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Interdependent ecological transsex: Notes on re/production, “transgender” fish, and the management of populations, species, and resources

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Through a consideration of the politics of thinking about classificatory infrastructures, this essay questions whether the categories of sex/gender/sexuality, human/animal, and nature/culture are the best ways to understand the unfolding reorganizations of re/production that (post)industrialization, biotechnology and the emerging bioeconomy implicate. It argues for a re/productive orientation as a partial and incomplete step in devising knowledge about the systemic interconnections of living things, resources, populations, and species. As specific examples, it considers immunological re/productive medicine and the recent emergence of transgender fish as bodies and populations tying all humans and living systems together in the potentialities of what I will call “shared interdependent transsex.”

Keywords: queer; reproduction; transgender; species; ecology

Introduction

I contend that everybody on the planet is now encompassed within the category of transgender. I illustrate this proposition by tracing some of the not-so-visible links of how this shared rearrangement of sex and re/production is unfolding. I also contend that we might be better off responding to this rearrangement, not through fear of the eco-catastrophic assumptions transsex invokes, but by embracing our shared interdependent transsex, a term that is about queering ideas of re/production, and refers to dynamic ecosystemic relations of multiple “bodies,” energies, and things – animals, humans, lakes, plants, uranium, etc. – which compose broader economic re/productive relations and energies of the bioscape.¹ Shared interdependent transsex refers to “bodies” as constant processes, relations, adaptations, and metabolisms, engaged in varying degrees of re/productive and economic relations with multiple other “bodies,” substances, and things, in which no normal concept of re/production, as based on our common categories of sex, gender, and sexuality, exists. It is a phrase that questions human-centered understandings of re/production, family, species and kind, which align with developments of agriculture, capitalism and the rise of the corporate (trans)national state as a governing apparatus that increasingly manages the basic elements necessary for human and animal life; e.g., water, food,

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shelter, meaningful work, pleasure, and a re/productive landscape and/or waterscape. The perpetual transformations and adaptations that transsex constantly engages in order to re/produce are what “bodies” have in common. Commonality does not mean sameness, and crosses populations, species, and things of incalculable differences.

Embracing our shared transsex is one component of many that will be needed to address the vast social and ecological problems we face in the unfolding century. As some of the basic necessities for human and animal life – water, forests, agriculture, seeds, migration, knowledge, and shelter – become increasingly privatized, owned, and controlled by world corporations, evolutionary re/productive arrangements and relations, which are composed of thousands – perhaps millions – of years, are being rearranged in a very short period of time. This rearrangement in the speed of re/reproduction is made possible largely through the concentrated energy of oil, the backbone of the corporate economy and possibly the most politically charged substance of the twentieth and twenty-first centuries, which continues to be centered in the political and economic decisions of the world’s elite. Non-elite human and non-human bodies also make “decisions” in re/productive and economic relations that need greater consideration in the politics of globalization. Political ecology should not just refer to the decisions humans make to manage their ecological land and waterscapes, but should include the decisions non-humans make as well. Interdependent transsex as a mode of conceptualizing systemic relations queers ideas about politics and identity, in order to create the possibility for humans to observe and interpret the “decisions” non-human bodies, relations and systems make. This perspective situates humans as merely one component among many in re/productive relations – and one which has a great deal to learn from the politics of interdependent transsex, or the various interrelated decisions systems and things make.

I illustrate our interdependent transsex through two seemingly separate but interrelated re/productive rearrangements. Specifically, I consider the re/reproduction of particular sectors of the human population through “progressive” contraceptive and sterilization interventions in humans alongside the recent emergence of “transgender” fish in the Potomac River – two seemingly separate phenomena, connected by hormones and hormone-mimicking substances such as EDCs (endocrine-disruptor chemicals). EDCs refers to a multitude of petrochemical, agricultural, and industrial products, processes and wastes, which interfere, mimic, and/or disrupt human and animal hormonal endocrine systems.

These rearrangements in re/reproduction emerge at the cusp of what Donna Haraway has called naturecultures, or “the co-histories and co-evolutions of humans and other organisms.”² These co-histories and co-evolutions are where “flesh and signifier, bodies and words, stories and worlds” are joined, various parts “don’t add up to wholes,” and only “partial connections” are possible.³ Connections, if valued as partial, can illustrate “counter-intuitive geometries and incongruent translations necessary to getting on together, where the god-tricks of self certainty and deathless communion are not an option.”⁴ This essay engages partial connections and negates fantasies for quests of an (inter)disciplinary whole; it attempts to think more

systemically about the interdependence of living and non-living systems, while realizing at the same time that a complete holistic view of the world is never possible. It attempts to engage Evelyn Hammonds' notion of a queer geometry for knowledge worlds, capable of illustrating what gets produced as invisible silence in relation to what is knowable, discernable, and readily apparent. Hammonds, concerned with the invisible silence of black women's sexuality, wrote that mere visibility "does not erase a history of silence nor does it challenge the structure of power and domination," but that our goal "should be to develop a 'politics of articulation'" capable of interrogating "what makes it possible" for people "to speak and act."⁵ Additionally, considering co-histories and co-evolutions of "transgender" fish and re/productively managed human populations and resources requires situating them within the major organizing classificatory knowledge infrastructures of Western thought: sex/gender/sexuality, human/animal, and nature/culture.

Our shared transsex, emerging through natural/cultural assemblages of fish, hormones, EDCs and neoeugenics, becomes more visible when situated within the politics of knowledge infrastructures and critical engagement to expose the work normative categories do to make certain ideas knowable and others impossible. I attempt to make some of the unfathomable imaginable by providing a working and flexible re/productive orientation for feminist and queer critique, thereby partially interrogating the classificatory infrastructures of Western thought in order to expand notions of re/reproduction in directions we're not so used to. I then consider a few ideas emerging from recent developments in queer ecological studies to illustrate ways in which the reorganization of sex and re/reproduction are being thought about and to suggest additional ways we might begin to think through these rearrangements. Lastly, I turn to partial connections and co-constitutions that "transgender" fish and reproductively managed human populations share through the prism of hormones and EDCs, in order to promote a systems thinking approach.

