The Great Devonian Controversy* (Rudwick, 1985); after reading it, I went "Oh my God, I see what he is doing with narratives and narrative theory", and he fascinated me. Then I read Donna Haraway[9], another big influence, and I had the pleasure to work with her when I was in California.

So I had people like Joseph Rouse[10], you may know him, he's an excellent philosopher, he became a very close friend of mine and he said "You have to write this up as a book and explain to people what you did to get this narrative", because half of it is how I got there, the historiography, the philosophy of history, and the other half is the actual narrative of the evolutionary synthesis. So, there are literally multiple projects here. That's how it came to be.

Authors: One of the aspects that came to our attention when we were reading *Unifying Biology* was the number and extension of the footnotes. Why is that?

Betty Smocovitis: First of all, there's a book by Merz that I had to read for Pearce Williams's course in historiography called *A history of European thought in the nineteenth century* (Merz, 1907). If you look at the bottom, the footnotes are this big [indicating with the fingers a thick amount of them] and the footnotes talk to each other. This is a specific genre of intellectual history. I'm not the first to do it. Second, in *Isis*, you can't do it because it has only articles of 20 pages. But if you look at the footnotes, they are really long and always at the bottom. So there's a specific genre of history that functions with these long footnotes. Some of it is a creditation for who did what. Because, again, we're not as original as we think we are, we are always building on people's work. So it's like a scaffold, it is as though you're looking at a work of art like the Sistine chapel. If you take away the scaffolding, you remove all the people and the structures who helped to create a Sistine chapel. You may think it was made by Michelangelo, the "genius", and you've forgotten: who prepared the paints? Who did the drawings? Who did all of this? Ultimately, historical scholarship is like a scaffolding that you're building together as a community of scholars. Almost all my papers have this acknowledgment; I feel terrible if I forget somebody. But some of it is creditation, while some of the footnotes are talking to each other. And some of it is a way of showing you some of the threads that cannot be woven in the main narrative. That's the most important thing.

Authors: You had a personal relationship with two great characters of history, William Provine and Ernst Mayr, to whom the book was dedicated. Did you feel any kind of "pressure" coming from them? How was their reception of the book?

Betty Smocovitis: No, I was independent, and they liked me that way. Ernst read the first draft sitting in my house, and he just came out (he was wearing his pajamas, if you can picture Ernst Mayr, early in the morning) saying "Betty, you've really written a lot of history that I don't

9 Donna Haraway (1948-) is a historian and a professor in the Feminist Studies Department at University of California, USA. In the chapter 4 of *Unifying Biology*, Smocovitis (p. 88) cites Haraway as an example of a contextualist author, who explored History of Science together to Cultural Studies and History of Culture.

10 Joseph T. Rouse (1952-) is a professor of philosophy at Wesleyan University. He is the author of works in the philosophy of science and STS.

understand". So, this is what he said, and he was very generous. When Provine read my paper, not the book, my paper (Smocovitis, 1992), he called me on the telephone and he said "This is the best paper" – I'm going to cry because I miss him – "this is the best paper I have read in the history of science". This is my thesis advisor, this is the most important person in your life at this early stage in your career. I don't know anyone who has such a deep knowledge of the history of Evolution in its technical features like Provine. Will was not skilled in historiography, he was not reflexive, and what I have done is to add historiography on a lot of things that I had learned from him. To me, I feel as though I solved a complex problem with historiography. So the answer to the question is they never did they pressure me, never did I feel that I owed them anything other than a kind of personal affection, but I never felt that I had to please them, or having to cave into pressure from either of them. People say "She's Mayr granddaughter or something", and I go "I didn't agree with Mayr on a lot of things, I just studied him".

Authors: How do you evaluate the reception of the book, in the academic field and in the general public?

Betty Smocovitis: The reception from intellectual historians outside of history of science, people like Donald Kelley[11], loved it. I mean, I'm friends with all of these big intellectual historians who do European intellectual history or history and religion. A lot of them have now died. Some scientists, like Stephen Jay Gould, understood what I did, because he was a really excellent historian and an evolutionary scientist. Stephen Jay Gould was a historicist, and he was a kind of a contextualist, because he studied paleontology, which I had studied. A fossil is embedded in a temporal sequence: why should we not think of ideas in the same way, right? So, the scientists were fine, they didn't get the historiography but they got the narrative.

The people who hated it, I mean, I cannot describe hate, capital H-A-T-E, were some of our colleagues in philosophy of biology. I shook their underpinnings - everything about them that was mythologized as part of the discipline of the philosophy of biology, beginning with David Hull. The young philosophers of science now write to me, privately, and I tell them: "I was attacked, consistently attacked by all these [old] philosophers of biology", and ultimately, what they did is they pretend that I didn't even write it.

