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'Wannabe Toxic-Free?' From precautionary consumption to corporeal citizenship

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ABSTRACT

Ecological citizens are increasingly encouraged to adopt 'precautionary consumption' – a set of practices aimed at shielding them from the potential health harms of exposures to everyday toxics. The utility and the effects of precautionary consumption in relation to common chemical exposures are investigated. Precautionary consumption is not only of questionable utility, but is fundamentally misguided as an approach for inspiring antitoxics organizing. The failure of this approach is in part due to its assumption of a naturally bounded, autonomous individual who is able to maintain an impermeable boundary between herself and the environment. Drawing on the work of material feminist theorists, it is argued that Gabrielson and Parady's notion of *corporeal citizenship*, an approach that places bodies into a complex web of material, ecological relations entangled with the social, offers several strategic advantages for framing resistance strategies.

KEYWORDS Precautionary consumption; toxics; environmental health; corporeal citizenship; material feminisms; ecological citizenship

Introduction

The catchy slogan *Wannabe Toxic-Free?* is aimed at encouraging people to take responsibility for protecting themselves from the potential health harms of exposures to everyday environmental chemicals. According to the organization of the same name (see wannabetoxicfree.org), the way to take responsibility is to 'check out their website, read the label, shop wisely, and do it yourself'. In the industrialized global North, media coverage of the risks of exposures to everyday environmental chemicals similarly encourages people to manage their exposures, and thereby reduce their 'body burdens', by offering advice about individual actions and smart consumer practices (MacKendrick 2010). Environmental advocates now routinely encourage people to reduce their exposures to chemicals found in everyday consumer products (e.g. household cleaners, cosmetics,

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furniture etc.) by making informed choices in the shopping aisles. Norah MacKendrick coined the term *precautionary consumption* to describe individual consumer behaviours intended to address current and potential health harms by toxic exposure. While it may be part of a broader orientation towards a sustainable lifestyle, engaging in precautionary consumption is primarily about shopping for 'clean' foods and consumer products. MacKendrick (2015) has noted the individualized orientation of precautionary consumption, in line with earlier critiques of green or ethical consumerism (Sandilands 1993). Other critics have pointed to the starkly gendered dimensions of precautionary consumption, noting how advocacy organizations often place responsibility for contaminant avoidance on women, especially young mothers (Altman *et al.* 2008, MacKendrick 2014, MacKendrick and Stevens 2016). Further, there are indications that precautionary consumption could be an ineffective way to reduce exposures to everyday toxics: in other words, it may not even be possible to 'shop our way out' of this problem.

The promotion of individual consumer behaviour as a means to address harms from toxic exposures is consistent with broader processes of neoliberal individualization. Over the past three decades, citizens have been encouraged to exercise choice and act responsibly to manage their own health. Many scholars have pointed to the risks of an overly narrow focus on individual consumer behaviour in approaching questions of environmental citizenship (Sandilands 1993, MacGregor 2006) and have noted how this narrow focus on individual consumer behaviour has evolved in conjunction with new kinds of green governance involving forms of responsibilization (Soneryd and Uggla 2015). In fact, MacGregor has stated provocatively that it is now 'time to kill off the figure of the "consumer-citizen"' (2016). Here, we build on these critiques to argue that advocacy that encourages 'precautionary consumption' as a mode of resistance to toxics is misguided and should be reoriented around the notion of *corporeal citizenship*, which has the potential to counter the individualizing trend in antitoxics organizing, and expand people's sense of their political and ethical responsibilities in the world. In this respect, we hope that activism in a corporeal citizenship mode can contribute to the necessary re-politicization of green citizenship that MacGregor urges (2016).

We begin by assessing the utility and effects of precautionary consumption as a way of reducing health harms from exposures to everyday toxics such as brominated flame retardants (BFRs) and phthalates. BFRs and phthalates share several characteristics that are hallmarks of the contemporary toxics challenge: they are the subject of emerging health concerns and attention in the media (Walsh 2010, Callahan and Roe 2012), exposures are ubiquitous in everyday environments (Schettler 2006), and the developing science regarding their toxicity points to serious potential effects on human health at low doses

(Birnbaum and Staskal 2004). These characteristics have attracted attention from environmental advocacy organizations and make BFRs and phthalates likely targets for those practising precautionary consumption. As an example, Environmental Defence, a national environmental organization in Canada, recently launched a resource for smart shoppers entitled, 'The Just Beautiful Personal Care Products Pocket Shopping Guide'. This follows similar moves by the Campaign for Safe Cosmetics in the United States, the David Suzuki Foundation in Canada (the Sustainable Shoppers wallet-sized guide and the Dirty Dozen mobile app), and the Environmental Working Group's Skin Deep Database. Journalists and others writing for popular audiences about the risks posed by everyday chemicals also tend to provide advice that is consistent with precautionary consumption. This coincides with the trend, over the past decade, for regulators in the global North to adopt information- and risk-based approaches to mitigating exposures to toxics, facilitating individualized strategies based on consumer 'preferences', rather than hazard-based regulatory controls.

Campaigns encouraging people to take up precautionary consumption are misguided; we argue, in part because they accept the assumption of a naturally bounded, autonomous individual who is able to maintain an impermeable boundary between herself and the environment. That is, precautionary consumption is premised on a clear separation and a fixed boundary between the physical body and the natural environment; it presumes that individuals can control the movement of toxics across this boundary. Instead, we adopt a material feminist position, taking the view that boundaries between nature/culture and environment/body are permeable and mutable. Bodies, similarly, are conceived as porous and leaky, allowing for the fluidity of corporeal boundaries (e.g. Shildrick 1997, Alaimo 2008, Tuana 2008). This is not to say that flow is unconstrained: there are mediating membranes operating on biological, social and political planes (Alaimo 2010). In the end, we argue that Gabrielson and Parady's (2010) conceptualization of *corporeal citizenship* offers a number of strategic advantages, as a model by which to frame social and political resistance to the risks posed by the presence of toxics in everyday environments, because it promotes a positioning of the subject as interconnected to wider communities, ecologies and economies. Corporeal citizenship has the potential to allow ecological citizens to expand the sphere over which they exercise ethical and political responsibility; as such, it responds to MacGregor's call for scholars to articulate alternatives so that the concept of green citizenship might be rehabilitated (2016).

