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Subramaniam, Banu; Schmitz, Sigrid

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:

Verlag Barbara Budrich

#### Empfohlene Zitierung / Suggested Citation:

Subramaniam, B., & Schmitz, S. (2016). Why We Need Critical Interdisciplinarity: A Dialogue on Feminist Science Technology Studies, Postcolonial Issues, and EcoDiversity. *FZG - Freiburger Zeitschrift für GeschlechterStudien*, 22(2), 109-122. <https://doi.org/10.3224/fzg.v22i2.27059>

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## Why We Need Critical Interdisciplinarity: A Dialogue on Feminist Science Technology Studies, Postcolonial Issues, and EcoDiversity

A Dialogue between Banu Subramaniam and Sigrid Schmitz

*The following dialogue between two biologists and Feminist Science and Technology Studies (STS) scholars, Banu Subramaniam and Sigrid Schmitz, took place on June 16th, 2016 at the Albert-Ludwigs-University of Freiburg. Banu Subramaniam gave a talk on “Interdisciplinary Hauntings: The Ghostly Words of Naturecultures.” Afterwards both researchers discussed the linkages between feminist science studies, postcolonial perspectives, and eco-diversity discourses.<sup>1</sup>*

**Sigrid Schmitz:** In your previous talk “Interdisciplinary Hauntings: The Ghostly Words of Naturecultures“ that is based on your publication *Ghost Stories for Darwin*<sup>2</sup> (2014) you have asked what morning glory flowers or alien plant and animal species have to do with the histories of gender, race, or eugenics. You trace the genealogies of ecology and evolutionary biology to demonstrate how foundational ideas of “variation” in biology are inextricably connected to ideas of “diversity” and “difference” in the humanities. Making a passionate case for interdisciplinary work across the humanities, the natural sciences, and the social sciences, you have explored how histories and concepts of gender and race shape contemporary biological theories and what lessons we can learn about the relationships between natures and cultures.

I would like to start our discussion on the potentials and limits of the inclusion of current feminist science studies and postcolonial perspectives into eco-diversity discourses, and on their importance for questions of environmental governance. You’ve shown how deep the linkages are between the categorization of animals and plants as good/bad, native/alien on the one hand, and the simultaneously used terminology concerning worldwide migrant politics on the other hand. If I have got it right, you argued that we *should rethink* the constraints we place on our scientific politics, and perhaps how we could change these politics – and consequently maybe also change eco-politics as well as migrant politics. And I refer to the end of your lecture where you talked about the monarch butterfly that could provide a different framing for an alien; as something we may welcome a little bit more.

**Banu Subramaniam:** We live in surreal times. Across the world, we are seeing a turn to nationalist and nativist politics; we talk of walls and electrified fences to keep the undesirables out. The rhetoric is in the air. The world is separated into binaries, good and evil; natural and unnatural; native and alien; rational and irrational; sacred and profane; white and black.

What interests me are the narratives of fear and apocalypse, and how these narratives are connected to particular histories of colonialism, race, and gender. The solution seems to be to eradicate all invasive, foreign, and exotic species, and to return to a native planet, where everything is in its “proper” place. What is that imagination of a native planet? For me it is a fundamentally anti-evolutionary argument. Because central to evolution and evolutionary biology is change, is chance, and random mutations. Nature never stays still. And so this idea that we have to fix the good and desirable planet on some arbitrary point in the ecological evolution of the planet is fundamentally anti-biological for me.

The metaphor of the ghost – as I have used in my talk – emerged in the landscapes of Southern California. This began as a collaborative project on invasion biology. As a biologist, I was keen to understand and explain the shifting landscape – why are native species dwindling in numbers and why are exotic and foreign species growing? Engaged in the feminist studies of science, I was interested in invasion biology’s articulations of space and belonging. The idea of invasion is predicated on understanding nature as being “in place” or “out of place.” This idea of “nature in place” was first outlined by English botanist John Henslow in 1835. “Nativeness” and the familiar native/alien binary thus emerged in the botanical world so that botanists could define “a true British flora”. In our recent genealogy of invasion biology, Charles Elton’s book *The Ecology of Invasions* (1958) is often cited as the classic book. According to the United States Department of Agriculture (USDA), “[i]nvasive plants are introduced species that can thrive in areas beyond their natural range of dispersal. These plants are characteristically adaptable, aggressive, and have a high reproductive capacity. Their vigor combined with a lack of natural enemies often leads to outbreak populations.” While we have seen policies to limit the free flow of biota across borders, it was only in the 1990s that “invasion biology” as a field or discipline of its own emerged, leading to an explosion of work over the last two decades. Indeed, this is now fertile ground for research and policy. Most governmental and non-governmental organizations that deal with the plants and animals, such as the USDA, state governments, National Science Foundation (NSF) committees, as well as environmental groups such as The Nature Conservancy and The Sierra Club all have invasive species programs.