Toward re/productive orientations for feminist and queer critique

My claim that everybody – in this case, literally every body – is interdependently transsex is not intended as the next inclusionary progressive step in the explosion since the 1990s of signifiers, aesthetics, bodies, commodities and identities that have increasingly become encapsulated within the category trans. In fact, I am rather apprehensive of (although interdependent and indebted to) the use of trans as solely associated with individual human identities and the economies of desires and consumption surrounding identity as we mostly know it. I am not against identity, but I think identity needs to be radically re-conceived in ways that de-center the human, so that various, perhaps endless, interrelated components of global ecology can be regarded as giving life (and dare I say death) to the human.

It is for the de-centering of the human I seek to reimagine the concepts of both trans and identity. Transgender is a category associated mostly with post-industrialized nations of the West, but which is also meaningful in other parts of the world. It is mostly used to describe individuals who do not fit neatly into normative notions of human re/reproduction in which the category of sex has an

imagined clear, distinctive, and essential male and female. Transgender relies upon an understanding of gender that is dependent and distinguished, yet closely associated with the category of imagined essential sex. Gender is largely thought of as a constructed human category, a cultural universal displaying diversity across cultures, while sex is considered an essential universal of “Nature,” although much scholarship in the humanities and social sciences now situates sex as a socially constructed category. The prefix *trans* – meaning to cross, go beyond, and to change – when combined with gender, means to go beyond, to change and to cross the anthropocentric category of socially constructed gender. Transgender as a category is also closely associated with ideas about human individual identities and imagined and real human collective communities, even as David Valentine has shown that the category conveys different meanings to many of those who use it and to those it is used to describe in the same local contexts.⁶ So why does the term transgender continue to commonly be held in close association with the human, when the term literally means to change and disrupt the human-centeredness of the category of gender itself? Transgender as a category is just as much about queering the human as it is about queering sex and gender. Because of the human-centered paradox of the category of transgender, I prefer the term *transsex* in this essay, in an attempt to use another (just as problematic) signifier to expand the trajectory of transgender studies and to describe the eco-systemic relations and negations of re/production of multiple species and things. To change, go beyond and across normal meanings of sex is to expose the queer relations of re/production of multiple species and things.

If we believe Darwinian stories of evolution and that living things, including humans, have evolved through great periods of time and processes, connecting our genealogical lineages to multiple other beings – many which don’t re/produce in regards to strict heteronormative standards of human knowledge infrastructures of sex and re/production – then we must grapple with the fact that we humans are all, at least remotely, *transsex* – at least partially, historically, genealogically.⁷ This in some ways invokes J. Jack Halberstam’s notion of queer time, but with a different scale and focus: the scale of evolutionary time, with a focus on how the non-human in human infrastructures of knowledge makes us “normally” sexed and gendered. Halberstam’s focus is the way some queer subcultures defy heteronormative social and institutional structures of what constitutes a “successful” life trajectory in the span of one individual human life.⁸ Although it might seem odd to consider Halberstam’s notion of queer time in studies of queer ecologies and ideas about evolution, Halberstam’s idea lets us ask how we might begin to imagine how normative notions of time at the evolutionary scale might be queered in order to draw possible partial connections of the ecological structures at work that constitute “successful” life trajectories of interdependently connected, living and dead components of whole ecosystems. If we begin to deal with different time scales, which favor relation over individuation and evolutionary time versus generation, then the human becomes more and more remotely *transsex*. And if Joan Roughgarden and other scientists are right about the vast diversity of non-normative sex and re/production in non-human species across the planet, and if we share

history and similar DNA with these species, then this brings us even closer to acknowledging our shared transsex. But this broad evolutionary consideration of our transsex will most likely not be convincing to most people, especially since popular ideas about evolution emphasize taxonomies and classificatory processes, and progressive linear trajectories of individual species and human lives.

Both transgender and identity, as concepts in queer and feminist thought, are highly tied to classificatory knowledge infrastructures that favor cultural categories. Although the cultural is crucial, it is also human-centered and largely assumes the only way to understand the concepts of trans and identity is through the socio-cultural lens. These concepts don't need to be rethought exclusively within the fantasy of "Nature," nor does the concept of culture need to be forgotten, but more work is needed to think through the ways in which classificatory knowledge infrastructures inhibit our ability to grapple with the reality that both transsex and our identities do not culminate exclusively in individuated embodied wholes, with clear distinctions of inside and outside and where reality, meaning, and knowing exist exclusively in the human mind. Multiple processes (metabolisms, relations, interactions, and adaptations), substances (hormones, EDCs, communicative pheromones) and decisions (biopolitics at multiple levels of and beyond the human) compile the systemics of re/productive transsex. While culture certainly is one powerful component, multiple non-human components compose the foundation and possibility for culture in the first place. These components are based within local ecological bioscapes that make economy, meaning, languages, and life not only possible for the human, but make human experience and identities different across diverse bioscapes. What we know as cultural difference (e.g., using the category of culture to explain human difference) is a human-centered notion. The anthropocentrism of such a vast and broad category, which is used to explain enormous segments of human experience, histories, behavior, social structures, taboos, and survival, also renders many of the foundations of culture – local ecologies and their subsequent economies of re/reproduction – invisible. Culture is certainly an important human-centered concept, but it is founded in local (and increasingly global) ecologies, in which many more components than just the human are at work in creating the re/productive relations necessary for unique human cultures. For example, Native cultures of the Pacific Northwest were dependent upon broadly diverse phenomena including salmon, cedar trees, sword ferns, the Pacific Ocean, tides, snow melt, and forest fires. Likewise, foreign oil, Appalachian coal, sheep and cattle, imported food, southern summers, and northern winters are some components that make cultures of metropolitan Washington, DC possible and unique. Interrogating the local re/productive relations that make human cultures unique and possible will be a necessary step in devising more ethical re/productive relations with populations, species, and things.