We begin by demonstrating that precautionary consumption has become a widespread practice and forms a key element of contemporary antitoxics campaigns by environmental advocates in the industrialized nations of the global North. We review the regulatory approach in Canada that has

facilitated the emergence of precautionary consumption and explore critiques of this approach. Next, we examine the scientific, clinical and social scientific literatures with the aim of assessing the (f)utility and the effects of precautionary consumption in mitigating health harms from everyday toxics such as BFRs and phthalates. Lastly, we consider what this review demonstrates about the limitations of precautionary consumption and we look to the material feminists and the notion of *corporeal citizenship* to offer an alternative framework for inspiring environmental action and activism.

Our contribution advances debate in environmental politics by demonstrating how a framework based on corporeal citizenship, as conceived by Gabrielson and Parady in this journal in 2010, could reorient antitoxics action so as to urge ecological citizens to expand their spheres of ethical and political responsibility. Acting ecologically, in this new frame, includes not only caring for oneself, but also the wider social community, environment and economy. Corporeal citizenship, with its recognition of the 'active materiality' of synthetic chemicals in our world, can prompt this change in orientation by demonstrating that while exercising strict 'control' over bodily boundaries is impossible, relinquishing control means taking responsibility over a larger sphere – and this is both possible and necessary.

The rise of precautionary consumption

The term 'precautionary consumption' describes a set of practices undertaken primarily by women 'to mediate personal exposure to environmental chemicals through vigilant consumption' (MacKendrick 2015, p. 705). MacKendrick's qualitative studies find that people take up precautionary consumption in order to compensate for a weak regulatory system that is judged to be ineffective at protecting them and their families from the harms posed by everyday chemical exposures (MacKendrick 2014, 2015). She ties the rise of precautionary consumption to media trends in North America since the mid-1980s. Reporting on toxics has shifted, she argues, from framing the task of managing potential health harms from chemicals as a state or regulatory responsibility, towards framing it as an individual, consumer responsibility (MacKendrick 2010). Rather than holding industry and regulators accountable for the production and release of potentially harmful chemicals, individuals are encouraged to mitigate health harms by becoming better, more informed customers.

In Canada, a 'permissive approach' to chemicals regulation in which the burden of proof falls on those trying to show that chemicals are harmful has enabled industry associations to exploit uncertain, contested and incomplete scientific evidence about the health harms associated with everyday toxic exposures (Scott 2009, Collins and McLeod-Kilmurray 2014, Abelkop and Graham 2015). Since the early 1990s, environmental advocates have

pressured regulators to adopt a more precautionary approach.[1] But while the 'precautionary principle' is enshrined in Canadian toxic substances legislation (the *Canadian Environmental Protection Act, 1999*, Part IV), the regulatory framework is still largely permissive in practice. In line with this approach, and driven by the prevailing tenets of neoliberalism which took hold over the past three decades, the measures introduced to manage emerging risks from everyday chemicals have favoured voluntary approaches, often aimed at enabling the consumer to make informed choices based on her own 'risk preferences'. This means that although risk assessments are completed and corresponding risk management actions are eventually introduced, these measures tend to focus on providing the consumer with information, rather than protection. Perhaps predictably then, since effective labelling of consumer products becomes crucial on this model, campaigns by advocacy organizations have adopted the language of the 'citizen's right-to-know', which enables, validates and fuels the practice of precautionary consumption (Scott 2015).

Scholars writing about environmental health justice have raised several critiques over the past decade that are relevant to an analysis of the utility of precautionary consumption as a strategy for mitigating health harms posed by everyday toxics. First, Altman *et al.* (2008) describe how individuals, as consumers, believe they can prevent chemical exposures by avoiding certain products. According to the authors, this belief is a 'consumption fallacy' because it is based on the notion 'that consumer choice is un-bounded, when [in fact] the range of options consumers have to reduce exposure to chemicals like phthalates or flame retardants is limited' (2008, p. 426). The authors observed that people who learned of their exposure levels ('body burdens' or internal contaminant loads) through biomonitoring studies made efforts to change their consumption habits; however, when these efforts were demonstrated to be ineffective, people strove to physically and symbolically separate themselves and their homes from 'outside' environmental toxins (2008). Szasz (2007) describes this instinct to isolate oneself as entering an 'inverted quarantine' mode and warns of the detrimental effects that this kind of personal and symbolic isolation can have on environmental movements that require collective, political action. More recently, Washburn (2014) found that for some people who participated in biomonitoring studies, 'the more they tried to exert control over their exposures by reading labels and/or avoiding certain products, the more they realized how little control they actually had. Sometimes this led women to feel depressed and powerless' (341).

Second, evidence suggests that attempting to minimize chemical exposures through modified buying habits may reinforce existing socio-economic disparities in exposures. Differences in chemical body burdens are correlated with not only socio-economic status (Zota *et al.* 2010a, MacKendrick 2014) but also

race/ethnicity and geographic location. People with lower income levels had higher levels of BFR exposure (Zota *et al.* 2010b); children with mothers and caregivers who have lower education levels had higher body burdens (Rose *et al.* 2010); and in California, Black and Hispanic children had higher body burdens than White and Asian children (Windham *et al.* 2010). Exposures to phthalates are also correlated with race/ethnicity (Trasande *et al.* 2013). Thus, precautionary consumption, if at all effective, is likely to exacerbate health disparities along social modalities of race/ethnicity, education levels, and socio-economic status.

Lastly, feminist scholars argue that precautionary consumption is feminized labour (Lee and Scott 2014, MacKendrick 2014). Precautionary consumption can be viewed as part of a broader set of domestic practices aimed at minimizing levels of chemicals in the home. People are encouraged to read labels and buy products that are chemical-free, to clean their floors with a wet mop, dust and vacuum regularly and buy organic food (Babycenter.ca 2016, Eco-novice.com 2011). Feminist scholars have long theorized domestic work, or reproductive labour, as women's work and have demonstrated how it is crucial to social reproduction (Luxton 1980, Cossman and Fudge 2002, Luxton and Bezanson 2006). Globally, women continue to do most of the household labour, most of the grocery shopping and meal preparation, and provide most of the care for children and family members (Sullivan 2000, Oates and McDonald 2006, Lindsay 2008, Altintas 2009, OECD 2014). By performing this work, women have less time available to participate in broader environmental activism (Buckingham *et al.* 2005). Thus, the work of precautionary consumption falls disproportionately on women and adds to their already unequal share of social reproductive labour. When these individualized burdens begin to pile up, women are likely to have less time available to participate in collective, political action to reform the regulatory regime (MacGregor 2006).