Authors: What was the importance of the contextualism for writing this book?

Betty Smocovitis: Firstly, I'm a historicist, and you cannot understand what I did if you don't understand radical historicism. Secondly, the contextualism I used is a very specific kind of contextualism; this is not *Leviathan and the Air Pump*, from Simon Schaffer and Steven Shapin (Shapin & Schaffer, 1985). I read their work and I loved it, but it did not work for me; I published my book with Princeton because I wanted it to be in the same series as *Leviathan and the Air Pump*. These people were sociologists of science. I do history, philosophy, sociology, and I call it intellectual and cultural history. Now it is accepted, right? But it is a history of discourse, a history of ideas in language and circulating discourses. Foucault was there forty, fifty years ago with the history of discourse. It's not new, right?

11 Donald R. Kelley (1931-) is a historian and professor in the Department of History in School of Arts and Sciences at Rutgers University, USA.

I would recommend you read about the Cambridge School, a movement inside intellectual history, led by Quentin Skinner and J. Pocock[12]. They have written about their interpretation of contextualism, which means "in text" for context analysis. So, the history of circulating discourses is another way of saying, you're taking a text and it's always embedded within other texts. There is no point of origin, because texts are always moving, and you've got to choose a direction. I got this from Donna Haraway, who thinks in terms of multidirectional traffic of influences.

Anyways, the contextualism that I used, I borrowed it from the Cambridge School. I really like a book called *The Machiavellian Moment* (Pocock, 1975). It's a very tough reading, but I took this methodology to heart and applied it in my historical work. At Stanford, I gave up studying history and philosophy of science, and I went upstairs, to the history department. I studied European intellectual history and historiography with a scholar named Keith Michael Baker[13]. He doesn't publish a lot, because what he does is very hard, it is very hard brainwork. He is the biographer of Condorcet (Baker, 1975). He studies the history of knowledge. I sat with him for a semester in a course, called European intellectual history, on a graduate seminar for Stanford history students. He was the one who helped me with Skinner and Peacock.

The other thing (about contextualism) is that it can apply to images, it can apply to music. If you read the paper I wrote in *Isis*, 2009, it's called "Singing his Praises" (Smocovitis, 2009), it's all about music. Jim Secord[14] loved it, and he says "this is pioneering and breakthrough". I started working on that paper in 1995, when I worked on the Darwin Centennial. It's not that I had some gift or something, it's because of the methodology. It liberated me. Contextualism and historicism is liberating. You can ask different questions, and about the sources - because as historians, we absolutely are dependent on our sources, and if you read the footnotes in Unifying Biology you see. I'm using science fiction, I'm using film, I'm using music.

What contextualism does is to really free you to be using a range of sources. Music speaks to evolution. Just take a look at that 2009 paper. And then you have Constance Clark, who wrote this book called *Images of Evolution in the Jazz Age* (Clark, 2012). She became a friend. She felt nobody was understanding what she was doing, and I said "I get what you're doing". Because she was looking at cartoons, cartoons of evolution as a way of understanding a context, right? It was a way to write the history of evolution through the prism of cartoons.

People say: "How do you do this" and I go: "just locate it", look at the different things as embedded in a context. Take something, an idea, for example, and just start weaving around it and see all of the threads and the connections. This kind of contextualism is liberating and empowering; I very often say to people like Bob Richards[15] - he's a friend, I really admire him. But we have these wonderful "fake disputes" - they're fake because we really understand what we are doing, and he is a very superb historiographer and philosopher and historian - and I say to him "Prove to me that there is no connection!" Prove to me, because I can tell you that in my mind and in my reckoning, there are always connections between what someone like Dobzhansky is

12 Quentin Skinner (1940-) is a British historian and John G. A. Pocock (1924-) is a New Zealander historian. Both work in the area of history of political thought.

13 Keith Michael Baker (1938-) is a British historian, professor at Stanford University.

14 James A. Secord (1953-) is an American historian and professor in the Department of History and Philosophy of Science, at University of Cambridge. Secord is well-known for his work on the reception of the anonymous *Vestiges of the Natural History of Creation* (1844), written by Robert Chambers.

15 Robert Richards (1942-) is a historian of science, professor at University of Chicago.

doing in *Drosophila* and the bigger, the bigger context if you look hard enough. "Prove to me that there is no context, some kind of connection that you can draw". So, it's a very different way of approaching the history of science, because we want science to be distinct, we want to create barriers between it and culture. Contextualism embeds science within different contexts.

Authors: Let's talk about some theoretical questions related to the biological sciences. Where or when we can say, in the history of the field, that a unified biology emerged? Foucault, which you cited before, wrote about it.

