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(Micro)chimerism, Immunity and Temporality: Rethinking the Ecology of Life and Death

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ABSTRACT

The recent upsurge of interest in the co-articulation of biopolitical and bioethical entanglements underpin both a concern for the putatively temporal thresholds of human life and the very conception of a bounded humanity itself. Taking a step further, I want to suggest that micro(chimerism) as a very specific form of somatic multiplicity, read together with the contemporary rethinking of the concept of immunity, instantiates a fundamental disordering of linear temporality. And that in turn calls for a further reconceptualisation of conventional bioethics. I acknowledge the force of an existing postmodernist bioethics that has attended to the materiality and viscerality of the body and challenged the meaning of human being but, until recently, it has not addressed the bookends of life and death. Once the teleology of the life course is contested, however, death is no longer an insult to being, but merely one event constituting an ongoing vitalism. I propose an atemporal bioethics of coexistence rather than one of successive existence that is faced always with its own finitude.

KEYWORDS

Immunity; temporality;
transplantation;
microchimerism; Derrida

... biological discourses have not yet had adequate feminist intervention, have not yet been strongly enough disturbed by the questioning of feminist theory. And feminist theory has protected and insulated itself from any incursions into biology through the fear, indeed paranoia, surrounding the question of essentialism, though biology is one of the few disciplines able to adequately contest essentialism. (Grosz 2010, 50)

I preface this article with a quote from Elizabeth Grosz that highlights the reluctance of feminist scholars to engage with biology, and the potential of biology itself to subvert the very essentialism that it is assumed to represent. The somataphobia that she refers to has been a long-standing facet of feminist theory though nowhere near as universal as we might suppose. The claims of new materialism to refocus on the substance of the body – and of much else besides – diminishes a vibrant strand of feminist thought that has always taken the biological sciences seriously, albeit it as a minority interest. Yet given that feminist theory is committed to contesting the seemingly rigid hierarchies and oppositions of the Western logos, and anticipates that things could be otherwise, then an excursion into the biosciences may prove invaluable in grounding a range of

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philosophical, political and socio-cultural speculations and actions. The rethinking of biological orthodoxies, particularly with regard to the existence of a singular genetic profile of what counts as human, has come together with the co-articulation of biopolitical and bioethical entanglements that underpin both a concern for the putatively temporal thresholds of human life and the very notion of species boundaries. In the biosciences, the relatively recent emergence of bioscientific work on the human microbiome and on microchimerism, together with a concomitant upsurge of interest in the concept of immunity across political, philosophical and cultural spectrums, opens up a radical contestation of the dimensions and significance of human being.

In the humanities, the concept of the immunitary paradigm – originally prominent in the work of Jacques Derrida on autoimmunity and compellingly taken up by Roberto Esposito – has returned to its socio-judicial roots, while investigations in the biological sciences around a similar conundrum of what is at stake in the distinction between self and non-self, and what follows from the failure of distinction, have resulted in a new acknowledgment of the genetic diversity of all bodies. There are many implications to explore, but in this article I want to suggest that (micro)chimerism, as a very specific form of somatic multiplicity, that ties in with the contemporary rethinking of the concept of immunity, instantiates a fundamental disordering of linear temporality. And that in turn calls, amongst other things, for a further reconceptualisation of the conventional bookends of life and death, and suggests a new ecology of life. Once the teleology of the life course is contested, however, death is no longer an insult to being, but merely one event within a greater sphere of an enduring vitalism. The bioethics of such a conception has yet to be thought, and the speculations that I offer here are at best preliminary, but what can be anticipated is a move away from a thanatoethics, where death is always imminent, to a more affirmative mode that concerns itself with the persistence – even the un-timeliness – of dynamic expansiveness.

I will start by providing a very basic introduction of the concepts of chimerism and microchimerism as they have recently become prominent in the biological sciences and biopolitical thought. Classically, chimerism is understood as a combination of forms, either intraspecies or transspecies, that nevertheless retain genetic and usually morphological distinctions within a single body. Chimerism at the level of whole bodies represents the conventional use of the term, but it is nowhere near as ubiquitous as the unseen microchimerism that occurs at the cellular level and has limited impact on morphology. Strictly speaking microchimerism indicates that no more than 1 in 1000 cells is *genetically* distinct from the majority, but in some cases such cells may come to predominate in a particular organ as well as circulating in low numbers throughout the body. As Dupré remarks:

Chimeras do not necessarily experience any unusual symptoms, so the prevalence of full chimerism, chimerism derived from multiple zygotes, is not really known, and may be much higher than suspected. (2010, 22)

Unlike a hybrid, such as a mule, which is the genetically *assimilated* offspring of a horse and a donkey, a true chimera, such as a geep, maintains the unique signature of the distinct genetic components of the parent sheep and goat in a patchwork of cells. In other words, in a hybrid *each* cell consists in a combination of genes, while in a chimera each individual cell will contain genes from only one of the originating organisms. In short, the tissues of a chimera are populated by cells that are genetically distinct from each

other. In consequence, a mule – whose interspecies chromosomes cannot form the necessary pairs – is unable to breed,¹ while a female geep can theoretically give birth to either a lamb or a kid depending on which genes predominate in the reproductive gametes. The two categories, hybrid and chimera, both contest the separation of self/non-self and disrupt the expectation of genetic singularity. However, my concern here is with a rethinking of temporality, which is not directly troubled by the sterility of a hybrid, except insofar as it is a reproductive dead-end.

In conventional evolutionary terms, microchimerism is an ancient phenomenon widely detected in plants and invertebrates as well as many vertebrates and mammals including monkeys, cattle, dogs and humans. In human beings, a range of both iatrogenic and natural chimeric states exist, with biomedical interventions such as organ or stem cell transplantations constituting the former, while the latter includes the fusion of dizygotic twins *in utero* into one body or the more common incidence of foetal cell engraftment into the maternal body, and vice versa. Whatever the provenance, such transformations challenge ‘the traditional evolutionary dogma for the dominancy of genetically *homogenous* entities in nature’ (Rinkevich 2011, 1). Bioscientific explanations for the existence of chimerism and microchimerism are disputed. But this has transformative implications for our conventional model of distinct biological objects, including ourselves as human beings, where each organism is coincident with a single genome. What is at stake, at very least, is the principle that DNA is sufficiently stable across individuals and over inter-generational time to provide a reliable guide to the genetic basis of human health, disease, and difference. But as Lappé and Landecker note: ‘(a)s genomic instability becomes an area of increasing focus for life scientists, it opens up a new landscape of genomic multiplicity and temporality in health and disease’ (2015, 161).

More importantly, if research into microchimerism has the capacity to shake the biosciences, then it is equally deconstructive of some fundamental structures of modernist philosophy, which feminist and postcolonial thinking has already delighted in undermining. The contestation of the Western logos, in which undivided masculinist individuality reigns supreme, has long been underway from what I would cautiously call a feminist standpoint. But this critique has rarely escaped the bounds of humanism, nor has it engaged with more than a highly circumscribed mode of knowledge production. However, this is where the growing recognition of genomic variation can take us: some further steps along the route to posthumanism. Not as a nebulous plaything that might offer some better ways of becoming but as the inevitable outcome of some very material and often highly pragmatic research. As feminist theorists we have to push the ‘so-what?’ question to its limits and perhaps even contemplate that there are no limits.

The theorisation of (micro)chimerism seems to me to be one clear way of opening up the terrain, as does the somewhat more familiar awareness of the dimensions of the human microbiome. In the latter case, we should remember that the microbiome has been the focus of state-sponsored research on a massive scale in the US. The benign public aims are all about understanding how changes in the microbiome affect health and disease – and one can only speculate with foreboding the military uses that the research may support – but as always there are some highly radical and largely unspoken implications that could paradoxically disrupt both monolithic power structures and the very sovereignty of human beings that generate the parameters of the research in the first place. What is being rapidly established is that the human body, far from having

one exceptional genome that marks it as superior to other organisms, is a complex admixture of bacterial, fungal, parasitical and viral components on a cellular level in which the strictly human cell (or rather the human as previously understood) is vastly outnumbered. The ratio of human to nonhuman genetic material may be very low, and there are estimated to be around 10,000 microbial species living in the body, mostly in the gut (National Human Genome Research Institute 2012). It is difficult to make the case that animals, including human beings, are individuals in the anatomical sense, and it may be that microbes, measured by cell number, constitute approximately 90% of human bodies (Gilbert, Sapp, and Tauber 2012). This percentage is constantly being revised both upwards and downwards² but neither move makes a difference to the basic argument: that we are materialised as genetically multiple. There is no steady state and each individual has a unique microbial makeup that interacts both with the external environment and within the body between different microbial communities. The paradox is that as a supraorganism, the human being is both denied conventional individuality, biologically based on a singular genetic code, and afforded an absolute uniqueness by the complexity of the intra-active microbial communities.