Not only do women perform most of the domestic labour, they are also primarily responsible for ensuring the health of their children and families. The compounding effect of these two responsibilities is perhaps best exemplified in women's role as mothers. Scholarship has demonstrated how a culture of 'intensive mothering' holds women as mothers accountable for the health of their children (Hays 1996, Fox 2006), and how pregnant women in particular feel obligated to avoid toxics as they take on the responsibility for the foetal 'environment' (MacKendrick 2014). According to MacKendrick, there is an ontological shift that occurs as a woman comes to view her body not primarily as her own, but as belonging to her future child. Not only must they stop drinking alcohol and eating raw fish, and engage in 'appropriate' levels of exercise, but as precautionary consumers young mothers are told that they must now also avoid shampoos and food containing phthalates, and sleep on BFR-free mattresses, among other

things. But, while the prevailing regulatory approach enables precautionary consumers to act in accordance with their own 'risk preferences' (a choose-your-own-adventure of sorts), there are elements of judgment, guilt and blame that creep into the picture as well. An emphasis on individual responsibility for our health 'can lead to an over-simplified picture which has *control* at its centre – with disturbing overtones of both infinite optimism and fault and failure' (Nedelsky 2011, p. 285, our emphasis). In fact, the re-figuring of control, as we will demonstrate, is a key element of the shift towards a framework based on corporeal citizenship in antitoxics organizing. We turn, now, to an examination of BFRs and phthalates to illuminate the limited utility of precautionary consumption as a strategy for mitigating the health harms posed by everyday toxics.

The ubiquity of everyday toxics

BFRs and phthalates are examples of chemicals that are added to many everyday products and are now considered to be ubiquitous in the industrialized world (Schettler 2006). Both classes of chemicals are also 'endocrine-disruptors': synthetic chemicals that are structurally similar to hormones, and thus can have wide-ranging negative effects on human health at low doses (Velez 2015). Since endocrine disruption is the focus of increasing media attention, public concern and environmental advocacy (Greenpeace 2010, San Antonio Statement 2010, Walsh 2010, Callahan and Roe 2012, Environmental Health Fund 2012, WHO/UNEP 2013), people who adopt practices of precautionary consumption are likely to be trying to avoid these types of exposures (Birnbaum and Staskal 2004, Hauser and Calafat 2005). Thus, while the specifics differ between the two classes of chemicals (i.e. BFRs persist and bioaccumulate in bodies whereas phthalates are metabolized quickly and excreted, exposures to BFRs might be seen as more difficult to mitigate through altered consumptions habits than phthalates because of their role in addressing the risk of fire), we can place both BFRs and phthalates into the category of 'everyday toxics' for the purposes of assessing the (f)utility of strategies of precautionary consumption.

BFRs have been widely used in North America since the 1970s (Alaee *et al.* 2003). Added to a broad range of everyday items such as furnishings, fabrics, carpets, appliances, foam, wiring, computers and televisions, BFRs are found in the spaces in which people live and work daily. Some of the most commonly used technical mixtures of BFRs are referred to as polybrominated diphenyl ethers (PBDEs). As items treated with these flame retardants degrade, PBDEs are released as dust particles concentrated in indoor environments (Alaee *et al.* 2003). Researchers have shown that the main route of exposure for North Americans, from toddlerhood to adulthood, is through inadvertent inhalation and ingestion of household dust,

and for infants, it is through breast milk (Allen *et al.* 2007, Betts 2008, Huwe and Larson 2008, Johnson-Restrepo and Kannan 2009). The second most common route of exposure for PBDEs is through dietary ingestion, primarily animal and dairy products (Wu *et al.* 2007). The fate process of PBDEs is such that they are released indoors and then make their way outdoors where they enter ecosystems and agricultural food systems. Their persistence leads PBDEs to bioaccumulate in organic materials and bodies: as lipophilic compounds, they collect in fatty tissues in animals and humans. Researchers suggest that BFRs can be detected in the blood of nearly all individuals in the general population; in fact, the presence of PBDEs, among other toxins, in the umbilical cord blood of the newborns they tested prompted Environmental Defence (2013) to use the term 'pre-polluted' to refer to the next generation of Canadians.

Phthalates are a group of compounds that are used in a variety of applications to act as solvents and produce malleable plastics. They are found in flooring and wall coverings, food packaging, shampoos, cosmetics, perfumes, lotions, medical devices and coatings on medications. Like BFRs, phthalates are ubiquitous in a wide range of everyday items and spaces. Researchers say they are constantly being released into the environment through migration, evaporation, leaching and abrasion from consumer products (Wittasek *et al.* 2011, p. 8). The primary route of human exposure to phthalates is through food contaminated as the chemicals migrate from plastic packaging (Kohn *et al.* 2000, Clark *et al.* 2003, Colacino *et al.* 2010). Additional routes of exposure include inhalation of fragrances, hair sprays, and cleaning products and dermal absorption from handling toys and other items. Unlike BFRs, phthalates are metabolized quickly and excreted from the body. Still, research suggests that exposures to different endocrine disrupting chemicals have a cumulative effect; thus, the effects of daily BFR and phthalate exposure (among others) may be additive (Rider *et al.* 2010, Velez 2015).

Despite the high number of studies over recent years raising alarms, the regulatory response has been weak. For phthalates, the risk management measures introduced in Canada only address the possible exposures to children, and only through contact with toys, teethers and pacifiers. While legislators in Europe banned phthalates from children's toys in 2005 and the United States followed suit in 2009, Canada relied on a 'voluntary withdrawal' until June 2011, when new regulations came into effect. Now, under the *Canada Consumer Products Safety Act*, the use of the six common phthalates in children's articles and toys is restricted, but to date, there are still no measures to reduce exposures to adults, including pregnant women. The situation is similar for BFRs. Even though PBDEs were added to Canada's *List of Toxic Substances* in December 2006, the regulations enacted in 2008 address only certain forms, most of which were

already 'voluntarily withdrawn' by manufacturers.[2] The government did not list or prohibit decaBDE, despite the fact that decaBDE was the only form still widely used in Canada at that time. A number of environmental organizations filed a formal objection, and in 2010, the government finally committed to regulatory action that would prohibit decaBDE in Canadian consumer products. However, over the next 6 years, the government stalled, and in April 2015, brought forward a meaningless regulatory proposal that would prohibit the release and manufacture of PBDEs, but not their presence in imported consumer products.[3] In other words, Canada has dragged its heels on regulating PBDEs for a decade, the same period of time over which the EU has restricted or banned PBDEs in many consumer products.