Betty Smocovitis: Actually, I'm still thinking about the question about Foucault and the origins of biology. I'm aware of this. But there's no evolution. It's not there. Darwin was not an evolutionary biologist. The word doesn't even exist in the *Origin of Species*, right? This has to be a contextualist, historicist analysis. I see a process with particular moments. I use the term "moments." I have a paper I wrote about pivotal moments in evolutionary biology (Smocovitis, 2020). So you do have what Foucault describes as a rupture and this is a pivotal moment. And you can then move to the nineteenth century with this article that I mentioned, written by Joseph Caron (Caron, 1988). It's an excellent article, and I wish more people would read it on the historiography of biology. He argues biology actually emerges as a discipline, the science emerged in Huxley's England because Huxley writes the first of these textbooks, the principles of biology and so on. It's a good argument but I would still say it's not the modern unifying science of biology. It's not possible to create anything that I can see that is a unified science in the 1920s. There's nothing that can unify, this is life sciences, let's call it, in a broader context. It's not coming from here and spreading, it's actually all over the place. I'm not opposing Foucault or Caron. What I'm doing is adding to them, because it's a historicist view, there's a process of looking at a narrative; I'm constructing it knowing, being self-aware, that I'm building a unifying narrative. But at the end, when I write myself in it, and if you follow it, that narrative collapses. When I say: "the construction of a construction", it's because I'm always deconstructing, I'm always taking it apart, rewriting it. The possibility of life without narratives is something I really don't want to explore. I think we see the world in terms of stories and we may not even be aware of them. But they're always there.

The concept of scientific discipline, and scientific community, that I used in my work was heavily based on Foucault; I, and a lot of my colleagues in the History and English department were reading Foucault in the 1980s. A book that really shook me was *Discipline and Punish* (Foucault, 1987) for obvious reasons, because it is about discipline. That's the one (of Foucault's books) that really spoke to me. *The Order of Things* (Foucault, 2016) is a little bit dense and I was already prepared for it. I was interested in community and I thought of "discipline" in a Foucaultian way. In the 1980s, there was a lot of work in the sociology of Science that was centered on discipline. There was a book on radio astronomy (Edge & Mulkay, 1976) and another written by Rob Kohler, *From Medical Chemistry to Biochemistry* (Kohler, 1982). So I read this literature, and I used it. Steve Shapin wrote *Discipline and Bounding* (Shapin, 1992), how disciplines bound communities, what's inside, what's outside. And I read all this and ultimately I just created my own definition. I took bits and pieces and I created my own view of scientific disciplines. And then, I thought about the big picture: we move towards diversity and now we have a constant struggle, a political dynamic. We move towards unity and we exclude people. How do we live in this world, struggling between unity and diversity? And I think most people don't even have the

sense of it. I'm disappointed that my colleagues in the Biology department, for instance, don't understand the meaning of diversity in a biological, political sense and epistemic sense. They can't see the parallels between the diversity of life, the diversity in a political sense, and diversity in the terms of epistemic sense. If you follow situated embodied knowledge, if you give up on universalism completely, you're going to be arguing, fighting and killing each other. So I can't answer that, that's where I have a dilemma and I leave the book in the end with a question: I just don't know how to resolve this tension. I can see that there's a kind of politics, that there's a science called biology, and evolutionism is in the middle of that, but I can't answer that for you, still, 21 years later.

Authors: Are you saying that, in the end, you are not defending or postulating unifying biology, despite the title of your book? Was the title a provocation?

Betty Smocovitis: That's not my question. The way this question is put, "is biology unified?" is not a question that a historicist would ask. It's synchronic; it's now. It centers biology. It ignores the fact that biology exists in different contexts. Some of this I learned in Cornell in the "Division of Biology," but a lot of these things I know from working in the University of Florida, because it is a comprehensive university. I like that here, so I stayed here. For example, we have biology in the college of medicine, but those people have nothing to do with people in agriculture. I'm not looking at 10 biologists located in one or two units. I'm looking at hundreds of biologists. We have a museum of natural history, the third largest in the United States. Right now I'm in the biology department, which is in the College of Liberal Arts and Sciences. So we have multiple units and they all claim to do biology. You function in that environment. In the beginning of the book I say: "I went to this department, I went to that department. What is evolutionary biology? How come I was told it was unified?" These people, the guy in the geology department, the guy in molecular evolution, the genetics unit, the guy in the systematics, they were all professors that I took classes from people who claimed to be doing evolutionary biology. I took classes with Frank Drake[16], who was Carl Sagan's collaborator. I ended up at this course called "Life in the Universe", and it was all about evolution taught out of the Space Sciences Department. So this question "is biology unified?", doesn't really make sense as a question to a historicist and contextualist. It misses the fact that there are many biologies, and that we must adopt a pluralistic view. And that's where I ended up with the extended evolutionary synthesis and what troubles me (about it); there are multiple things that bother me, not about the extended synthesis, but about the people and the way they write about the extended synthesis. There's no history! They create this modeling of the synthesis but they include no one in the history of science and the work done on it. Look at their footnotes! There's a group of scientists and there are two or three philosophers around them. Where are the historians? That's deliberate. They don't want the historians there. Because now I have papers where I'm talking to them and I go: "guys, there's no unified, there's no monolithic theory to come out of the evolutionary synthesis. There's no absolute consensus. It's a loose consensus". And I say it in my language in the book, there's enough of a consensus so they can feel as though there is unity. There's a spirit of unity that they have a shared project, right? And I love it when Ernst Mayr says in the article that he