Thinking about how classificatory knowledge infrastructures of Western thought shape the knowable and unfathomable engages what Katie King has called "the politics of thinking about thinking."⁹ King's notion that thinking and knowledge are inherently political – in that decisions about what is knowable or impossible to know are made by multiple entities and processes, including but not

limited to humans – forces us to acknowledge that the process of making new knowledge and social worlds cannot ever be thought to be in the hands of one person or thing. Claiming we are all interdependently transsex by de-centering the human into a more systems-based understanding of the world and its life forms and processes of death requires that we think about how it is that we come to know and think. Geoffrey C. Bowker and Susan Leigh Star claim we must “ask historical questions about the deeply and heterogeneously structured space of classification systems and standards” in order to deal “with a four dimensional archaeology” in which systems move and develop, not just in the mind but also relationally and simultaneously in time, space, and process.”¹⁰ Classificatory infrastructures “literally saturate our environment,” forming “a complex web” in which no one “classification scheme or standard” can stand alone.¹¹ The major classificatory infrastructures – sex/gender/sexuality, the human/animal, and nature/culture – cannot stand alone. They are all implicated through, within, and among each other. Both “transgender” fish and re/productively managed human populations weave in, out and amongst all these categories. “Transgender fish” are transgender only because we signify them as such culturally, and this signification disrupts clear distinctions and an imagined knowledge progression of the categories of sex, gender and sexuality. Their re/productive anomalies or adaptations within a vast glocal ecology are simplistically absorbed into the category of transgender when the categories of animal, “Nature,” human and culture should logically also be at play. We simply signify them culturally as transgender. But much more is at work. Re/productively managed human populations – such as African American women, who are probably the most obvious example in US society – also vacillate according to context between the categories of sex/gender/sexuality, human/animal, and nature/culture, not only due to the fact that until recently white men were the only homo sapiens achieving meaningful status as “human beings,” but also because of the history of blackness as essentialized with uncivilized “Nature,” and the association of non-white people with livestock.

The categories of sex, gender, and sexuality have their own teleological histories embedded within science, capitalism, and medicine. While feminisms and queer thought have intervened to complicate and resist what these categories have come to mean, contributing to transformations in meanings of the categories themselves, it must still be acknowledged that feminisms have relied upon the categories which create the conditions for feminism in the first place. I’m not sure there is a way around this paradox, but I want to use this opportunity to briefly question sex/gender/sexuality as an organizing infrastructure for queer and feminist thought.

Although queer and feminist studies have increasingly engaged issues of race, nation, class, etc., it is still largely assumed that sex/gender/sexuality is the foundation from which these much needed intersectional interventions could emerge. And while these intersectional analyses were and are still much needed, they, like much of the rest of feminist and queer thought, rely upon a framework of identity and rights. This identity and rights framework is largely based upon the assumption that the classificatory infrastructure of sex/gender/sexuality is a socially constructed field of knowledge and thus the conditions that create social oppression

can be changed. While social conditions can and should be changed, I'm not sure they can be ethically transformed when assumptions about identity and rights dominate our framework. Additionally, we must also be prepared that changing some socially and ecologically oppressive conditions might not constitute change "for the better" and that an identity and rights framework also might not be the most practical framework to deal with this dilemma. This is because both identity and rights require a precondition of assumed oppression, and identification in opposition to or in blind silence to the categorical infrastructures of governance that organize everything from space, segregation, labor, education, family, etc. That sex, gender, and sexuality represent socially constructed categories might seem old news to some, especially within postfeminist and queer scholarly critiques, but I believe this issue is still alive and well among us and represents a major obstacle in devising theory and practice to deal with the vast social, ecological, and economic problems we face. Further, while knowledge infrastructures are certainly made possible through social relations and social constructions, the social construction paradigm is inherently anthropocentric.

Jasbir Puar's critique of intersectionality is an example that promotes thinking about categories and difference outside the confines of rights, identity, and intersectionality. Puar argues that identity and intersectional models promote "narratives of progress that deny the fictive and performative aspects of identification" and function as "a tool of diversity management and a mantra of liberal multiculturalism," colluding "with the disciplinary apparatus of the state."¹² For Puar, we need models that account for "an affective conglomeration that recognizes other contingencies of belonging," and a "series of dispersed but mutually implicated and messy networks" drawing "together enunciation and dissolution, causality and effect" and "organic and nonorganic forces."¹³ It is through these "other contingencies of belonging" that I seek to push the anthropocentric, socially constructed, identity-rights-based categories of sex/gender/sexuality into a re/productive orientation that can account for multiple interrelations, interdependencies, and contingencies of belonging, with multiple beings, species, things, and entities, to make way for a re-imagination of identity.

According to Diana Fuss, questions surrounding what it means to be human – and animal – have never been so urgent, contested, or difficult, as we are evolving into an age of genetic engineering, reproductive technologies, virtual worlds, and artificial forms of intelligence.¹⁴ Fuss contends that we should not simply "rechart the topography of the human" by broadening it as a category to include those previously excluded, "but to engage in a more radical interrogation of *the process by which the human comes to mean* in the production of cultural difference."¹⁵ The interrogation of the *process* in which the human comes to mean is about recognizing that meaning is not just dependent upon the classificatory infrastructure of human/animal, but also sex/gender/sexuality, nature/culture and several other categories (race, species, ability, class, etc.) which are implicated amongst, within, and in contradiction to one another. The point in interrogating these classificatory infrastructures, in order to de-center the human, is not to put animals or other things on a pedestal or to include them, but to begin to map our interdependencies in larger

systems of relational re/productions. To simply include or valorize non-humans would deny the obligations humans bear as complexly thinking animals capable of solving some of the major social and ecological problems we've created. On the other hand, our interrogations of the categories of human and animal must address how it is that both are implicated not just in human social problems, but also the problems we have created for animals, which include the obvious horrors such as factory farming, torture, and enslavement, and also the so-called progressive notion of animal "rights" as well.