The uncertain utility of avoidance

On the basis of this review, we conclude that the utility of precautionary consumption as a way of avoiding exposures to these everyday chemicals is very uncertain. There are two fundamental problems with avoidance. First, due to widespread ecosystem contamination caused by 'indoor' chemicals getting 'outdoors', people could not avoid consuming these chemicals even if they avoided all processed or packaged foods, and only purchased consumer goods that do not contain them. Even raw fruits and vegetables will come into contact with some amount of phthalates since they are present in the materials and technologies of food sorting and packaging; and most animal and dairy products now contain trace levels of BFRs. Second, these everyday chemical exposures cannot be avoided by making a few simple or symbolic changes. The Endocrine Disruptors Action Group (2016) refers to BFRs as 'built-in exposures', demonstrating that homes and workplaces are, for the most part, 'toxic by design'. Industrial chemicals are 'embedded in the ordinary materials and objects that populate our everyday lives'. Since we have purposefully built these chemicals into the things that surround us, not just in our own homes – but in our workplaces, schools and public transit – these exposures are now almost impossible to avoid. Thus, we conclude that it is challenging at best, and futile at worst, to try to avoid everyday chemical exposures through precautionary consumption in the contemporary industrialized world.

But, on the other hand, the data showing body burden disparities could lead one to conclude that the most privileged people *are* managing to protect themselves, to some degree, from the worst toxic exposures. In other words, social location does seem to affect body burdens. Although studies are only beginning to probe this question, it is likely that these varying exposure levels are best explained through

differences in general ambient pollution levels in neighbourhoods of residence or workplace exposures. Further, studies exist that clearly demonstrate for BFRs that population-wide body burdens vary by jurisdiction depending on the regulatory stringency. As an example, concentrations of some flame retardants measured in Canada and the United States are an order of magnitude higher than those found in Europe, where regulatory action has been tougher (Zhou *et al.* 2014). Thus, 'we are forced to admit that there is both a predictability and a deep unpredictability to this' (Scott 2016, p. 279). The unpredictability stems from the profound uncertainties and complexities of the social and ecological entanglements of our times, and the 'predictability derives from the insights of the environmental justice movement: that pollution is most easily found in places inhabited by the poor, the racialized and the marginalized' (Scott 2016). Faced with the reality of weak state regulation, and the limitations of individualized strategies of precautionary consumption, we turn next to the development of an alternative framework for guiding political engagement on the question of everyday toxics.

From precautionary consumption to corporeal citizenship

This third section has two parts. First, we draw on the insights of material feminist theorists to develop a framework for antitoxics organizing based on Gabrielson and Parady's (2010) concept of corporeal citizenship. We demonstrate the porosity of bodily boundaries and make visible the agency of non-human active materiality, which refigures the notion of 'control' over boundaries. The movement of toxics across bodies, and through our environments and economies, provides a rationale for *why* we should extend out our spheres of political and ethical responsibility from the level of the individual or family to cover broader ecosystems and communities. We argue that precautionary consumption is a misguided framing for antitoxics organizing because it accepts the assumption of a fully autonomous, clearly bounded individual who is able to act 'against' the environment to keep toxins out. An individual conceptualized as such stands outside of, and separate from, the environment. This conceptualization limits agency to the individual and effectively depoliticizes efforts to address toxics. Second, we articulate three strategic advantages of shifting our activism away from precautionary consumption and towards this new framework of corporeal citizenship.

In our reading of the work of material feminist theorists, we focus on insights relating to the interface, or boundary, between humans and the environment. Responding to what they view as an erasure of active materiality in both realist and constructivist approaches, material feminists

theorize physical materiality in order to 'rematerialize the social' (Tuana 2008, p. 188). They argue that to do otherwise – that is, to uphold firm distinctions between subject/object, human/not-human (i.e. the environment), culture/nature etc. – is to think and work within a frame that situates the physical world outside of human and social interactions (Alaimo 2008). This is crucial because to turn a blind eye to the materiality of bodies and their interactions with the environment limits the kinds of political and ethical interventions that can be made. For example, if the environment is viewed solely as outside of bodies, responses to everyday toxics would include individual efforts to keep toxics 'out', as per precautionary consumption. Instead, material feminists adopt an ontological frame in which entities do not pre-exist their relationality: both humans and non-humans, subjects and objects, and social and physical entities, mutually co-constitute each other. Tuana (2008) refers to this as *interactionism*, Alaimo (2008) uses the term *trans-corporeality*, and Barad (2003) theorizes the *intra-actions* between entities.

Foregrounding the corporeality and sociality of both human and non-human entities (i.e. the fleshiness of humans and the sociality of nature) and viewing both as mutually constituting means that boundaries assumed to be natural and self-evident begin to blur. For example, the notion of a 'toxic trespass' is intended to invoke the breach of a bodily boundary by a synthetic chemical (Cranor 2007). A metaphor commonly employed by scientists to describe how endocrine disruptors mimic hormones in the body is that of the *messenger* – 'moving through the body, picking up "packages" from the "outside", delivering them to receptive agents [on the "inside"], igniting and transforming productive processes…' (Scott 2012, p. 67). It is an image that not only reinforces the understanding that bodies are in dynamic relationships of exchange with environments, and constantly in flux, but it also highlights the idea of agency for non-human actors. As Max Liboiron says, these synthetic chemicals actually '*participate in* the body's endocrine, or hormone, system…' (2014, p. 140, our emphasis).

The very presence, and specific concentrations, of endocrine disruptors like BFR and phthalate molecules in the environment is also influenced by social dynamics and technology, and by economic and political forces favouring the industries that produce and emit them. Thus, political and social factors have a direct role in the material (i.e. chemical) composition of the environment, and accordingly, our material bodies. Tuana (2008) captures this blurring of boundaries with her notion of *viscous porosity*. Demonstrating the ongoing, continual exchange between material bodies and the environment, Tuana describes the movement of chemicals from large PVC producing plants in New Orleans into the bodies of workers and residents, transforming their bodily flesh. As the phthalates are released

into air, or leach from PVC plumbing into water, they make their way across membranes and into bodies, tissues, and cells where they bind to receptors and activate metabolic processes, mimicking the body's own hormones. In this way, synthetic chemicals generate material changes in bodies as physiological responses are triggered by their actions (making proteins, for example). Tuana (2008, p. 198–203) refers to this as 'plastic flesh': these synthetic chemicals come to be a part of the body's physiology. This would also be true for BFRs which enter bodies through inadvertent ingestion and are ultimately stored in fatty tissues. In fact, even more so than phthalates, because of their high rates of bioaccumulation, BFRs can be thought to create a fleshy material archive of one's social location, practices, and movements. Not only are bodies embedded in social contexts and structures, but the social is also embedded, literally, in material bodies.