16 Frank Drake (1930-) is an American astronomer and astrophysicist. He is well-known by being involved in the creation of search for extraterrestrial intelligence (SETI) and conceiving the Drake Equation: a probabilistic model to estimate the number of extraterrestrial civilizations in the galaxy.

writes in response to my original paper and he says: "Oh, historians have made too much of the unification of biology!" and I read it and I broke down laughing and I said: "who is that? You said that in 1982, when you (Mayr) wrote that book *The Evolutionary Synthesis: Perspectives on the Unification of Biology* (Mayr & Provine, 1982). Go back and read it!" He's the one who wants the synthesis as the unification of biology. And you know, I'm laughing.

When I confronted him about this, he said: "we were trying to unify, we were trying to straighten our differences". What makes you think that you can write a straight story? You can see that even his language; this is what I mean by contextualism and discourse, to come back to the methodology. Listen to what people are saying, the language, because it reveals the assumptions, the background assumptions being made. In my opinion, Mayr is the anti-positivist positivist. Does that make sense? He wants positivism to work for biology, so he's the one who most wanted the autonomy of biology, but not so autonomous, that it breaks entirely from physics and chemistry. Biology is distinct, it has its own unique principles according to Mayr.

But at the same time, if you keep that at a total reductionism, you fall to chemistry and physics, and you end up commiting suicide, with a nihilistic view saying: "My life is meaning-less". You fall into that existential void. Because I viewed that (existential and metaphysical dimension) as the final element, in this kind of contextualist scheme that I adopted; people are looking for the meaning of life, when they look to evolution. And we know that Dobzhansky was very religious, we know that... metaphysics is all over Dobzhansky and some of his work. Don't pretend it's not there. Stebbins was a Unitarian, but he was raised as an Episcopalian. But I think evolution has that existential component that makes a lot of people uncomfortable. But I think it's pretty interesting, fascinating, important. So just to come back what we were saying... I mean, to "straighten" the story in order to turn biology in a unified science, when I hear that, I think: "you didn't get the point. I can't respond to this".

Authors: Still in this topic, you participated, earlier in this year, in an evolution meeting in the US, in a roundtable with Alan Love[17] and Sam Scheiner[18]. Scheiner has this proposal to make theories in order to organize all biology in one general theory and five subsidiary theories (Scheiner, 2010). We would like to know what is your opinion about it, and if you see it as a kind of unification because he states that it is a pluralist proposal.

Betty Smocovitis: I knew Sam Scheiner before this meeting because he comes here, to the University of Florida, during winter time in the United States, in order to visit Robert Holt[19], a colleague of mine in the Biology Department. Sam and I have a good relationship. I agree with you. I think that he wants his cake and he wants to eat it too; you know this expression, when you want all of it? I personally cannot fully connect to his project, but I do think that he is a pluralist, as I am. He invited me to write the introductory article to his new book (Smocovitis, 2020), and he said "you can do more with the extended synthesis", and I said "no, I don't want to deal with those people". But now I have to do it, and that is why I am now writing what this extended synthesis actually looks like to a historian of the modern synthesis, but I agree

17 Alan Love is a philosopher, professor at the College of Liberal Arts at the University of Minnesota, USA.

18 Samuel Scheiner is a biologist and member of the Division of Environmental Biology of the National Science Foundation, USA. In this topic mentioned, the reader may check Scheiner, S. 2010.

19 Robert Holt is a biologist, professor in the Department of Biology at the College of Liberal Arts and Sciences, University of Florida, USA. He is a specialist in theoretical ecology and evolutionary biology.

with you that he wants to create this kind of multivocal unification, and it is still a unification, still universalizing.

Authors: Talking now more broadly, about the institutionalization of the history of science, how do you think that the field is going? Is it mature? What is the "state of the art" of the field now?