As I argue in my recent book, *Ghost Stories for Darwin*, the relationship of nation states and the natural world have varied historically in numerous and diverse ways. To give you a few examples, Alfred Cosby in his influential book, *Ecological Imperialism* (2004), argues that the roots of European domination of the Western world have a critical biological and ecological component. Where Europeans went, their agriculture and animals thrived and indigenous and local ecosystems collapsed. In the late 19<sup>th</sup> century and early 20<sup>th</sup> century, the USDA sent biologists as “explorers” around the globe to find new and interesting plants of economic and aesthetic interest. For instance, Dr. Douglas Fairchild, director of USDA’s Seed and Plant Introduction Section from 1898-1928, is said to have introduced over 80,000 species and varieties into the United States. Likewise, the American Acclimatization Society attempted to introduce all of the bird species in Shakespeare’s works to New York City’s Central Park in the

1890s. However, by the end of the 19<sup>th</sup> century we see an end to the open and laissez-faire U.S. policy towards the “foreign.” This, historians argue, is in part due to America’s changing relationship with nature. In the decades after the Civil War, industrialization, urbanization, and westward expansion transformed the nation’s landscapes and redefined Americans’ relationship with nature. A new “love of nature” was evidenced in the dramatic growth of “nature lovers,” and Americans saw their love of nature as *the* quality that distinguished the “natives” from the new immigrants. As Philip Pauly notes in 1996, the paradigm of the nativist approach was the Chinese Exclusion Act, passed at the insistence of California workingmen in 1882, a year after the state’s quarantine law. After World War I, Congress expanded this law to introduce limitations on entries of all European immigrant groups in the Immigration Act of 1924. Thus, we need to understand the biogeography of the world in these varied circuits of history and politics. Seemingly innocent ideas such as biological variation become entangled and translated into complex ideas of difference. Which landscapes are superior or inferior? What constitutes home and abroad? Who is deemed native and alien?

**Sigrid Schmitz:** As an evolutionary biologist and feminist STS scholar your interdisciplinary research integrates – inter alia grounded in Donna Haraway’s natureculture concepts – expertise in natural sciences with methodologies of the humanities. If you conceive invasive species as a case study to show how “naturecultures” work, what does it mean if we don’t think of plants and animal immigrants as natural and human immigrants as cultural, but if we think natureculturally about these different agents, agencies, and diverse ontologies?

**Banu Subramaniam:** When we fail to see nature and culture as “naturecultures,” we fail to see the underlying structures that shape discourses across natures and cultures. It is indeed ironic that in this era of globalization as the world is ostensibly getting “smaller” that we see a renewed call for the importance of the “local” and the protection of the indigenous. With the increased permeability of nations and their borders, and the increased consumption and celebration of our common natures and cultures, we have begun to obsess about our different natures and cultures with a fervent nationalism, stressing the need to close our borders to those “outsiders.” The globalization of markets and the real and perceived lack of local control feed nationalist discourse. High unemployment rates coupled with outsourcing and the easing of immigration have increasingly been perceived as threats to local employment. These shifts continue to be interpreted by some elements of both the right and the left as a problem of immigration.

What a naturecultural analysis allows us to see is the circulation of knowledge – that these represent the same anxieties, the same problem our cultural anxieties of a fast-changing world; our anxieties that we, and (“our kind”) will be left behind.