As we have hinted at already, when the integrity of boundaries between human and non-human corporeality destabilizes and those boundaries are viewed as present, but permeable and viscously porous, conventional understandings of human *agency* and non-human *passivity* come into question. Liberal theory takes the individual human as having agency, while the non-human (i.e. environment) is non-agentic; the latter is thought to passively follow 'natural laws' or be acted upon by humans (Alaimo 2008). However, material feminists demonstrate that matter is not inert and that human corporeality continuously interacts with the materiality of the environment, what Alaimo (2008) refers to as *trans-corporeality*. Thus agency is not exclusive to humans, but must also be applied to the intra-active and reactive, responsive materiality of environments.

Critically, Tuana argues that although boundaries are not self-evident – but are rather semi-permeable and established and stabilized through social and natural interactions – we must nevertheless *take responsibility* for how they are maintained. This notion is useful for countering the sense of defeatism that can result from the ubiquity of toxics in the environment and our bodies – the 'seeming paradoxes of our autonomy as embodied beings who participate in creating ourselves and our world, but control neither' (Nedelsky 2011, p. 285). A radical unpredictability is introduced by the recognition of 'active materiality' that profoundly undermines the notion that as humans, we can exercise perfect control over the movement of toxics through our world. However, as Nedelsky urges, 'we can be responsible and creative even when we have very little control' (291). This in fact is a key aim of the material feminists: to open up creative space for new avenues of political and ethical engagement with respect to toxics and environmental justice. What kinds of ethical and political engagements might be possible, and necessary, if one takes trans-corporeality seriously?

Bringing together the work of material feminists with environmental political theory, Gabrielson and Parady (2010) offer the concept of *corporeal citizenship* as a way to address what they view as the limitations of 'green citizenship' approaches. These authors argue that green citizenship theories are based on notions of autonomous human subjects who have the knowledge and the ability to participate in appropriate 'green' activities. According to Gabrielson and Parady (2010), this approach necessarily excludes some people from being able to engage fully as citizens in environmental action as a consequence of unequal social locations. In other words, only those who are in a position to know what a 'good green life' entails can fully participate. People who are marginalized based on social modalities of difference will most likely be excluded from full participation and thus will be further marginalized. MacKendrick (2014, p. 721), detailing the toxics-avoidance techniques undertaken by pregnant women and new mothers in Toronto, underscored this worry, demonstrating how 'precautionary consumption belongs to a classed performance of good motherhood'.

Gabrielson and Parady (2010) argue that attending to the interplay between bodies and the environment foregrounds the diverse materiality of bodies and the ways in which various social modalities (e.g. gender, class, ethnicity, ability etc.) have shaped bodies differently. Attending to corporeality also means recognizing that the material environment shapes and influences self-understanding (Gabrielson and Parady 2010). A framework based on the notion of corporeal citizenship takes the natural world and environment as part of the political domain and recognizes its transcorporeality with human political citizens (see also Sandilands 1999). If people are inextricably entwined with the environment as corporeal citizenship suggests, the state's responsibility to manage and protect the health of its population is inseparable from its responsibility to care for the health of the environment. Moreover, the sphere of ethical and political responsibility of 'individual' citizens expands to include not only caring for oneself, but also the wider social community and environment.

Corporeal citizenship builds on, and is in conversation with, scholarship on ecological, environmental, or green citizenship, which aims to bring together civic or public engagement with environmental theory and activism (MacGregor 2006, Gabrielson 2008, Hobson 2013). While the concept of ecological citizenship is contested and evolving, it tends to go in either of two directions: towards the promotion of civic virtue through collective challenge of neoliberal, individualizing governance structures, or towards empowering the 'responsible consumer' who is called upon to shop her way out environmental problems. As Gabrielson and Parady (2010) argue, however, both strands of scholarship have been largely homogenizing, not attending adequately to social and cultural differences, and not accounting

for people's varying capacities to engage in 'green activities'. Others have criticized ecological theory for its failure to account for inequities and marginalization (e.g. Latta 2007) and for 'emptying out' collective action (Machin 2012). Moreover, ecological citizenship theories that situate the individual person as 'polluter' and aim to impose responsibilities on people to effectively 'pollute less' or have smaller ecological footprints (e.g. Dobson and Sáiz 2005) cannot adequately address how we are to act against being 'polluted' ourselves. Corporeal citizenship, in contrast, turns attention to thinking about the environment *through the body*, emphasizing difference, with the ultimate aim of collective action and decision-making (Machin 2012).

Corporeal citizenship is also in conversation with feminist ecological and political theories. Feminist re-theorizing of citizenship since the 1990s has worked to undermine the division between the public and private. In 're-gendering' the public sphere, this work has demonstrated the centrality of care and reproduction to civic life. Sherilyn MacGregor's work on feminist ecological citizenship seeks to cultivate a 'positive political identity' that does not limit women's actions 'to the private sphere of care and maternal virtue' (2006, p. 6, 2014). Instead, she urges us to *politicize* our capacity for care and to strive towards an 'ideal of coming together as equals to produce a common world beyond private human identities, interests and needs' (2014, p. 630). In the next section, we demonstrate how a corporeal citizenship approach can take up this call.

Antitoxics activism in the frame of corporeal citizenship

As a framework for guiding environmental engagement and activism, how does a corporeal citizenship approach differ from precautionary consumption? What does it offer that a framework of precautionary consumption cannot? How would adopting a corporeal citizenship approach change campaigns by environmental organizations related to everyday toxics? In addition to theoretical differences concerning conceptualizations of human/environment, boundaries and agency discussed thus far, we suggest that corporeal citizenship offers a number of strategic advantages that are absent under models based on precautionary consumption. To begin, while precautionary consumption is consistent with contemporary neoliberal discourses and strands of green citizenship aimed at 'responsibilizing' the individual consumer, corporeal citizenship does not require validation of the capitalist market economy. When people exercise precautionary consumption, they are required to engage as consumers; that is, by buying particular kinds of products and not others.[4] In doing so, they validate corporate marketing strategies that appropriate people's desires to be environmentally conscious and toxic-free for the goal of generating profit. It is

possible that there is a theory of 'market signals' that underlies these practices and/or campaigns (i.e. the idea that our consumer choices send signals to corporations about what kinds of toxics we want them to avoid, which will eventually result in cleaner products for everyone) but since these are neither explicit nor consistently articulated as part of the campaigns, precautionary consumers tend to enter a 'boundary-making mode' rather than a politicized mode of collective engagement towards broader system change.