Betty Smocovitis: I think that historians of science are doing what I call the "new eclecticism." They are all doing something very different. I do not think that they suffer the same kinds of tensions we had in the 1990s. When I am having a bad day, or when I think in negative terms, I think we lost a sense of a shared community that we used to have in the history of science society; today, everybody is doing their own thing, they are doing very different things and not always talking to each other. But on the positive days, I think to myself "that's okay, the field is mature''. And there is so much work that has happened, and people feel free and they do not feel the need to be following any particular tendency or direction. The field has no real trunk, like a Christmas tree, with this main trunk. It is more like a mesh, with people are all over the place, and the ideas are moving, and I think that part of it is maybe due to the maturation of the history of science.

Authors: Do you think that this name, "history of science", will persist? We do not know if you are familiar with what is on the site Harvard Department of the History of Science, where we read that the name, History of Science Department, is just a name they care about. As a matter of fact, what they list as going on research is something really different. This makes us think, here in Brazil, where the history of science never achieves its institutionalization, what is the future of the field? Do we need to struggle for the "history of science"? Or everybody will move on to those new perspectives?

Betty Smocovitis: Let me tell you what is worrying me right now. There is a new book, written by Andrea Wulf[20], the biography of Humboldt (Wulf, 2015). It is an awful book, and I will explain what I mean. I and other colleagues formed a group, during the year of Humboldt[21], because we came in contact with some misconceptions about Humboldt during its anniversary, where people who knew nothing about history took over. One of these people is Andrea Wulf; she is a science writer, and wrote this book just getting all kinds of material from everywhere, not giving scholars enough credit, and in the end, her Humboldt emerged as this heroic, brilliant figure, who achieved his success independently of local knowledge: the knowledge of Spanish-language communities in Latin America that Humboldt drew on. I mean, there were scientists in what is now Ecuador. There was a lot of local knowledge in places like what is now Brazil and in other countries in Latin America. And Wulf does not mention that Humboldt actually picked up the knowledge from a lot of local experts, and just not knowledge, but also scientific knowledge that existed at the time; she did not mention that he was part of German imperialism. You cannot talk about Humboldt without saying he was a member of the elite, a German imperialist, a colonizer, just like Darwin was. You cannot get away with it anymore. People understand

20 Andrea Wulf (1972-) is a German-British author of books on history aimed at the general public. Her book *The Invention of Nature: Alexander von Humboldt's New World* was included on the New York Times Best Seller List.

21 The year 2019 saw a number of celebrations in honor of the 250th anniversary of the naturalist's birth.

colonialism. Some of my, colleagues in the Biology department who are taxonomists, and I are working on a paper right now on botanical taxonomy and colonialism. We are studying the process of naming and collecting plants by the colonizers. We came to the view that all of the local or traditional knowledge that undergirded botanical collections was just literally erased, so it looks like that Europeans really "discovered" plants in the so-called "new world".

I am worried, to come back to your question, I am really worried that there are people coming into the history of science, who call themselves historians of science, and they are not! Let me give another example. There is a new book from Richard Rhodes[22]: a biography of E. O. Wilson (Rhodes, 2021). And you could ask: "who is Richard Rhodes?" and I can tell who he is, because I read his book for a prize committee of the History of Science Society[23]; he wrote a book on the making of the hydrogen bomb (Rhodes, 1995). He is a professional writer, a journalist. However, he is not going to have a scholar's perspective on the history of science. That book is going to make millions of dollars, people are going to be buying it. What I'm seeing that worries me is the lack of critical perspective or the sophistication, because we are now a mature field that has scholarly nuance. This sophistication is not going to make it into these books, and these people are going to represent us in popular media. They are already doing it! My dean made an invitation to Andrea Wulf, and I was on the committee making this invitation. I said, "over my dead body", because this is embarrassing! We have a large Latin America history program, not just in the state of Florida, but one of the biggest in the whole country. I said: "this is humiliating, you cannot have her coming here to sell Humboldt in the face of our scholarly interest in Latin America". But they did it anyway and I just said: "Ok, this is not a battle for you to fight anymore, but still, I fought it".

So in becoming sophisticated, in worrying about our footnotes, I am concerned that we are losing our audience of scientists and whoever wants to read about the history of science. I am really worried about it. These people are writing these books that we should be writing, without the quality that we can put into them I am not too worried about the internalist history of science, I think that there has always been space for the Einstein scholars, the Helmholtz scholars, the Darwin scholars, Newton scholars, Kepler scholars, and so on. There have always been these little pockets, and specialty journals, which accept works from these scholars. However, I am worried about programmatically the presence on university campuses of these "historians". In 2008, our administration here shot down the PhD program in history of science; that's no longer in existence. I was talking to a colleague of mine, and he is worried that there is no history of science department in any West Coast University of the US, or a dean that supports it. They are all closed, and the courses are taught by people who don't know anything about the subject. They are teaching froth, superficial stuff. They are not teaching it as a historian of science would teach the subject. I'm worried in very practical terms about this. Who is going to be writing the books? Who is going to be teaching the courses in such institutions that don't have large history of science programs established?

