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Gloves, embryos, and DDT: thinking with surfaces on toxicity in South Africa

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In the early 1980s, researchers at Tygerberg Hospital in Cape Town, South Africa were confounded by the persistent failure of their experimental mice embryos. The researchers had hoped to develop the first successful in vitro fertilization (IVF) programme in Africa. Yet, attempt after attempt, the mice embryos died. One researcher recounted to me later that he reviewed other protocols and realized that technicians in successful experiments had not been wearing lab gloves. In effort to make them easier to put on and take off, many gloves used talcum powder or corn starch powder, both of which were toxic to developing embryos. "We removed the gloves, and the embryos grew," the researcher told me. In 1984, Falcon de Vos was born[1]. What is meant as protective cladding, assuring the purity of genetic material, can in fact prove toxic.

All of us have some levels of toxicants in our systems (Murphy, 2017). Yet the degree of exposure, the compounding of toxicants, and the impact of those toxicants varies greatly. These toxicants are both produced by and maintain the political and social hierarchies that structure life (Agard-Jones, 2013). Some bodies are rendered more porous, more precarious, more exposed, than others. Some bodies are thus more ensconced by privilege metered out along lines of class, race, gender, and sexuality.

Indeed, recent scholarship on toxicity has been driven by a growing concern with permeable and absorptive bodies. Harris Solomon's work on metabolic illness in India demonstrates how porous bodies interact differentially with the world around them and thus, "demand a detailed look at the situated, absorptive interface of bodies and surroundings" (2016:9). This indexes a conceptual shift within the biological sciences to thresholds and hybrid zones of interactions. Solomon asks, "What is the body and what is environment? Where does one end and the other begin?" (2016: 9). Donna Haraway (1991), in a famous essay introducing the figure of the cyborg, asked a similar question: "Why should our bodies end at our skin?" (178).

I might be taking Haraway's question too literally, but in thinking about the porosity of bodies and environments, and the absorptive interfaces

between the “inside” and “outside,” I kept returning to the surface of skin. Skin has historically been viewed as the demarcation of a modern individual body, though as a border it remarkably lacks in solidity. It absorbs environments and oozes interiors; it slowly sloughs off into our surroundings (hello dusty bedroom!). If we view skin as a kind of surface, it becomes a kind of cladding that conceals hidden depths of meaning.

Skin is also deeply political. Skin was (and remains) the surface from which social standing was read in South Africa, where race dictated access to citizenship, space, and employment, particularly during the apartheid period. The vast majority of South African land, including the urban centres where fertility clinics are located, was designated for the sustenance of white life. Inspired by literary scholars who have explored the potential of surfaces for generative political reconfigurations in South Africa (see Nuttall 2013), I want to focus on the surface—the aesthetics, affects, and expressiveness of postcolonial life—in scenes of toxicity. Here I describe two seemingly disparate spaces within South Africa: elite, urban fertility clinics and homes in rural Limpopo. Can we learn about toxicity and porous bodies via different scales and spaces? That is not only of widespread exposure in precarious communities, but also microscopic navigations in elite fertility clinics?

Beautiful and porous embryos:

IVF labs are designed with two sets of bodies in mind: the bodies of lab technicians and the bodies of embryos. However, embryos require very different environments than the people that attend to them. As bodies, embryos[2] can and do absorb their environments. Thus, the lab air is filtered and pressurised to prevent outside air from coming in. The space is heated to around 27 degrees Celsius, which can feel rather uncomfortable for the human body (that is, at least mine). The lights are dimmed in an attempt to mimic the *in vivo* environment. And, as lab staff explained to me, even with these climate control conditions, embryos should not be exposed to lab air for more than a handful of minutes. Embryos should ideally remain in special incubators, where factors such as light, temperature, and levels of oxygen and CO2 are controlled.