Second, we suggest that if agency is located within assemblages of socio-environmental exchange, addressing the health and environmental concerns of everyday toxic exposures requires attending to how one intra-acts with the environment and other corporeal citizens. The locus of responsibility and action expands from the individual to the collective. For example, Washburn demonstrates that through 'being biomonitored', individuals come to see themselves 'as bearing varying degrees of responsibility for their own past, present, and future exposures' (2014, p. 341). In the frame of precautionary consumption, this is a process through which, Washburn acknowledges, 'individuals enter into new relations *with themselves*, such that measured quantities of environmental chemicals and/or their metabolites become the basis for feelings of regret, relief, and anxiety, as well as personalized strategies for exposure management' (341: our emphasis). This is decidedly not a process through which individuals enter into new relations with the broader set of actors that constitute their communities, ecosystems or the economy. A corporeal citizen, on the other hand, must not only consider how the use of phthalate-containing materials might affect her own body (and the bodies of her family members), but also how lifestyles that have come to depend on phthalate-containing items (e.g. for convenience, for social standing etc.) in turn rely on the production and release of phthalates that constitute our shared toxic environment. This high phthalate-containing environment then acts on the corporeal bodies of the workers who produce the chemical, and on the 'downwinders' – the residents who live in close proximity to the manufacturing plants. Those workers and residents are likely, according to environmental justice scholarship and activism, to belong to already marginalized communities. Under corporeal citizenship, the expanded sphere of ethical and political responsibility of the ecological citizen includes a responsibility to take account of the health of these workers and of the downwinders.

Third, and most importantly, a shift to corporeal citizenship refigures the sense of 'control' sought by ecological citizens. Assigning agency to the non-human materiality of environments disrupts the notion that, as human subjects, we can exercise full control over the interactions between our environments and our bodies. This is the boundary control that

precautionary consumers crave: As one of MacKendrick and Stevens' respondents stated: 'I feel that I can control what goes into my body. I know we're surrounded by chemicals and pollutants and all that, but I control what goes into my body by the food I choose to eat, the products I buy' (2016, p. 323). In seeking this perfect control over exposures, MacKendrick and Stevens' found that precautionary consumers faced with the ineffectiveness of their attempts retreat to a 'contingent boundary'; that is, '[o]nce they recognize that their commodity-based boundary is unstable and porous, they intentionally ignore information about contamination to maintain a sense of normalcy' (327). The kind of control we must seek as corporeal citizens is different: instead of judging our inability to achieve control over exposures as fault and failure, we must concede and relinquish the quest for perfect control of a false boundary, and instead seek to consciously expand our sphere of responsibility, beyond our roles as individual consumers. We must seek to be more broadly and creatively *responsible* for chemical production and pollution, in the face of very little control.

Conclusion

Attending to these broader socio-environmental considerations brings into sharper focus the need for people to act collectively to advocate for change at the level of regulations governing the production of toxics. In addition, considering one's reliance on BFR and phthalate-containing items also requires self-reflective consideration of one's own participation in producing the social and economic conditions that enable these chemical industries to thrive. Rather than a narrow focus on 'downstream' actions of individual consumption, a corporeal citizenship approach involves 'upstream' collective engagement to agitate for changes in policy and legislation.

Many of these consumer-based campaigns launched by advocacy organizations are reacting to the broader trends of responsibilization promoted by neoliberal influences on current environmental governance. Where governance may have previously 'related more strongly to obligations, duties, solidarity, and citizenship', it is now oriented towards 'consumption, responsible choices, and lifestyle' (Soneryd and Uggla 2015, p. 917). And yet, as the literature on green governmentality points out, we must ask ourselves 'what sorts of environmental citizens are being worked up, through what means, and to what ends'? (Hobson 2013, p. 57) The dominant subject position of the responsible, precautionary or green consumer must be challenged by our anti-toxics organizing, and replaced by a corporeal citizenship framework that can re-invigorate the political and collective aspects of environmentalism. This means campaigns that engage

people in open and public debate about how best to approach the required regulatory changes and their distributional effects and collective reevaluation of our need for and dependence on these chemicals.

Notes

1. See for example, petitions by the Canadian Environmental Law Association, and submissions to the 2016 Parliamentary Review of the *Canadian Environmental Protection Act, 1999*.
2. Polybrominated Diphenyl Ethers Regulations, 2008, SOR/2008-218.
3. *Prohibition of Certain Toxic Substances Regulations, 2012*, SOR/2012-285.
4. Remarkably, it is almost never about buying *less*. As MacGregor has noted, 'ordinary people in advanced consumer societies accept simultaneously the green cause and the non-negotiable right to over-consume' (2016:3).

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References

Abelkop, A. and Graham, J., 2015. Regulation of chemical risks: lessons for TSCA reform from Canada and the European Union. *Pace Environmental Law Review*, 32 (1), 108–224.

Alaee, M., *et al*., 2003. An overview of commercially used brominated flame retardants, their applications, their use patterns in different countries/regions and possible modes of release. *Environment International*, 29 (6), 683–689. doi:10.1016/S0160-4120(03)00121-1

Alaimo, S., 2008. Trans-corporeal feminisms and the ethical space of nature. *In*: S. Alaimo and S. Hekman, eds. *Material feminism*. Bloomington: Indiana University Press, 237–264.

Alaimo, S., 2010. *Bodily natures: science, environment, and the material self*. Bloomington: Indiana University Press.

Allen, J.G., *et al*., 2007. Personal Exposure to Polybrominated Diphenyl Ethers (PBDEs) in residential indoor air. *Environmental Science & Technology*, 41 (13), 4574–4579. doi:10.1021/es0703170

Altintas, E., 2009. FAMNET state of the art report: division of labour. *EqualSoc*.

Altman, R.G., *et al*., 2008. Pollution comes home and gets personal: women's experience of household chemical exposure. *Journal of Health and Social Behavior*, 49 (4), 417–435. doi:10.1177/002214650804900404

Babycenter.ca, 2016. *Phthalates: What you need to know* [online]. Available from: http://www.babycenter.ca/baby/safety/phthalates/ [Accessed 8 September 2016].