About the Harvard program, here is a little bit about the background: Harvard has two competing programs, one in History of Science, and another one in STS, that is led by Sheila

22 Richard Rhodes (1937-) is an American journalist, author of several fiction and non-fiction books.

23 Professor Smocovitis refers here to the "Watson Davis and Helen Miles Davis Prize", an award given by the History of Science Society to books aimed at the general public.

Jasanoff's[24] group. They do science policy, they do a lot of anthropology and sociology, but they don't do history of science that much. So you have two sometimes competing programs on the same campus. So, I read this statement (above) from the history of science department at Harvard as saying, "well, we're not some narrow esoteric group". In a way, STS literally appropriated what we always had as far as relevancy, as in "hey, knowing your history allows you to come up with policy".

As an example, I teach a course on biology and society, just like Provine did. I teach a course on contemporary issues, I can teach stem cells, I can teach bioethics and issues related to it, despite not being a philosopher. Let's call it "baby philosophy". In the old days, a historian of biology could do all of this. I am comfortable with STS, but I think History of Science *per se* has been appropriated, and I think that is what is happening at some places. It makes me worried.

I have been a panelist for grants[25]. It is very hard to obtain funds in our field! When you have a proposal for some obscure scientist, "oh, I want to work on the 18th century or early modern history, or 19th century", they don't care! But if you want to work on something like Facebook, and social media platforms, or reproductive technologies, you will likely be getting the money! Can you see what I am saying? They appear to be more relevant. I think that is the challenge for us in history of science, is to be more relevant.

Authors: Do you think the same thing is happening in Europe or is the history of science there "safer"?

Betty Smocovitis: Europe is very different. I taught in Greece for two years, and I thought about it a lot. There is nothing comparable in Europe to the American Public Universities, the land-grant universities[26], like the University of Florida. What you have is elite, old schools, like Cambridge and Oxford in the UK, and then you have agricultural institutes or smaller mostly elite institutes. In the UK, they do not connect necessarily, or move between fields or areas, like we do here. My students come from everywhere, my colleagues come from everywhere.

In Europe, for example, a molecular biologist does not even have to talk to an evolutionary biologist, ever. I will use Bruno Strasser[27] as an example. Bruno spent his entire life inside the elite molecular biology community, and his interpretation of how he sees the history of biology is shaped by that. I disagree with Bruno because I do not see the same divisions that he sees, in his new book (Strasser, 2019). I see integrative biology at Berkeley (a big public university) existing much earlier, it is a very different view of the history of biology. I think Europe is different. Also, when I think of Europe, I think of Germany with the Max Planck Institute, I think of Zurich, which has this big polytechnic institute for science studies; these are established elite institutions with money, so you can do almost anything you like. It is not the same as being in a huge public state school like Florida which answers to the state.

24 Sheila Jasanoff is an Indian-American professor at the Kennedy School of Government, Harvard University, USA.

25 "Panelist for grants" refers to individuals experienced in certain academic fields who serve as members of the Granting Agencies.

26 This term refers to US institutes of higher education designated by a series of acts (dating from 1862 to 1890 called "Morrill acts") to receive federal benefits, such as the permanent endowment of the land on which these institutions are based. Currently, these universities are primarily public.

27 Bruno J. Strasser is professor at the University of Geneva, Switzerland.

Authors: And how do you see the "conflict" between the hard sciences and the humanities which happen in the universities?

Betty Smocovitis: Honestly, I do not think that the humanities care about the sciences (and vice versa). The dean of my college says: "you are the only one who understands what they do in the humanities department". I actually go on PhDs committees, in the English department, and I give suggestions, even coming from the Biology Department. I think that it helps me personally, professionally, in the "now I understand" process. I can say that I respect the different communities. The university has 50.000 people, we have 16 colleges, the college of medicine, the law school, education, journalism, everything. For three years I chaired the committee for tenure promotion. I studied a diversity of different academic profiles, and I could see the different requirements that each field demands. For example, the science citation index is worshipped in physics, but we do not use it at all in the humanities. Working on this project for Unifying Biology helped me to understand the different communities of academics, and the fact that they are all valid. And, you understand, anthropologists think very differently from sociologists; most people think that social sciences are just one thing. They are not! They are very heterogeneous and the same happens with natural sciences and the humanities.