In my book, I tried to explore what it means to think about morning glory flowers and invasive species through a naturecultural lens. I explored the history of evolutionary biology, and the history of eugenics came tumbling out. I use the metaphor of the “ghost” to refer to the histories, and the people affected by those histories that we often render invisible within scientific disciplinary logic. Eugenics today evokes the holocaust, racial hygiene, genocide, mass sterilizations of peoples considered “inferior,” horrors of the unholy alliance of science and politics. Eugenics was without doubt an important and fundamental aspect of many key movements in the last two centuries, intimately linked to ideologies of race, nation, and sex, and also a part of several institutions such as population control, social hygiene, state hospitals, colonial governance, and the welfare state. Yet, eugenics had very different biological and political valances at different periods, embraced by an astonishing number and range of scientists with diverse political persuasions. Eugenics was thus less about a clear set of scientific principles but rather a “modern” way to discuss social problems in scientific terms; to promote social policy under the guise of objective and apolitical language of science and the laws of nature. Their goals were varied, as were their understandings of biology, nature, and culture. Our theories of inheritance, heredity, and genetics have not been static and have evolved alongside raging debates on eugenics and the relationship of nature and culture. The history of eugenics reminds us that science is never monolithic; at any historical moment there are always debates and disagreements. There were debates about eugenics, just as there are debates today about how we should understand our changing landscapes and borders.

**Sigrid Schmitz:** I’ll refer here to Thomas Kuhn’s famous 1962 paper that argued against the myth of a linear enlightenment progress and instead said changes in scientific paradigms appear in times of crisis. Today we witness the notions of crises, as political crises, ecological crisis, crisis of pollution, or whatever we perceive as a crisis today. I think you are definitely right that crises bring up fear, and they point to our politics of getting the “not known” out and of closing borders to save the “own and known.”

But the question for me is also whether crises could also have positive impacts and might have the possibility to change our way of thinking. As diversity decreases and species variety is reduced, is there perhaps a changing notion that migrant “species” not only could be welcomed but could enrich the native ecodiversity? Drawing the line again to your case of the welcoming of the alien “monarch butterfly,” I’d like to explicate my ambivalent (positively and cautions) thinking and feeling about this case. You have talked about the “monarch butterfly” as a naturecultural vision that contrasts with strong anti-immigration slogans such as “Deport! Deport!” With the “monarch butterfly” arose a different campaign, one that mobilized the insect about the naturalness of migration. But it is my impression that the monarch butterfly is not only, so to say, “welcomed.” It remains assigned as “the other,” and “othering” is “according to postcolonial perspectives” the most powerful Western notion of separation and distinguishing one’s own collective from the “others,” to assign characteristics to the “self”

versus the “other,” as civilized versus un-civilized, cultured versus naturalized, or exceptionalist versus inferior, to name only a view ascriptions that are used to ensure the own group identity against the foreigner and to legitimize powerful policies. And this is my point. Colonial policies always also argue in humanist manner with a missionary note to “improve” the perceived inferior status of the other. So, is there also some source in the “monarch butterfly’s migration case” that is argued in a missionary manner referring to the question of crisis of ecodiversity. “Representation is never innocent!” – With this phrase Abi-Sara Machold started a talk at the 2005 Film Festival *Diagonale* in Graz. The crucial point is, whose knowledge counts, is heard, and gets into political action. In 2007 María do Mar Castro Varela and Nikita Dhawan have connected these questions of knowledge production with migrant politics. I assume that the question behind the obvious policies is whether there are shifts in categorizing and framing the value of a “migrant species.” And last but not least there is the question of whether the naturalization of the other, even in terms of “positive” naturalization, again bears powerful assignments of culture over nature and may result in or be utilized for legitimizations of in- and exclusions, rights and violations.



Fig. 1. Poster that uses a variety of Native American and natural symbolism (Facebook/César Maxit).<sup>3</sup>

**Banu Subramaniam:** Yes, as I mentioned in my talk, Nadine Bloch, one blogger used the “monarch butterfly“ to make a case for migration: “Consider (...) the monarch butterfly as a graphic representation of the migrant. Beloved for its beauty and its seemingly miraculous migration across huge distances, the monarch embodies hope for those who must travel great distances to survive and find opportunity. Their pattern of migration takes monarchs from Mexico to Canada through the United States, spanning lives of several generations; no one butterfly makes the whole trip. How new generations know to return to their ancestral grounds is still the stuff of scientific mystery. And for the activist artists who support immigrants, this mystery conveys the message that holding on to one’s cultural heritage across generations can be a wellspring of strength for a long struggle. Migration and transformation, in fact, are what make us beautiful.”