Barad, K., 2003. Posthumanist performativity: towards an understanding of how matter comes to matter. *Signs*, 28 (3), 801–831. doi:10.1086/345321

Betts, K.S., 2008. Unwelcome guest: PBDEs in indoor dust. *Environmental Health Perspectives*, 116 (5), A202–A208. doi:10.1289/ehp.116-a202

Birnbaum, L.S. and Staskal, D.F., 2004. Brominated flame retardants: cause for concern? *Environmental Health Perspectives*, 112 (1), 9–17. doi:10.1289/ehp.6559

Buckingham, S., Reeves, D., and Batchelor, A., 2005. Wasting women: the environmental justice of including women in municipal waste management. *Local Environment*, 10 (4), 427–444. doi:10.1080/13549830500160974

Callahan, P. and Roe, S., 2012. Fear fans flames for chemical makers. *Chicago Tribune*, 6 May.

Clark, K., Cousins, I., and Mackay, D., 2003. Assessment of critical exposure pathways. *In*: C.A. Staples, ed. *The handbook of environmental chemistry, vol. III, part Q*. Berlin: Springer, 22–262.

Colacino, J.A., Harris, T.R., and Schecter, A., 2010. Dietary intake is associated with phthalate body burden in a nationally representative sample. *Environmental Health Perspectives*, 118, 998–1003. doi:10.1289/ehp.0901712

Collins, L. and McLeod-Kilmurray, H., 2014. *The Canadian law of toxic torts*. Toronto: Carswell.

Cossman, B. and Fudge, J., eds. 2002. *Privatization, law, and the challenge to feminism*. 1st ed. Toronto, ON: University of Toronto Press.

Cranor, C. 2007. *Toxic torts: science, law and the possibility of justice*. Cambridge: Cambridge University Press.

Dobson, A. and Sáiz, A.V., 2005. Introduction. *Environmental Politics*, 14 (2), 157–162.

Eco-novice.com, 2011. *Eco-novice: going green gradually: avoiding phthalates in deodorant and everywhere else* [online]. Available from: http://www.eco-novice.com/2011/06/avoiding-phthalates-in-deodorant-and.html [Accessed 8 September 2016].

Endocrine Disruption Action Group, 2016. Toxic by design. *Flame retardant chemicals, standards, and built-in exposures, a white paper by the endocrine disruption action group* [online]. Available from: https://endocrinedisruptorsaction.org/ [Accessed 8 September 2016].

Environmental Defence, 2013. *PRE-POLLUTED: A report on the toxic substances in the umbilical cord blood of Canadian newborns*. Toronto, ON: Environmental Defence.

Environmental Health Fund, 2012. *Programs: safer substitutes to brominated flame retardants*. Available from: http://environmentalhealthfund.org/programs.brominated.php [Accessed 1 August 2012].

Fox, B., 2006. Motherhood as a class act: the many ways in which "Intensive mothering" is entangled with social class. *In*: M. Luxton and K. Bezanson, eds. *Social reproduction: feminist political economy challenges neo -liberalism*. Montreal: McGill-Queen's University Press.

Gabrielson, T., 2008. Green citizenship: a review and critique. *Citizenship Studies*, 12 (4), 429–446.

Gabrielson, T. and Parady, K., 2010. Corporeal citizenship: rethinking green citizenship through the body. *Environmental Politics*, 19 (3), 374–391. doi:10.1080/09644011003690799

Greenpeace, 2010. Why BFRs and PVC should be phased out of electronic devices. *Greenpeace International* [online]. Available from: http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/what-s-in-electronic-devices/bfr-pvc-toxic/ [Accessed June 2011].

Hauser, R. and Calafat, A.M., 2005. Phthalates and human health. *Occupational and Environmental Medicine*, 62 (11), 806–818. doi:10.1136/oem.2004.017590

Hays, S., 1996. *The cultural contradictions of motherhood*. New Haven, CT: Yale University Press.

Hobson, K., 2013. On the making of the environmental citizen. *Environmental Politics*, 52 (1), 56–72. doi:10.1080/09644016.2013.755388

Huwe, J.K. and Larson, G.L., 2008. Polychlorinated dioxins, furans, and biphenyls, and polybrominated diphenyl ethers in a U.S. meat market basket and estimates of dietary intake. *Environmental Science & Technology*, 39 (15), 5606–5611. doi:10.1021/es050638g

Johnson-Restrepo, B. and Kannan, K., 2009. An assessment of sources and pathways of human exposure to polybrominated diphenyl ethers in the United States. *Chemosphere*, 76 (4), 542–548. doi:10.1016/j.chemosphere.2009.02.068

Kohn, M.C., *et al*., 2000. Human exposure estimates for phthalates. *Environmental Health Perspectives*, 108 (10), a440–a442. doi:10.1289/ehp.108-a440b

Latta, P.A., 2007. Locating democratic politics in ecological citizenship. *Environmental Politics*, 16 (3), 377–393.

Lee, R. and Scott, D.N., 2014. (Not) shopping our way to safety. Guest column. *The Canadian Women's Health Network*, April 30.

Liboiron, M., 2014. Plasticizers. A twenty-first-century miasma. *In*: J. Gabrys, G. Hawkins, and M. Michael, eds. *Accumulation: the material politics of plastic*. London: Routledge.

Lindsay, C., 2008. *Are women spending more time* on *unpaid domestic work than men in Canada?* (Catalogue no. 89-630-X). Ottawa, ON: Statistics Canada.

Luxton, M., 1980. *More than a labour of love: three decades of women's work in the home. Toronto*: *Women's Press*.

Luxton, M. and Bezanson, K., 2006. *Social reproduction: feminist political economy challenges neo-liberalism*. Montreal, QC: McGill-Queen's University Press.

Machin, A., 2012. Decisions, disagreement and responsibility: towards an agonistic green citizenship. *Environmental Politics*, 21 (6), 847–863.

MacGregor, S., 2006. *Beyond mothering earth: ecological citizenship and the politics of care*. Vancouver: UBC Press.

MacGregor, S., 2014. Only resist: feminist ecological citizenship and the post-politics of climate change. *Hypatia*, 29 (3), 617–633. doi:10.1111/hypa.2014.29.issue-3

MacGregor, S., 2016. Citizenship: radical, feminist and green. *In*: T. Gabrielson, C. Hall, J.M. Meyer, and D. Schlosberg, eds. *Oxford handbook of environmental political theory*, Oxford: Oxford University Press.