Kelly Oliver has addressed the problematics of both human and animal rights frameworks. For Oliver, rights frameworks for equal protection do nothing to combat the structural and historical foundations of oppression, or "redress the material or cultural inequities in the distribution of resources" for either animals or humans, and in many ways "equal protection means increased surveillance and regulation" for both humans and animals.¹⁶ For Oliver, ideas of human individuality, "seen as the hallmark of human freedom," is part of the problem. To address this problem, Oliver argues for a new knowledge infrastructure of human and animal, based in the common experience of embodiment and the shared capacity for suffering. Histories of suffering for both humans and animals "at the hands of humans" are intimately tied, and an ethics of obligation to recognize and address this suffering is what is needed to reconstruct the category of human in a more ethical manner.¹⁷ Oliver demands "a meta-ethics that goes beyond rights or recognition to the conditions of embodied life on a shared planet and the obligations those conditions entail." This materializes as "an ethics of relationally and responsivity" that obligates us to share the "*fruits* of the earth" and imagine what it would mean to "go a step further and question what it means to belong – whether human or animal – not as property but as inhabitants of a shared planet."¹⁸

I have thought about what more ethical models of belonging might entail, and while I don't claim to have definitive answers, I have built off the work of Puar and Oliver by extending this ethical dilemma in the direction of Simone Weil's work on the distinction between rights and obligations. For Weil, rights "are always found to be related to certain conditions" – conditions embedded in the various interrelated mechanisms of social structures, the state, and hierarchical personhood.¹⁹ Obligations, on the other hand, are "not based upon any *de facto* situation, nor upon jurisprudence, customs, social structure, relative state of forces, historical heritage, or presumed historical orientation."²⁰ Rather, all humans "are bound by identical obligations" which might be enacted diversely depending upon context, but which can be collectively encapsulated by the overall obligation of respect.²¹ Obligations are "only performed if the respect is effectively expressed in a real, not a fictitious, way; and this can only be done through the medium of Man's earthly needs."²² Thus, I seek a theoretical framework using the concept of belonging to encapsulate a systems thinking approach that simultaneously addresses ecological and social problems and attempts to theorize belonging, not in terms of rights based in socio-cultural categories of identity, but through the concept of obligations performed because humans have interdependent earthly needs shared with the ecologies of multiple species and things which are literally the backbone of

human economies. My use of the term transsex seeks to point to the interdependent earthly needs of multiple species and things, and attempts to queer human-centered notions of economy. Perhaps the emerging bioeconomy, information economy, and service economies are heavily saturated and centered upon the human, but these economies would not be possible without the raw materials, resources, tools, energy, and labor of multiple species and things. Transsex intentionally queers economy, in order to illustrate that economies extend far and wide beyond capital and the human. The classificatory infrastructure of nature/culture is perhaps the broadest, most universal knowledge infrastructure, engrossing several other major classificatory infrastructures such as sex(nature)/gender(culture), and human(culture)/animal(nature).²³

We must complicate the limits of solely socio-cultural paradigms by considering many other dynamics and processes, both human and non-human, that enable and uphold culture as a classificatory infrastructure guiding most scholarship in the humanities and much of the social sciences.²⁴ Works by scholars such as Lisa Duggan and Aihwa Ong insist that cultural analyses are not enough, and a more accurate theoretical framework in the neoliberal era requires considering the intersections of culture, politics, and economics.²⁵ But how can we continue talking about culture, politics and economy without considering interdependent relational re/productive ecological economies as the backbone of all three? Even the advent of the bioeconomy, which speculates value, requires ecological symbioses and divisions to make raw materials and energy, and labors to make the machines, computers, and various infrastructures of the bioeconomy possible.

My thinking of re/productive orientations initially stemmed from Henri Lefebvre's *The Production of Space*, for his attempt to unearth and connect "naturalized" discourses about re/production, the family, re/producing the labor force for capitalism, and re/producing the social relations necessary for re/production – the family, capitalism, and culture. Lefebvre explained "three interrelated levels" in which social space is produced: "(1) *biological reproduction* (the family); (2) *the reproduction of labour power* (the working class *per se*); and (3) *the reproduction of the social relations of production* – that is, of those relations which are constitutive of capitalism and which are increasingly (and increasingly effectively) sought and imposed as such."²⁶ When these three components are made visible, it becomes clear that a system of symbolic representation works "to maintain these social relations in a state of coexistence and cohesion," displaying "them while displacing them . . . concealing them in symbolic fashion – with the help of, and onto the backdrop of nature."²⁷ In other words, the production of space (or how capitalism produces space) becomes "naturalized," though for Lefebvre, the process is entirely social.

Lefebvre's work allows for linking normative ideas of sexuality, human re/production and the management of labor and populations to the various components of economic production involving the production and management of resources, populations, species and the landscape. Through Lefebvre's model, we can decipher that capitalism is a human social process and structure, and the "fitness" and "success" of white European and American exploitation, while

hanging upon the backdrop of “nature,” is in fact a social process made invisible through normative discourses and the symbolic realm. There is nothing distinctively “natural,” or beyond the grasp of humans, about the exploitations of capitalism; these exploitations are political decisions made by groups of people about other groups of people, resources, and species. Additionally, Lefebvre’s work allows us to shift thinking about the category of “sexuality” to the realm of “re/production,” which expands the category of normative sex, gender, and sexuality to account not just for humans having babies, but also maintaining and managing labor pools, resources, species and the social and economic relations necessary for those labor pools and resources to re/produce for capitalism. However, Lefebvre’s work barely addresses the material world and species beyond humans, except to briefly explain “nature” as a “source and resource,” that is “part of the forces of production and part of the products of those forces.”²⁸ Lefebvre’s model can be expanded by adding a fourth interrelated level – ecological re/production – to the production of space, which consists of the non-human ecological relations, materials, and species that make human reproduction possible in the first place. The literal re/production and exponential growth of the human species would not be possible without the multiple other species we rely on for food, food pollination, tools, labor, and the mitigation of disease and predation. The list of what Donna Haraway calls “companion species” is vast, and includes species of bees, cedar, dogs, rats, grass, fish, etc. This fourth level of ecological re/production can produce space independently of humans, outside of capitalism and the symbolic realm, but can also be manipulated, although not completely controlled, by humans to produce space for capitalism. It is noticing the discrepancies that arise between “Nature’s” ability to independently produce space and human production of space through capitalism that has the potential to illustrate useful tools and ideas for devising more equitable and ethical economic orders. By paying attention to nature outside the human urge to control it, one can see that “Nature” has a different system of valuation and profit than that of capitalism. There is not one “natural” economy called capitalism but multiple interactive and adaptive economies at work, in sync and in contestation with capitalism. Paying attention, observing, and documenting “Nature’s” systems of valuation and profit has further capacity to demystify capitalism as part of the natural order, illustrating our interrelated co-constituted situatedness in global ecological economies of people, resources, things, desires, and processes. Interdependent transsex, as illustrated through “transgender” fish and the fear EDCs invoke about human re/production, is just one example. Re/productively altered factory cattle are another example, pumped with synthetic hormones and antibiotics that humans consume directly as meat and milk and then indirectly through waterscapes of agricultural runoff (EDCs) and also through the fish we consume.