When you work on a variety of disciplines like I did, one of the questions that one could ask about my book is "how did you get this interpretation?" and I answer "I follow the narrative; it takes on a life of its own." Sometimes Dobzhansky is at the center, sometimes it is Huxley, I mean, the two of them take turns in that way. The narrative enables them to emerge as players, and for that methodology on narratives, I used Clifford Geertz; I was reading *Notes on the Balinese cockfight* (Geertz, 1972), *The interpretation of cultures* (Geertz, 1973) and in particular on his work on charismatic figures to ask "what is a charismatic figure?" A charismatic figure is when a narrative or set of narratives converges in an individual and he becomes charismatic. The culture shapes them. If you lived through the 1980's, or as you say, in the 1990s, this way of thinking about narratives and cultures was a common point of view in the humanities and social sciences.

Authors: Do you think we have fundamentalist positions about science and humanities nowadays? For example, in politics, to face the anti-vax movement there is the extreme opposite to defend science at all costs, losing criticism and going back to the "scientificism" we thought it was overcome. In the university, too, the positions are exacerbated. Last year [2020], a colleague from the Institute of Physics of USP organized a big online seminar with historians, philosophers, and sociologists of science, lasting two or three months. The audience was good. Well, this colleague, the organizer, received e-mails from a colleague, telling him that what he was doing was not science, saying that his seminars were shameful for the Institute, and things like that. So we call it the fundamentalist perspective about science, just to have a short way to represent the kind of difficulty scholars have to face when open to different areas.

Betty Smocovitis: I do think and I agree with you that this is a problem. Last month, our governor in Florida was intervening heavily in our freedom and that really shook us.[28] Here in

28 In October 2021, three scholars from the department of Political Sciences of the University of Florida were prohibited to testimony against the DeSantis administration in a case that challenged a law passed by the State Congress limiting voting rights. In January 2022, a federal judge won the case for the three teachers, claiming that their right to freedom of expression was undermined by the ban on participating in the previous October trial.

Florida, we're living under a rightist and Republican government. It's totalitarianism, it's the word to use. So I mean that's a rude awakening. I was writing e-mails that said "Lysenko of Florida," even though the intervention was from the right.

Another point of interference was the choice of the Chief Surgeon of the University. The governor chose a doctor that denied the importance of masks and vaccines. [29] Then, I thought: "What's going to stop them from telling us we can't do work on covid-19?" It looks like the governor is trying to kill us, he's trying to kill people. So I look at this as a historian of biology and I said: "Climate change? Stem cells? Evolution?". It could be anything. They could use anything to interfere in our academic freedom. This case was about the testimony of professors of the Political Science Department about voting rights. However, scientists of the "hard sciences" are also under political pressure. Everything is always political, we are historians, we always see politics. I think it's uncomfortable.

I wish more people had these conversations. I wish we were open to different methodologies and I wish we were more reactive. I think as intellectuals, we need to be exploring and pushing ourselves in these directions. Come on, I'm not doing this for money! Who gets a PhD because they think they're going to be rich? You do it for the ideas. I don't know about Brazil but what happens in the United States, you do have people who are careerists. And they become very powerful. They know who they are, because they take over the reigns of power in the academy. A lot of them go into the administration. And they do make a lot of money. But the rest of us want to be teachers, we want to live in a community of intellectuals, we want to do work, that has some kind of meaning that pushes you to think in different ways. The reward is answering a complex problem in a field. And I think it's a global problem for intellectuals now, probably.

Authors: There's something that comforts us. It's global, it's not only in Brazil .You had your [Donald] Trump, we have our [Jair] Bolsonaro. In the last weekend [13/11/2021] we had this national exam to get into universities [ENEM] and Bolsonaro declared that he was very happy because "finally" the exam of this year reflected his government. Thirty professionals from the institute responsible for the exam had just resigned.

Betty Smocovitis: In the spring of this year, all faculty of the university in Florida are required to do a survey of diversity of opinion. And we don't know what it's going look like. And that's because the governor wants to survey our politics. Is the university system offering a diversity of opinion? Because he wants to say that we're all left wing, crazy people. So what's the difference, really? It's that kind of government, it's not meddling, it's literally forcing us, it's authoritarian, forcing you to do something that you really don't want to do. Yes, I do see it. I spent six months in Poland, as a visiting professor. And I was in this small college called Kolegium Artes Liberales. Many of these people are all vegan. They do critical plant studies, critical animal studies. Very powerful, very serious intellectuals. They live in central and eastern Europe; they experienced the Cold War under the Soviet Union and before that they had Hitler. They have seen all these totalitarian regimes. And they were open, they were not afraid. But you can just see how the government was coming in and intervening. They had priests, a Jesuit and a Franciscan, coming in and evaluating our classes. And where is the separation of the church from the state? And

29 In 2021, in violation of the University's own hiring laws, DeSantis appointed Joseph Ladapo, a notorious covid-19 pandemic denier, as Chief Surgeon of the University of Florida.

they said to me: "It's Poland, we're all Catholic"! And I was just so glad that Jesuit evaluator who was in our seminar had a good understanding of the relationship between science and religion. I could talk to him about that. It's all in the cover of my book actually: I'm not afraid of this topic at all. I don't see polarizing extremes. So, it's not just Brazil.