MacKendrick, N., 2015. Protecting ourselves from chemicals: a study of gender and precautionary consumption. *In*: D.N. Scott, ed. *Our chemical selves: gender, toxics, and environmental health*. Vancouver: UBC Press, 58–77.

MacKendrick, N. and Stevens, L.M., 2016. 'Taking Back a Little Bit of Control': managing the contaminated body through consumption. *Sociological Forum*, 31 (2), 310–329.

MacKendrick, N.M., 2010. Media framing of body burdens: precautionary consumption and the individualization of risk. *Sociological Inquiry*, 80 (1), 126–149. doi:10.1111/j.1475-682X.2009.00319.x

MacKendrick, N.M., 2014. More work for mother: chemical body burdens as a maternal responsibility. *Gender & Society*, 28 (5), 705–728. doi:10.1177/0891243214529842

Nedelsky, J., 2011. Law's relations. *In*: *A relational theory of self, autonomy and law*. Oxford: OUP.

Oates, C.J. and McDonald, S., 2006. Recycling and the domestic division of labour. *Sociology*, 40 (3) (June 1), 417–433. doi:10.1177/0038038506063667

OECD, 2014. *Gender, institutions and development database*. Paris: OECD Publishing.

Rider, C.V., *et al*., 2010. Cumulative effects of in utero administration of mixtures of reproductive toxicants that disrupt common target tissues via diverse mechanisms of toxicity. *International Journal of Andrology*, 33 (2) (April 1), 443–462. doi:10.1111/(ISSN)1365-2605

Rose, M., *et al*., 2010. PBDEs in 2-5 year old children from California and associations with diet and indoor environment. *Environmental Science & Technology*, 44 (7), 2648–2653. doi:10.1021/es903240g

San Antonio Statement, 2010. *Environmental Health Perspectives*, 118 (12), A516–A518. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3002202/ [Accessed 17 September 2016].

Sandilands, C., 1993. On 'green' consumerism. Environmental privatization and 'family values'. *Canadian Woman Studies*, 13 (3), 45–47.

Sandilands, C., 1999. *The good natured feminist. Ecofeminism and the quest for democracy*. Minneapolis: University of Minnesota Press.

Schettler, T., 2006. Human exposure to phthalates via consumer products. *International Journal of Andrology*, 29 (1), 134–139. doi:10.1111/ija.2006.29.issue-1

Scott, D.N., 2015. Conclusion: thinking about thresholds - Literal and figurative. In: D.N. Scott, ed. *Our chemical selves: gender, toxics and environmental health*. Vancouver: UBC Press, 387–393.

Scott, D.N., 2016. 'We Are the Monitors Now': experiential knowledge, transcorporeality and environmental justice. *Social & Legal Studies*, 25 (3), 261–287. doi:10.1177/0964663915601166

Scott, D.N., 2009. Testing toxicity: proof and precaution in canada's chemicals management plan. *Review of European Community and International*

Environmental Law (RECIEL), 18 (1), 59–76. doi:10.1111/j.1467-9388.2009.00621.x

Scott, D.N., 2012. Pollution and the body boundary: exploring scale, gender and remedy. *In*: J. Richardson and E. Rackley, eds. *Feminist perspectives on tort law*. London: Routledge, 55–79.

Shildrick, M., 1997. *Leaky bodies and boundaries: feminism, postmodernism and (bio)ethics*. London: Routledge.

Soneryd, L. and Uggla, Y., 2015. Green governmentality and responsibilization: new forms of governance and responses to 'consumer responsibility'. *Environmental Politics*, 24 (6), 913–931. doi:10.1080/09644016.2015.1055885

Sullivan, O., 2000. The division of domestic labour: twenty years of change? *Sociology*, 34 (3), 437–456. doi:10.1177/S0038038500000286

Szasz, A., 2007. *Shopping our way to safety: how we changed from protecting the environment to protecting ourselves*. Minneapolis: University of Minnesota Press.

Trasande, L., *et al.*, 2013. Race/ethnicity-specific associations of urinary phthalates with childhood body mass in a nationally representative sample. *Environmental Health Perspectives*, 121 (4), 501–506: doi:10.1289/ehp.1205526

Tuana, N., 2008. Viscous porosity: witnessing katrina. In: S. Alaimo and S. Hekman, eds. *Material feminisms*. Bloomington: Indiana University Press, 188–213.

Velez, M.P., *et al.*, 2015. The impact of phthalates on women's reproductive health. In: D.N. Scott, ed. *Our chemical selves: gender, toxics, and environmental health*. Vancouver: UBC Press, 31–252.

Walsh, B., 2010. The perils of plastic - environmental toxins. *Time*, 1 April. Available from: http://www.time.com/time/specials/packages/article/0,28804,1976909_1976908_1976938,00.html.Wannabetoxicfree.org.

Washburn, R., 2014. Measuring personal chemical exposures through biomonitoring: the experiences of research participants. *Qualitative Health Research*, 24 (3), 329–344. doi:10.1177/1049732314521899

WHO/UNEP, 2013. *State of the science of endocrine disrupting chemicals - 2012*. Geneva: WHO.

Windham, G.C., *et al.*, 2010. Body burdens of brominated flame retardants and other persistent organohalogenated compounds and their descriptors in U.S. girls. *Environmental Research*, 110, 251–257.

Wittassek, M., *et al.*, 2011. Assessing exposure to phthalates – the human biomonitoring approach. *Molecular Nutrition and Food Research*, 55 (1), 7–31.

Wu, N., *et al.*, 2007. Human exposure to PBDEs: associations of PBDE body burdens with food consumption and house dust concentrations. *Environmental Science & Technology*, 41 (5), 1584–1589. doi:10.1021/es0620282

Zhou, S.N., *et al.*, 2014. Measurements of selected brominated flame retardants in nursing women: implications for human exposure. *Environmental Science Technology*, 48 (15), 8873–8880. doi:10.1021/es5016839

Zota, A.R., Adamkiewicz, G., and Morello-Frosch, R.A., 2010a. Are PBDEs an environmental equity concern? Exposure disparities by socioeconomic status. *Environmental Science & Technology*, 44 (15), 5691–5692. doi:10.1021/es101723d

Zota, A.R., *et al.*, 2010b. Self-reported chemicals exposure, beliefs about disease causation, and risk of breast cancer in the cape cod breast cancer and environment study: a case-control study. *Environmental Health*, 9 (1), 16pp. doi:10.1186/1476-069X-9-40