Also there is the “Dandelion Rising” project,<sup>4</sup> which reminds us that in desolate times and a fast-changing planet, the freedom and beauty of dandelions are resources we need. Such naturecultural visions allow us to reorient immigration, and develop a new politics of migration that are attendant to history, biology, and environmentally responsible naturecultural thinking.

But the nativist politics obscures and renders invisible that the “natural” world is replete with multiplicity and copious border crossings. Nativist conceptions that develop rigid boundaries around ideas of nation, as well as sex, gender, race, class, and sexuality, have resulted in the endless suffering of groups who remain at the margins. These are the ghostly figures. Ghosts thus are a symbol of the unacknowledged injustices of history. Thinking natureculturally means listening to these ghosts. Living with ghosts forces you to confront the past; the dead never go away, history never sleeps, the truth can never be erased, forgotten, or foreclosed by modernity.

Ultimately as I argue in the book, society will revisit, reshape, and rethink its ideas of national belonging and of natives and aliens for centuries to come. As long as we do not resolve the fundamental questions – “What do we do with variation? What of diversity? What of difference?”– these debates will continue to rage in science and society, in defining our natural and cultural worlds. And to be sure, each time these debates are renewed, we will debate them as new, novel problems that we have never encountered before!

**Sigrid Schmitz:** At this point, I would like to talk about some aspects of Donna Haraway’s article “Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin,” published 2015 in the journal *Environmental Humanities*. Her privileged term in this triad is Chthulucene, a call for a strategy “to join” – as she writes – “forces to reconstitute refuges, to make possible partial and robust biological-cultural-political-technological recuperation and recomposition” (Haraway 2015: 160).

**Banu Subramaniam:** I think I am one of the many people who have been deeply influenced by Donna Haraway and her work. Her work has profoundly shaped my own. But this was one piece that got me upset, and I disagree with

her joining the bandwagon of the overpopulation camp. Instead of saying “making kin not babies,” I wish she had said “making kin and babies” or “making babies as kin.” I think we can make babies without reproducing the heterosexual family unit.

**Sigrid Schmitz:** I’m not quite sure about that. It has this connotation, but it also resonates with her 1988 published idea of “Situated Knowledges,” where she developed the concept of networks; scientific, political, activist networks; networks not by identity, but by affinity. This is a very crucial moment, or it was for me, because it touches all of these questions of whether we need identity categories for “woman” or “animals” or “plants” or whatever. Haraway argues – and I follow her in this line – that we don’t need identity categories to come together for a particular target in a particular situatedness, instead should fight together in affinity. This touches the never-ending question in feminist debate of the need of “identity” for political action. “Making kin not babies” is referring to kinship not as a biological concept, or a genealogical concept, but kinship by affinity.

For a moment, let me go far afield: Last year I organized a conference in Vienna; there was one panel on climate change. Sheila Jasanoff from Harvard University gave the keynote. She is one of the main – I would not say founders, but one of the main – forces, who started STS with us in the early 1980s. She argued that we should look for local knowledges, for local politics and policies, getting more attention on the contextualization of strategies, locally, not only globally.

Well, on the second day, two colleagues who work prominently at the intersection of research, climate change research, and politics, started to develop a very distinct line of what has to be done by Western science, what “we” know and should bring to the Third World to meet the challenges of pollution by all these very dangerous substances, such as Bisphenol A, that cover the sea, earth and atmosphere. And then Sheila, she is a very polite person, said: “To me that sounds colonial. What is with the knowledge of these local communities?” And then the situation became difficult. We had to struggle with the gap between Western science and these questions of hearing local knowledge and giving local knowledge a voice, considering local strategies. It was the point in a very communicative conference with members from very different disciplines, from the natural, social, and cultural sciences, from science-policy workers to queer feminist STS scholars, where the postcolonial arguments came up. Indeed, all colleagues wanted to get to good strategies and improved policies, but referring only to Western scientific knowledge as the solution was a bit of a benevolent science? It is difficult, absolutely difficult, to discuss in these circumstances, because it is not that *you* are bad or have motives of exploitation, it’s all for good aims.

So, I come back to Haraway and with her I want to emphasize the question of joint forces and the question: what could be a strategy, to come to joint forces, a joint “we”? Or, is the question moreover whether we can count on a seemingly joint “we” as a target? Who is the “we”? Who can be the “we”? What are the alli-



ances? Or do we need other alliances? This is my question to face diversity and a plurality of strategies, how can we deal with this?