This re/productive model seeks to push the politics of thinking about thinking into the realm of conceiving our being, our knowing, and our practice as located simultaneously within the histories and knowledge infrastructures of capitalism, but also within multiple other “economic” processes of life, death, and matters that involve other species and resources. What would it mean for feminist and queer thought to radically rethink ideas of sex, gender, and sexuality in this re/productive

light? I'm not suggesting doing away with categories like sex or gender altogether; too much history is caught up in these concepts merely to forget them. But I do think queer and feminist critique could be greatly enhanced by an interrelated, interdependent worldview of re/production that understands that multiple processes, species and things – what we call resources, energy, and labor – all make the human and its various knowledge infrastructures possible. Feminism and queer thought will have to find some way to begin to address the reorganizations of re/production that are unfolding in the age of transgenic engineering and “artificial” intelligence. The current classificatory infrastructure of sex/gender/sexuality will not be adequate, nor will any other category, if it is dependent upon the idea of individual identity. Partial re/productive models will also not be enough, but they are a step in addressing multiple levels of re/production in order to consider the transformations of re/production that are now unfolding.

Biotechnology and the bioeconomy emerging since about the 1970s now saturate everyday life: from the food chain of transgenic organisms we grow, buy and eat, to the experimental medical therapies improving (or diminishing) quality of life for those who can afford them, to the cross pollination between GMO crops and “conventional” crops. There is no way to escape biotechnology's impact. We cannot simply reject the advent of human-produced biotechnology and/or ignore its implications – implications that can be potentially horrifying, but also contain possibilities for transformations of knowledge infrastructures, with the potential to lead to more ethical earthly interrelations and social worlds.

Biotechnology, and its focus on life and matter at the molecular level, represents a reorganization in material re/productions, and also a crisis in human symbolic and taxonomic classificatory infrastructures which are central to Western thought. For instance, as Sarah Franklin points out in her brilliant examination of the reorganization of re/production illustrated by Dolly, the world's first “cloned” sheep; the language describing this reorganization of re/production is imprecise and in crisis around questions of sameness and difference. Franklin writes that Dolly represents “both sameness and difference as a clone,” but this reorganization of sex and re/production is hard to grasp through Dolly “because she slips out of familiar kinds: her existence does not parse within familiar categories” and “is syntactically noncompliant within the normative arboreal grammars of reproduction and descent; her queer genealogy haunts the very basis of the formal biological categories that once affirmed the stability of a known sexual and reproductive order.”²⁹ If Dolly and other reorganizations of re/production do represent a queer genealogy that challenges normative categories, then we really need to begin asking questions about what exactly a queer critique of the normative entails in terms of re/production. If the biotechnology industry emerged in tandem with the neoliberal restructuring of the US economy, as Melinda Cooper suggests, and transformations in both neoliberal global economics and technoscience no longer serve or emulate what is popularly conceived as the heteronormative family, then what exactly does queer critique entail?³⁰ Is genetic engineering and biotechnology the queer culprit, or is biotechnology merely inventing new norms that are not yet decipherable because we do not have the language to precisely describe these transformations?

One major assumption that drives a lot of scholarship considering biopolitical and bioeconomical reorganizations of re/production is that humans make biotechnology a possibility through our inventions, tools, computers, and a molecular view of the world. However, biotechnologies such as the manipulation of metabolism and possible capabilities of horizontal gene transfer exist in other life forms in ways that we may never be able to completely comprehend or mimic. For instance, Myra Hird suggests that by looking at the reproduction of bacteria, we can see that interspecies gene transfer is a technology much older than ourselves, which humans have just begun to engage through recent reproductive technologies. For Hird, bacteria have “invented all major forms of metabolism, multicellularity, nanotechnology (controlling molecules in ways that continue to elude scientists) and metallurgy,” that we might “consider that particularly with regard to sex, humans and other primates should be considered inferior to some other organisms.”³¹ Might we follow Hird’s lead and possibly consider that “transgender” fish’s ability to change “sex” due to the toxic presence of EDCs represents a technology beyond our grasp? We are most certainly “endangering” wild native fish, but we also need to begin asking what technologies, processes, and relations fish are using to change sex. Is this changing of sex a response, an adaptation, or both? Is this change a sign of resilience or a degenerative “defect”?

Scopes and scales of interdependent transsex: some reorganizations of re/production through the prism of hormones and hormone-mimicking substances

The recent emergence of “transgender” fish in the Potomac River and more recent developments in birth/population control are two examples I use for tracing more specific examples of re/productive relations of our interdependent, shared transsex. I use the term “transsex” to refer to the transformations in the re/production of the larger earthly, interdependent ecologies that have been radically altered through world wars, industrialization and expansive exploitation of resources, species, and populations. I use transsex as a term broadly defined through a hormonal, metabolic, and adaptive prism to constitute not just human transsexuals, but multiple and possibly endless other bodies, including but not limited to welfare recipients and Native women in the US, livestock, fish, bodies of water and even the so-called normative bodies of white, middle class Americans who may or may not eat meat and dairy but who consume water, food and products that contain EDCs. Even self-defined transgender or genderqueer-identified people who don’t intentionally take hormones share transsex through their relationships with meat, dairy, plastics, cosmetics, drinking water, occupation, etc. The scope of transsex defined through this hormonal prism is far reaching and global, and potentially encompasses every *body* on the planet.