Authors: Considering that you were talking about these books aimed at the general public, like the biographies of Humboldt and E. O. Wilson, what's your opinion about science popularizers – scientists and journalists – who write about science to a wider audience? Do they help, or can they cause any damage?

Betty Smocovitis: Both. On one hand, the benefit is that you might raise the interest of people, especially young people, to science. I watched Carl Sagan, I went to Cornell, I chose that, because of him. I love science, but I cannot tell you what comes first: if I love science because of Sagan, or if I love Sagan because of science. I used to watch *The Outer Limits* as a child and other science fiction works. But on the other hand, I can see the disadvantages: popularization fools people into thinking that they understand something as complex as modern evolutionary theory. I have the desire to write an essay called "selling science short." In other words, some of these authors are cheapening the price of science, you are selling it, and you are selling it at a cheap cost! There is a price to be paid. For example: you have these people who read five books written by Stephen J. Gould, or Neil Shubin, or Richard Dawkins, and they think they understand evolutionary theory! However, these people never read the papers of Sewall Wright, they do not know the difference between Wright and Fisher, they obviously do not know what researchers are doing in genomics right now, which is reinvented by A.I. I was on a committee on population genetics and artificial intelligence, and these people are transforming evolutionary genetics. It is a revolution that is happening and most of us do not even know about it. All of these data science researches that are happening: it is astonishing. To understand evolution, you must spend years! So, what makes you think that, after reading five books, you now understand natural selection and then can attack it? This is the downside: people who attack evolution are the ones who think they know because of the five books which were written by these popularizers.

I think that we should be more like the quantum theorists, or the five people who understand the theory of relativity, who say "only five of us can understand the theory of relativity", and nobody ever attacks physics, because they cannot understand it. So, do you see what I am saying by "selling it short"? By saying "it is easy to understand," or "science is easy," we think that we are eliminating the barriers, or making people comfortable with science, but there is a downside, because we are fooling them! It is not like in the 1800's, it is not the era of "sealing wax and string". Derek de Solla Price, a sociologist, wrote this famous essay "On sealing wax and string" (Price 1984), about how you could do brilliant experiments with very little. But that is not how it (science) works anymore! We are not being honest! We have papers in science that have 30 authors, 50 authors. Why? Because it takes many areas of expertise to put together a five page article.

We have to be honest and I would rather just say "No, you don't understand! There's nothing wrong with you, you are not stupid, but you have to take a PhD, you may take multiple years and study a lot of areas to understand science." And I would say the same thing also about history. I hate this. I hate the fact that anybody feels they can help themselves to being a historian. I deal with people who are writing genealogies, family histories and they think they are historians. At

the same time, I feel terrible, because I am an educator, and I am being a snob, which is not the correct attitude. But how do you walk that thin line? How do you struggle with this kind of dilemma? How do you handle it? There are moments when you are going to sound like an elitist, when you have to say "leave it to the experts." Would you have an endocrinologist operating on your brain? We have specialists. What makes you think that history is all the same? What makes you think biology is all the same? It is not!

Authors: Well, we had a wonderful afternoon chatting with you. Once again, thanks for your time.

Betty Smocovitis: I want to end on a positive note. I had my birthday yesterday [15/11/21], so I got very reflective, and I was thinking: "I am so lucky!" We are lucky! I personally have a job, I have had a salary for 33 years, I was hired when I still did not have my Ph.D. I am in such an exciting field, that takes me everywhere. And look at what we do for a living: we read books! We review books! I know, sometimes it is annoying to have somebody you disagree with, and you have a fight in some academic field, but putting it in perspective, that is part of the excitement. You have a community. We are now preparing for the History of Science Society meeting, so last night I did my profile for it. I started to really look at the program and I concluded that I am never tired of it! Never! It never bores me! I feel like I am 30 years old, a new professor going to a meeting, or a graduate student all over again. These are the joys of being an academic. I love History of Science, and all these things, these frustrations, people who do not understand: it does not matter in the grand scheme of things! Because you are doing it for yourself and maybe some young people. This is the other thing I discovered: all these young people, they come up to me and say: "I read this, you were right!" and I go: "really? NOW you tell me?" [laughs]. These young philosophers, I want to hug them, because they are writing about David Hull and they are not worshipping him in the same way. They see him as a human being. They are creating an interesting space for philosophy of biology and history of biology. It is going to be interesting to watch how that work comes out. And they are all working on the history of positivism in the philosophy and history of biology, I mean, they do not think I did anything crazy in my book.

Thank you all and I am looking forward to talking with you again. I am always available to discuss these exciting questions!

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