**Banu Subramaniam:** Firstly, regarding the example you give, it's just that you really have to pay attention to power. Of who has power, who is framing the questions, and how the problem is being named. So in this particular case the problem clearly becomes the Third World – they're having too many babies, they're over-reproducing, contributing to a world overpopulation problem, and they're producing too much pollution. But within science studies, others would say that if you look at how much pollution the average individual is producing, the problem is the First World, they are overproducing, right? So even within STS there is a debate on how one should frame the problem. I think that naming and framing the problem seems to be really important to how you locate what's going on. It shifts what the problem is, who is to blame and what the solutions are.

Secondly, at this moment with respect to climate change is the role of – for lack of a better word – I'm going to say neo-liberalism, of huge privatized industry and NGOs trying to solve these problems. Sometimes they are working with communities, but it's all about producing some kind of product that will help, right? But that is all caught up with an economic system that is just furthering whatever inequalities already exist. And the other aspect that complicates it for me with respect to India, which is where my recent work has been on, is the rise of Hindu nationalism and its own claims about indigenous and local knowledge. So I am very wary about local knowledges. I am very wary about going back to the past as this site of unique pure knowledge that we all have to go back to. For those people, who were marginalized in that world of the past-women, people oppressed by the caste system –, that wasn't Eden for them. So I am also very nervous about blindly embracing local knowledges and valorizing them as sites of decolonization and liberation. Even while I recognize that Western science has silenced much of the world and that there is much knowledge in the histories of all countries that we need to go back to, I don't think it can be done by an unproblematic embrace of old knowledges or an attitude of local knowledges as always right. So we need to create something different, and to me I don't think it's only about epistemology, to me it's fundamentally about power and politics.

**Sigrid Schmitz:** I agree with you, and because of that I try not to use the term “indigenous knowledge,” because I think it's a very difficult term. But to make it a little bit more precise, the point in the discussion was not that Western scientists said the problem for climate change is the Third World, they cause our problems, but that Western scientists prefer solutions for the whole planet. That was the problematic discourse. So, again it was the question of how could we come to strategies of joint forces.

And I want to add, the question of what role do we have as Feminist STS scholars to develop such strategies and politics? What would be if we could integrate one course of STS or, even better, one course of feminist postcolonial queer STS in each study, so that every student has to take a course like this? I

refer to Hannah Arendt, who says when you get people start to think, they will start to think critically, reflectively. I don't claim that scientists don't think, no, but they need to think about their own situatedness, the way of producing disciplines and knowledge. In 1992 Anne-Fausto Sterling had already proclaimed an interdisciplinary way of teaching as a two-way-street, so that the social and cultural scientists have to learn something about nature from the biologists and the other way around. We do need a negotiation of different forms of knowledge-production.

**Question from the audience:** For me it was very convincing that the eugenics movement or the aliens-concept are influencing the research or the concepts in biology and I also would like to put it the other way around. So the question is how would you say the environmental research is influencing the discourse on politics, because I would say the biological discourse was very important in other fields, for example in fields of brain research or some scientists discuss much more variety if you're looking at races of humans than concepts are telling us.

**Banu Subramaniam:** The history of science shows that things always move from nature to culture and culture to nature and so on. In the particular case of invasive species I would argue that the headlines place the environmental problems squarely at the feet of the "foreign." Foreigners! And so I would argue that environmentalists in using such sensational language are doing that precise work of making a general xenophobic environment across the natural and cultural worlds. So ultimately what we end up thinking is that "oh my god, there's a problem with foreigners: a problem of those human foreigners, there are problems with these cars, there are these problems with these plants," right? We "see" globalization as doing all of this harm, we are losing our jobs or refugees are coming, they begin to appear like independent problems. And part of what I'm arguing is that they're all the same problem. It's all the same symptom. It's just because of the ways in which we have compartmentalized knowledge, that we see these "problems" as independent. So when we see environmentalists making these kinds of campaigns on native species, to me we should see them as the same issue as, you know, a nativist politician making that argument. All the work that's happening in the environmental field by environmentalists is feeding the same politics with humans and vice versa.