Synthetically human-made reproductive and sex hormones were invented in the 1930s and have increasingly been used and promoted as a progressive invention for global public health, especially in the realm of birth control and reproductive drugs. The history of the development of sex and reproductive hormones through the twentieth century is intimately connected to developments in industrialization, fossil-

fuel economies, mono-mechanical factory and pesticide agricultures, epoxy resins, dyes, plastics, computers, genetic engineering, etc. More recently, what are now called EDCs include an ever growing list of plastics, pesticides, herbicides, epoxy resins, and agricultural run-off and waste. EDCs are thought to affect the endocrine and hormone systems of animals and humans, and are thought to mimic the effects of estrogen and other hormones and processes of metabolism that bodies produce. Theo Colborn, Frederick S. vom Sall, and Ana M. Soto write: "Literally, thousands of synthetic compounds [many made from oil], a number of which are endocrine disruptors, have been released in the environment, generating concern about their additive and synergistic effects."³² In less than 100 years, synthetic hormones and EDCs have most likely played a significant role in human population, species, and plant compositions and re/productions of the global present.

Both estrogens and testosterone have been willingly taken and forcefully prescribed in order to control re/production or change physical and/or emotional sex characteristics of humans and animals. Multiple "bodies" have also passively consumed, absorbed, and contained EDCs, altering endocrine and reproductive systems. Estrogens are of particular interest because of both the symbolic and material relationships between the control of animals, poor women, and the environment, for the maximization of profit in the social relations of human-centered re/production.

Julie Sze's work has documented the rise and fall of DES – one of the most promoted and distributed synthetic estrogens invented in the 1930s. It was promoted as both a pregnancy and livestock drug. Sze sees the historical rise of estrogen-mimicking DES as both "*a symbol connecting women and animals, and as a technological process to control nature and maximize efficiency through technology.*"³³ Sze argues that female identity and the categories of sex and gender became defined socially and medically to a significant extent through DES, given to "categories of women who were considered insufficiently female, such as menopausal women and lesbians."³⁴ If Sze is right that DES and other synthetic hormones are a technology to control nature and to maximize efficiency and profit, then the increasing use and invention of multiple other hormones and hormone-mimicking substances must be considered a technology of social engineering for the nation. Although DES was banned for use in humans in the 1980s, many more synthetic sex and reproductive hormones and EDCs have been invented, promoted, and absorbed into the bodies of multiple species.

The works of Dorothy Roberts and Andrea Smith document the abuse of newer synthetic reproductive hormones approved by the FDA in the 1990s. Roberts' work in *Killing the black body: Race, reproduction, and the meaning of liberty* illustrated the intimacy of race and reproduction. Roberts ties the social and racial history of an earlier United States slave economy, reliant upon controlling African American women's reproductive bodies to re/produce the labor force, to the contemporary economic conditions of late capitalism, in which poor African American women's bodies have shifted from being material economic commodities of reproductive profit, to an expendable managed population, imagined as draining the monetary resources of the US nation state. As part of welfare reform in the 1990s, many states

required that women receiving welfare benefits have Norplant implanted into their bodies and after Norplant was considered dangerous, Depo-Provera injections.³⁵

Long-duration sex and reproductive hormones used to control reproduction can be injected or implanted into the body, and the newest frontiers in research and experimentation involve immunological contraceptives, contraceptive vaccines, and possible recombinant DNA technology. These contraceptive vaccines can last for three months or for years, and many effects may even be irreversible.³⁶ The first generation of contraceptive related vaccine to emerge was Depo-Provera. The FDA approved the use of Depo-Provera for human use in the United States in 1992, despite the fact that it produced breast cancer in beagles. By the late 1990s, more than 15 million women across 90 countries received injections of Depo-Provera – a highly concentrated amount of the hormone progestin, shutting down reproductive processes for 3 to 6 months.

The further research and development of contraceptive vaccines into the twenty-first century involves a wide range of techniques and strategies to manipulate cellular and biosystematic function of sexual hormonal reproductive networks and their related immunological systems and relationships. A 2005 report in the medical research journal *Human reproduction* illustrates developments and advancements in contraceptive medicine, where various “targets are being investigated in various laboratories for the development” of the contraceptive vaccine. What is meant by targets here are the various and differing molecular and cellular process involved in manipulating hormonal functions and cycles and permanently terminating the ability to reproduce. This research implicates both “sexes” and includes sperm vaccines and anti-hCG hormone (human chorionic gonadotropin) blockers that prevent pregnancy. These vaccines use anti-sperm antibodies (ASA) to change the body’s hormonal immune responses to prevent reproduction.³⁷ This 2005 report frames the “progress” of this research in terms of the overpopulation crisis we face. In their introduction they write:

Population explosion and unintended pregnancies continue to pose major public health issues worldwide. The world population has exceeded 6.43×10^{38} ... Ninety-five percent of this growth is in the developing nations. In the USA, half of all pregnancies are unintended... This calls for a better method of contraception that is acceptable, effective and available both in the developed and developing nations... Since the developed and most of the developing nations have an infrastructure for mass immunization, the development of vaccines for contraception is an exciting proposition.³⁸

This report mentions nothing of the potential consequences and risks of manipulating antibodies, potentially triggering damaging immune responses such as autoimmune disorders and allergies, let alone the possible exacerbation of health problems such as AIDS.³⁹ Nor does it consider that contraceptive vaccines will be used as an alternative to condoms, increasing the likelihood of HIV transmission. Equally problematic is the statement that “developed and developing nations have an infrastructure for mass immunization” and that these new possible contraceptive vaccines are therefore “an exciting proposition.” Exciting for whom? What would a possible “mass immunization” of human re/production of the populations of nations entail? If most humans don’t have much choice about the basic living conditions of

everyday life including food, water, and shelter, then how will most humans contribute to the decision of who will qualify for possible mass re/productive immunizations?