Yet, lab technicians must balance these measures to control environmental factors with the need to observe the embryos. That is, attending to embryos means protecting them from toxicity, but attention to embryos—observing, assessing, and recording their development—also puts them at risk, opening them up to what Solomon refers to as “windows of exposure” (2016: 231). The need to monitor embryo development has become increasingly critical in light of the growing recognition that multiple embryos increase one’s chances for multiple gestations—twins or triplets—which is risky for foetuses and the pregnant person. As a result,

embryology research has focused on developing methods and techniques to discern the “best” embryo among a given cohort, in order to increase the success rate of transferring only one. Thus, embryologists must monitor embryo development daily, a process that potentially puts embryos at risk in the lab.

Among the methods, the most common is morphology, the study of the embryo form or structure; or colloquially, how the embryo looks under a microscope. Embryos are often described as “ugly” or “beautiful”. A visiting international embryologist who visited the fertility clinic to present on grading methods referred to “Hollywood embryos,” comparing them to participants in a beauty pageant. Despite the search for other techniques that are more than just “skin deep,” morphology remains the most economically accessible and common assessment method. New methods, ones that would reduce or remove those “windows,” increase costs. For example, the combination microscope-incubator hybrid keeps embryos entirely within protected conditions during their five to six day *in vitro* period and allows embryologists to observe the changes in morphology via time-lapse photography. Such methods were part of “premium” packages offered to some patients I observed, which came with a time-lapse video of the transferred embryo. Using the videos, embryologist can mark development in the inner cell mass of embryos, particularly the trophectoderm, or outer “shell,” which has the most significance for predicting “good” or “beautiful” embryos to transfer.

Spraying permeable walls

Now I turn to a very different border: not an embryo “shell” shielding the inner mass, but a river, the Limpopo, demarcating a national border. Saying that a mosquito crosses a border almost sounds nonsensical. There is no border for mosquitos, nor for the malaria virus they carry. Yet there are borders for people. Dichlorodiphenyltrichloroethane, more commonly known as DDT, was the first synthetically developed insecticide. Yet, since its development, DDT has become almost synonymous with potential toxicity for both human and non-human forms of life. As a result, DDT has been banned, except for in cases of public health, such as malaria control.

Following an outbreak of malaria in the summer of 1999/2000, DDT was re-introduced for annual indoor-residual spray in South Africa. Workers spray the roofs and indoor walls of unpainted brick, cement, and mud dwellings in at-risk areas. The Department of Health found the number of malaria cases dropped from around 65,000 in 2000 to 7,750 in 2005. Indoor DDT spraying is the cornerstone of the South African’s government’s target to completely eradicate malaria in the country. However, the question of DDT’s continued usage in malarial vector

control is a controversial one. Researchers have found that DDT and its metabolites (DDE, an endocrine disruptor) remain in the atmosphere for more than 15 years, leaching into soils and skin, entering lungs, and contaminating food (Aneck-Hahn et al., 2006). Exposure has been linked to breast cancers and reduced sperm counts and quality. Yet, DDT is both cheap and effective at controlling malaria, thus appealing to governments. While some state officials have acknowledged the potential risks from DTT, many argue that the risks of malaria are greater (Bouwman et al., 2011).

Value and temporality

Debates on DDT usage for public health programmes bring toxic exposure, structural vulnerabilities, and value into a similar calculative assemblage as embryologists: the need to protect bodies from exposure, but exposure viewed as necessary to mitigate other health concerns. In both cases, surfacing viewed as protective—latex gloves and DDT, both emerging out of similar post-World War 2 histories of shifting military-industrial production—have toxic effects on reproduction. Seeming “thriftiness”—keeping costs down for patients, or for the tax-payer via the state—also induces greater exposure.