**Sigrid Schmitz:** You posed the question of variety, which is in the brain and everywhere. I would – from my field of research on brain sciences and neurocultures – question plasticity, the changes in corporeality that are always interacting with culture, experience, our bodies, our behavior and thinking. Coming from a feminist science studies perspective, we have praised this plasticity argument as something which is good in breaking up nature-culture boundaries. Today, the potential change of biology by culture ends up in the call for optimizing our bodies and brains, and optimization may also be a central argument to get diversity again into ecosystems. It's all about potential, progress, optimization.

So this is a very crucial point for me to think about, the usage or the discourses on plasticity, variety, changing, if they are, as I would say, utilized in global, neoliberal thinking. Not speaking for general concepts per se, this notion of progress, of economic/political progress, and of permanent growth is a very leading theme of recent discourse. And the inclusion of plasticity into concepts and norms of growth and power satirizes all what is our concept of breaking boundaries between natures and cultures is parsing out: mutual interactions between biology and the social not as an opening up of possibilities but as a re-normalization under the realm of optimization. So we have to discuss these points always additionally in reflection on powerful structures and normative values in society.

**Banu Subramaniam:** Yes, if we use the word naturecultures or think nature-culturally it will not necessarily always be progressive. I think it can be appropriated, in all kinds of ways, to all kinds of ends. I was thinking in respect to plasticity that one of the things that's really surprised me is the recent research in epigenetics. When epigenetics initially emerged as a field it seemed like such a site of naturecultural coproduction, as a site that recognized that the environment matters, culture matters, politics matters, inequality matters, that all of this can ultimately transform and shape our bodies and that the body embodies this history and politics and can be passed down a few generations. Yet in reading the popular media, much of this work is just ending up policing women's bodies more. So women are always potentially pregnant, they need to watch what they eat, drink and how they live, always responsible.

So it's really to me a reminder that concepts by themselves can never do anything by themselves. It's those larger politics that shape how ideas get taken up; any concept can be appropriated towards any end sometimes. As much as the concept of plasticity or epigenetics can transform our vision of a natural body into a naturecultural vision, in practice we haven't seen that happen. Last year there was this piece in *Nature* by Claire Ainsworth finally arguing that it is not quite clear, what "sex" means. Thinking sex and gender through the genome was much more complicated than initially imagined. Yet in the entire piece there was not one mention of any feminist work. It was as if geneticists had come to it all by themselves. But this happens time and time again, old ideas in so-called marginalized fields getting reinvented as completely new and original within mainstream disciplines, there's an erasure of these other fields and other kinds of knowledges constantly.

**Sigrid Schmitz:** Perhaps even the term, "could it be progressive" is problematic, because we get attached or entangled in the concept of progress uncritically.

**Banu Subramaniam:** Agreed. I think STS needs to become part of the knowledge-making apparatus; we do need knowledge about the naturecultural world. As I have said in my talk, I always dreamed of a joint research program in biology and women's studies, exploring how the feminist and the cultural studies of science could inform the experimental practices of science. Rather than leave

the sciences, women's studies gives me the tools to understand my experiences of being a third world woman in the hallways of science, and renewed my passion for science, for thinking and doing biology. We need to build laboratories of our own.

**Sigrid Schmitz:** Coming back or going ahead to the point of feminist post-colonial STS perspective: we could state a change in possible strategies from Audrey Lorde's 1984 famous phrase "The master's tools will never dismantle the master's house," where she argues that we can only change powerful and discriminating systems from outside, to Gayatri Spivak's recent approaches of "affirmative sabotage" in 2012, i.e. the use of those tools and policies – also from natural sciences – "with which we are in sympathy, enough to subvert!" (Spivak 2012: 4). Nikita Dhawan (2014) has outlined in detail the various standpoints in enlightenment discourse over the last 200 years which turns out to be not only a single imperialist endeavor. Following Spivak, she argues that the Enlightenment ideals are eminently indispensable, even as their coercive mobilization in service of the continued justification of imperialism must be contested and the current challenges is to "employ the master's tools to dismantle the masters house" (Dhawan 2014: 71). Like you, I am a hybrid of biology and feminist STS, and both affinities are part of my heart and brain. Promoting the critical dialogue within me and between the fields of science and feminist postcolonial STS, as having pointed out above, for me seems to be the most affirmative strategy of sabotage. What is yours?