The ways we come to know and assume knowledge, through classificatory infrastructures and popular cultures of racism, US and Euro-centrism, environmentalism, speciesism, xenophobia, and self-righteousness, actually legitimize practices of collective human population management that are then promoted as socially progressive. Neoeugenics is not a thing of the past. Just as US environmental conservation efforts of the early twentieth century were linked to eugenics through what Charles Wohforth calls “population-control work” that simultaneously intended “to save nature and improve human existence,” contemporary discourses of eco-catastrophe including global warming, possible pandemic human disease, and shortages of food, water and energy, are also linked to human “population-control work.”⁴⁰ For example, an essay originally from the conference “Connecting Environmental Ethics, Ecological Integrity, and Health in the New Millennium” (also a cooperative collaboration with the Earth Charter Initiative and the Global Ecological Integrity Project) estimates the carrying capacity of the Earth to be “two to three billion” individuals.” This estimate “is based on maintaining a European-style standard of living for everyone in the world associated with sustainable use of natural resources.”⁴¹ This reflects many of the assumptions of mainstream academic and media environmentalism, in that human over-population is the root of larger ecological crises and over-use of resources. The over-population and sustainable re/productive European lifestyle assumption, when framed within Noel Sturgeon’s findings that popular representations of environmentalism naturalize stories of (white middle class) re/reproduction, militarism, and the race for space exploration and planetary security, illustrates that we are dealing with more than just benevolent environmentalism and progressive immunological reproductive medicine.⁴² We are also dealing with the politics of human re/reproduction – a politics questioning who will decide what populations will qualify to live, die, and re/reproduce. Which populations will qualify for mass immunization of their re/productive capacities? Which populations qualify as naturalized re/reproduction for militarism and planetary security? The “who” here is a tricky question and even though women of color, prisoners, people with disabilities, queer and poor people have borne the brunt of medical re/productive experimentation, everyone potentially has the possibility of qualifying as one of the “managed” populations – it just depends what categories, characteristics, behaviors, and locations constitute qualification. And since we don’t yet know the conditions for qualification even though we might have accurate predictions, re/productive immunology is a possibility for most humans on the planet.

Immunological re/productive medicine and the transformations of human endocrine, reproductive, and immune systems constitutes all humans as potentially transsex. If we could create planetary ethics and avoid not only genocide but also mass starvation, ecocide, disease, and “natural” disasters, then we are still left with an over-population for a sustainable European lifestyle. To reach a human population of two billion, either two thirds of humanity will have to die or there

will have to be dramatic interventions in human re/production across the planet, in which anyone potentially becomes re/productively managed. Perhaps a European lifestyle should be the goal of sustainability and we need to begin asking questions about what other kind of lifestyles are possible, and the population carrying capacities those lifestyles entail.

Populations of humans are not the only things to be counted in sustainable carrying capacities. Other species and resources must also be considered in relation to balancing sustainable renewal. However, much of the language of sustainability is wed to sustaining or keeping economic and ecological conditions the same. Perhaps we need to look for resilience in species, populations, and things, instead of or in addition to a fixed idea of sustainability. “Transgender” fish are an excellent example with which to begin considering not just resilience but the hormonal links across bodies and species of interdependent transsex, and the ways in which our interdependent transsex transpires through the byproducts of (post)industrialization and mono factory agriculture.

“Transgender” fish were first noticed in the Potomac River in 2003 when scientists with the West Virginia Division of Natural Resources and the United States Geological Survey examined widespread and pervasive fish kills and discovered that smallmouth bass exhibited widespread reproductive anomalies. They found that nearly 80 percent of male smallmouth bass exhibited an intersex condition in which eggs were found inside the testes.⁴³ Since then, there has been extensive coverage in both mainstream and scientific media on what are referred to as “transgendered,” “intersex,” or “sexually confused” fish, linking the rise of this new phenomenon to alarming amounts of EDCs found in synthetic chemical waste, sewer and agricultural runoff and “treated” grey water. The correlation between toxic conditions in waterways and reproductive anomalies is not a recent phenomenon. Since the late 1970s, reports by English anglers of “sexually confused fish” caught the attention of both media and researchers and it now appears that correlations between EDCs and reproductive anomalies are widespread and pervasive not only geographically, but across multiple species as well, including alligators, birds, panthers, turtles, mink, otters, and even large mammals such as polar bears and humans.⁴⁴ In fact, the issue has become enough of a concern that legislation was submitted to Congress in December 2009 to push for the *Endocrine Disruption Prevention Act* H.R. 4190, which if passed would legislate government-funded research investigating the sources of the problem.

It is interesting to consider why the idea of transgenderedness is being used to represent toxicity and eco-catastrophe, instead of the various economic and political aspects of “development” that create toxic endocrine disrupting conditions in the Potomac River. Stated simply, why is “transgender” the signifier and not “Merck & Co, Inc.,” or “Perdue, Inc.”? But even more interesting is that people and fish share this re/productive reorganization of endocrinology. Some of the visible pollutions of the Potomac River include plastics and anything imaginable that can float – things containing EDCs that people use and that then make their way into the river. Additionally, the Potomac River and other equally polluted bodies of water are the sources of drinking water for much of urban and suburban Washington, DC. The

Potomac River and many of its tributaries obtain agricultural, industrial, suburban, and urban runoff and then empty into the Chesapeake Bay. The Chesapeake Bay contains “dead zones” (low dissolved oxygen levels that kill most species of an ecosystem) in which contributing factors include “polluted runoff from farms and feedlots, deforestation and wetland loss, discharges by wastewater treatment plants, air pollution from cars, as well as the loss of oysters that would filter algae and other organic matter from the water column.”⁴⁵

Humans as much as fish are caught up in the transformations of re/production that are unfolding as a result of human-made EDCs circulating in the environment, water, and food chains. Although fish may hold EDCs in their bodies at higher concentrations than humans, humans share a habitat with plastics, pesticides, and factory farming, just at different scopes and varying degrees of intimacy depending on where one works, what one eats and drinks, and where one lives. But if we are to de-center the human in this unfolding problem, what does it really matter that humans absorb lower concentrations of EDCs than fish, if EDCs are possibly creating marine “dead zones” in rivers, water tables, bays and estuaries that are used to hydrate and feed global populations? Instead of eating locally and coastally, the majority of humans in the United States now eat from the agricultural and factory farms which are themselves their own tributaries for EDCs, draining to create “dead zones” of the world’s major bays and estuaries. EDCs are part of the food, productive and re/productive chain of non-human and human life and we will need to devise ways, just like fish, to adapt to their influence.