The scales—of populations, space, and time—are vastly different. Fertility clinics operate in economies of scarcity and via ideologies of reproductive rights that take the individual and their choices (structured by ability to pay) as the locus of concern. On the other end of the spectrum, DDT spraying makes sense in the logic of population health priorities, where malaria is tenacious in its immediacy and lethality and costs are always a concern. Reproductive disruptions at the scale of population, though highest in sub-Saharan Africa, does not invite the same attention. Part of the difference in attention is also a question of time. The impact of “chemical infrastructures” in bodies can take years and generations to register, as Murphy (2013) notices, describing the mild drudging of soil in the St Claire waterways that unearths latent chemicals: a brief scratch and the histories of chemical infrastructures come bubbling to the surface. Depths index an extended duration, the sedimentation of history, or using the expression that Murphy introduces, latency that signals a lag, a slowness. Thus, Murphy argues, we must think of chemical violence through intergenerational time. In the language of epigenetics, Murphy is describing transgenerational inheritance, “the heritable transmission of environmentally induced phenotypes” (Skinner & Guerrero-Bosagna, 2009). DDT, endocrine disruptors, and other toxicants are known to induce transgenerational effects, including male fertility disruptions, that may result in disease expression in the grandchildren of those presently exposed.

Surfacing relations

DDT is not only ugly and violent in its durational effects on well-being, both human and non-human; indoor DDT spray is also read as aesthetically and immediately ugly on the walls of Limpopo residents — many respond by plastering over the unsightly patch it leaves (Bate, 2000). I read this response to the aesthetics as a form of “slow activism” (Liboiron et al, 2018), a way of acting in South Africa’s polluted world that reasserts dignity in the face of top-down, public health programs. “Slow activism does not literally mean actions are sluggish (though they can be), but that but that the effects of action are slow to appear or to trace,” the authors describe (2018: 341). “[It] does not have to premised on an anticipated result. It can just be good.”

In fertility clinics, the development or attrition of embryos takes days, six at most, and protocols dictate exposure of no more than two minutes. Minimizing exposure requires both aesthetic adjustments and careful responsive care. Embryologists attend to constantly checking levels of CO2 and temperature, moving quickly in tight spaces, or readjusting lab spatial layout to minimize the distances between microscopes and incubators, incubators and human bodies. Attending to toxicity means reckoning with the radically different surfaces and temporalities: the slow absorption of DDT into skins, the volatile toxicity of lab gloves, surface readings of embryonic development and attrition, and the generational endurance of necropolitical (Mbembe, 2003) arrangements of life. Can surfaces and skins offer a space for “reading” politics that compels a form of reflexive and responsive ethics to toxicity, rather than replicates the excavations and re-pathologizing of “damage-centred” research (see Murphy, 2017)?

The work of Fiona Ross and Nicholas Eppel’s (2016) *Thermal Optimum* offersone example of “surfacing.” This collaboration between an anthropologist and an artist explores scenes of care in a context where these forms of care are often leveraged under the auspices of biological benefits via the Western Cape’s First Thousand Days of Life policy: care grows brains; touch reduces stress for babies. The project employed heat sensor cameras, another artefact of military use, to capture family life in Cape Town. Ross and Eppel’s photos disrupt conventional forms of representation, markers of particularities such as race and class, and instead bring to the surface different aspects of the world—touch, heat, presence, intimacy, quality of a relationship. The work refuses a narrative structure, and rather, arranges the photos as aesthetic objects. This project offers a different kind of attention to surfaces that “confounds our all too simple binary logics—between interior and exterior, essence versus covering, a superficial surface and a fleshy invisible depth—while also gesturing toward the emergence of alternative, even illegible, forms of

representation and personhood" (McMillan, 2018: 3).

Chemical infrastructures affect us all, though clearly some more than others, in distributions that replicate the structuring of life "with capitalism and its racist colonial manifestations" (Murphy, 2017: 498). Thinking with surfaces may allow us to see the relations—immediate, visceral, and expressive—in two seemingly disparate scenes in post-apartheid South Africa.

Notes

[1] Falcon de Vos was named after the brand of petri dish used in IVF, which is manufactured by Corning, Inc., a multi-billion dollar US-based company that also produces the glass for iPhones.

[2] See also Elizabeth Robert's (2014) piece in Somatosphere on the history of the petri dish, culture medium and permeability of petri dishes and wombs. http://somatosphere.net/2014/petri-dish.html/

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