**Banu Subramaniam:** We need to start producing knowledge about knowledge. We cannot have "nature" entirely defined only by theories and methods from the sciences. It's a political issue – of how we imagine knowledge and the academy. There are a lot of great scientists who are already on board, but the problem is that there are structural issues in place that make it difficult for them to work. Similarly, many humanists and social scientists are interested in naturecultural questions, but disciplines make it difficult for them to pursue these questions. I really think we need to start creating those sites of possibilities, we need to develop projects that develop biological knowledge, either by retooling ourselves or in collaboration with biologists who are interested in these projects, and I'm convinced there are lots of biologists that are very interested in such projects.

This workshop is being hosted by the college for natural resources. That is great. There are whole fields of environmental sustainability and natural resources where people want to create on-the-ground solutions for the vast environmental problems we face. I've always been frustrated within STS and sometimes even feminist STS when it comes to "oh, we will look at scientific knowledge and critique it. We want that objective view from outside to talk about how science is functioning." There's a real reluctance to get into the knowledge-making process itself. And I think the knowledge-making process is messy. When we do it people will critique us, but that's how knowledge builds, right? You have to open yourself to understanding that if we don't use categories such

as “native” or “alien” what other categories can we understand? All theories and frameworks always come with both possibilities and challenges.

Clearly there are vast shifts in our ecologies and environments; clearly species are changing and in not random ways. So, what kind of environment do we want? What should our relationship to the environment be? Should we care about species diversity; should we care about bio-diversity? Is the main issue that we don't want things to go extinct? Which variable are we trying to attend to and address? These are all biological categories, and we need to figure out, as a society, which of these categories matter to us. How do we want to imagine nature? And so, to me, these are all joint projects that have to happen interdisciplinarily. Biologists are very helpful in being able to tell us that some things are not biologically possible; there are limits to what is possible “biologically.” I think that STS should not stay on the sidelines, but needs to become part of the knowledge-making apparatus.

**Marion Mangelsdorf:** I would propose some more visionary ideas and questions, and I refer to the STS philosopher Bruno Latour, who together with Peter Weibel had an exhibition at the Center for Art and Media (ZKM) in Karlsruhe called “Making Things Public. Atmospheres of Democracy.” This was a format where an inter-media approach was developed to discuss alternative forms of politics. Hybrid spaces in between arts, science, and the humanities were created. We are always concentrated on words, right? If we talk about human and non-human agencies and actors and about people from different countries, different backgrounds, I think we need alternative formats like this to come together. Do you have some ideas to think about these formats to build up different forms of politics?

**Banu Subramaniam:** Well, I think we should all start with writing fiction. If the real world is a problem and we are not happy, how might we reimagine it? So I think we need to start imagining what those worlds would look like, imagine the best of people coming together and dealing with a particular problem and play it out in the best possible way. So I think that maybe, since the world is difficult, creating imagined worlds is at least a good starting place in thinking about what that might look like, and that that might be about ideas.

**Sigrid Schmitz:** Thank you very much, Banu, for this interesting dialogue!

## Remarks

- 1 The talk and dialogue was organised in cooperation with the Freiburger Gender Studies Journal [Freiburger Zeitschrift für GeschlechterStudien, fzg], the Zentrum für Anthropologie und Gender Studies [ZAG], the Professor of Sustainability & Environmental Governance, Michael Pregernig, of the Albert-Ludwigs-University Freiburg and the 'Carl-Schurz-Haus' Freiburg. This written version is based on the transcript of our dialogue and the script of the talk of Banu Subramaniam. A big thanks goes to Marion Mangelsdorf for organizing this event together with Michael Pregernig, and to her, Kristian Gäckle, and Nicholas Hittner-Cunnigham for the transcription and editing of our dialogue.
- 2 In 2016 Banu Subramaniam was awarded the Fleck Prize of the Society for Social Studies of Science (4S) for *Ghost Stories for Darwin: The Science of Variation and the Politics of Diversity*, published in 2014.
- 3 Taken from: <http://wagingnonviolence.org/feature/of-monarchs-and-migrants-the-arts-of-theimmigra/on-movement/> (accessed August 29 2016).
- 4 "The purpose of 'The Dandelion Project' is to empower better understanding and acceptance of humanity's diversity by embracing and promoting the vision of one community for all individuals." <http://www.thedandelionproject.org/> (accessed June 2, 2016).

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