EDCs clearly do not cause everyone to transition gender in the same ways and capacities as transsexual humans using medically prescribed hormones. But certainly most humans on the planet have most likely come into contact with EDCs; especially the pesticide DDT, the resin BPA (bisphenol A) and PCBs (polychlorinated biphenyl); all of which are highly estrogenic and at different points in time have saturated most parts of the globe. DDT and PCBs saturated industrial, urban, suburban and agricultural land and waterscapes through the mid-twentieth century, and even though DDT is now banned in many places and levels have dropped, PCBs in the production of coolants, pesticides, sealants, PVC coatings, and many other home and industrial construction products still saturate our living environments. BPA in the epoxy resins of hard plastics also surround us in our homes, offices, cars, and bottled drinking water.

So why do mainstream media representations of EDCs and this larger global ecological reorganization of re/production focus on the spectacle of the transgender fish? The use of “transgenderedness” as a sensationalized cultural signifier of re/productive eco-catastrophe illustrates that certain assumptions about re/production are at play and entangled with specific human socio-cultural categories in these mainstream media discourses. The fearful assumption that human-made environmental problems led to “transgender” fish, and possibly other “transgender” organisms that cannot re/produce, seems to be a motivating fear in governmental and scientific intervention into the problem. But I presume EDCs are not going anywhere anytime soon. Many EDCs come from oil and the thousands of products made from oil, and a transition from an economy of oil, plastics, pesticides, and

factory agriculture will take time. How might we begin to grapple with this time? Embracing our shared transsex is a first step, not out of fear that we might not be able to re/produce or be clearly distinguished as male or female, but out of the knowledge that life in many ways is simultaneously fragile, resilient, adaptive, and that transsex exhibits the ability to find ways to transform the possibilities of re/production. Perhaps our “emerging” interdependent transsex is only one step in the larger adaptation to adjusting to the damages that humans have caused to the larger Earthly ecology. That isn’t to say that we shouldn’t clean up our act, but what would it mean to imagine that transgender fish might just in fact be the “fittest” in the dance of life and death that is survival?

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Notes on contributor

Bailey Kier is a PhD student in American studies at the University of Maryland, College Park. Kier is writing a dissertation titled: “From discourses of eco-catastrophe, sustainability, and belonging to a queer eco-ethic.”

Notes

1. I use the term bioscape instead of biosphere for a few different reasons. The term biosphere conjures assumptions of life contained within a round objectified planet earth. Bioscape here refers to both life and energies in relation to an imperfect spherical earth, but also its relations to multiple other possible planes, elements, assemblages, and processes. These various scapes may or may not be considered “alive” by conventional human standards, but all contain energy in some form and/or relation and from or for some time. Commercial and military jetscapes, oilscapes, foodscapes, microwavescapes, surveillancescapes, mountainscapes, sunscapes, and waterscapes, are a few examples of various systemic energy infrastructures. Bioscapes is a terminology tactic to unpack various processes, components, and “bodies” within, among and beyond the biosphere.
2. Haraway 2003, 12.
3. *Ibid.*, 20, 25.
4. *Ibid.*, 25.
5. Hammonds 1994, 141.
6. Valentine 2007.
7. Joan Roughgarden and Bruce Bagemihl have both documented extensive “homosexual” behavior in non-human animals. See Bagemihl 1999; Roughgarden 2004, 2009.
8. Halberstam 2005.
9. The phrase “the politics of thinking about thinking” is Katie King’s pedagogical phrase introduced to me the first week of her advanced feminist theory course “Feminist theory through and beyond critique: Rupturing epistemologies and transforming relationships to

global realities.” The syllabus can be found online (King 2005). King’s teaching style urges students to think about the layers of knowledge and intellectual infrastructures as having boundaries which are controversial to cross. She urges her students to take risks crossing these boundaries in their thinking, research, and engagement in order to open up new possibilities for knowing and making social worlds.

10. Bowker and Star 1999, 42.
11. *Ibid.*, 37–8.
12. Puar 2007, 212.
13. *Ibid.*, 211.
14. Fuss 1996, 1.
15. *Ibid.*, 2.
16. Oliver 2009, 31–2.
17. *Ibid.*, 45.
18. *Ibid.*, 48.
19. Weil 2002, 4.
20. *Ibid.*, 5.
21. *Ibid.*, 4, 6.
22. *Ibid.*, 6.
23. The sex(nature)/gender(culture) combination is a bit tricky because the word sex has many meanings. In my work I assume sex to refer to the two main categories male and female which signify their division based on reproductive functions. And even trickier is popular culturally speaking sex defined in regards to reproductive capacity, is assumed to belong to the classificatory infrastructure of “Nature,” while in the historical “progression” of queer and feminist thought, the concept of sex has transformed from being the natural category from which the social or cultural category of gender could develop. However, since at least the 1990s, the category of sex has been increasing framed as socially constructed and thus been associated with the cultural realm. For an introduction to the social construction of sex see: See Fausto-Sterling 2000; Meyerowitz 2002; Schiebinger 1989.
24. I am especially indebted to Mary Sies for her sustained critique and insistence that I not limit and inhibit my thinking by merely trying to do away with a cultural paradigm and simply replace it with a spatial in hope that it would somehow miraculously incorporate the interrelated dynamics of “Nature,” and the ecologies which are the backbone of much of human political economies and organizations of space. John Caughey also provided useful critique and suggestions.
25. Duggan 2003; Ong 2006.
26. Lefebvre 1991, 32.
27. *Ibid.*
28. *Ibid.*, 343, 347.
29. Franklin 2007, 28.
30. Cooper 2008.
31. Hird 2008, 239, 241.
32. Colborn, vom Sall and Sota 1993, 380.
33. Sze 2006, 803.
34. *Ibid.*, 797.
35. Roberts 1997.
36. *Ibid.*, 146.
37. Naz et al. 2005.
38. *Ibid.*, 3271.
39. Roberts 1997, 146.
40. Wohlforth 2010, 22–8.
41. Edwards and Pimentel 2002, 121
42. Sturgeon 2009.
43. Chambers and Leiker 2006, 7.

44. Langston 3003, 129–32.
 45. Faber 2001, 8.

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