The language in which the microbiome enters into socio-cultural awareness is still biased towards militaristic metaphors such as 'competing armies' but the science reveals a high degree of cooperation and mutual benefit. In fact many microbes are unable to survive outside the body, just as the human being herself could not survive and develop without maintaining an active microbial viscera. As becomes obvious, infants are not born with a genetically predetermined microbiome; it is acquired over time. Although they do, of course, inherit many aspects of their parental makeup, the teleology of successive generations passing down definitive genes is disrupted. In place of a neat heredity mix of male and female chromosomes that underpin the genetic makeup of the next generation, there is genomic fluidity that continues throughout life, with older people having somewhat different genomes to their younger selves. *I am not who I was*. Most of us are unable to verify such claims for ourselves and they may seem to have minimal effect on our lives, so does it really matter whether we are able to identify a singular genome? There are of course immediate implications for health and disease, which range from the emerging field of faecal transplants, which finds its rationale in the microbiome, to my own ongoing research around organ transplantation, the success of which may turn out to be deeply intertwined with microchimerism. And more widely, anything that involves genetic testing as an absolute arbiter of biological 'truth' will require revision. The most profound argument, however, is that the impact of such knowledge must eventually disorder the socio-cultural imaginary of the autonomous, clearly defined and temporally situated individual. Certainly in the global North, our faith in genetic identity is practically unchallenged, so I'd like to recall a couple of puzzling but compelling stories that have reached the popular media, long before any bioscientific explanation has been widely accepted.

The first case was initially reported in a 2013 issue of *Psychology Today*, a magazine that pitches in the space called 'public understanding of science', and concerns the disturbing story of an American woman, Lydia Fairchild, whose maternity of her own 'natural' child could not be verified through genetic testing when she submitted a blood sample as part of a stringent welfare application. She was under suspicion for some time before giving birth to a further child. Despite surveillance witness testimony that she had indeed delivered the baby, and had not utilised any reproductive technologies that

broke the genetic link between carrying mother and infant, the child's DNA 'proved' that Lydia Fairchild could not be the mother. The case was finally resolved when it emerged that she had profound chimerism to the extent that the DNA of her blood (which was initially tested) was quite different to the DNA of her reproductive organs. Her genetic profile, in other words, was at least dual and possibly multiple (Kean 2013).³ The most likely explanation is that the woman was the result of a dizygotic twin conception that had disappeared from knowledge when her embryonic self had absorbed the other twin *in utero*. The resulting singleton carried both her own original DNA and that of the non-identical twin, thus creating a chimera. Research in the area of uterine chimerism is still sketchy, but there are many suggestions that the phenomenon might explain intersex conditions, even the phenomenology of transgendered people (Hanley 2011), or at a different level, the observation that some people have eyes of different colours.

The second case concerns the much-delayed publication of an Australian report about an emergency liver transplant carried out in a nine-year-old female child, whose whole immunological response realigned itself with that of the male deceased donor, with her blood group switching from O-negative to O-positive (Alexander et al. 2008).⁴ In the dry circumscribed style of bioscientific journals, the clinical paper reports that '(t)he patient remains well [five] years after transplantation. *She has not received any immunosuppressive therapy for [four] years, and the results of her liver-function tests are normal*' (Alexander et al. 2008, 371, my emphasis).⁵ The authors offer various tentative explanations for the surprising absence of what is called graft-versus-host disease, particularly as the transplant liver came, unusually, from a 'fully HLA-mismatched, sex-mismatched' emergency donation (Alexander et al. 2008, 373).⁶ It is usually assumed that the long term success of transplantation supposedly depends on careful, though never complete, tissue matching and the extent to which the recipient's immunological rejection of the donor organ, in which the antigens of the recipient body seek to destroy the antigens of the graft, can be controlled by a life-long mix of immunosuppressant drugs. In the Australian case, however, the chance discovery at nine months post-Tx of extensive chimerism during investigation of a small bowel obstruction led to a decision to *withdraw* all immunosuppressant medication. This enabled the donor cells over the next few months to effect a full, and therapeutically beneficial, engraftment, which resulted in the patient's eventual full recovery.⁷

In an earlier and seemingly isolated paper, Starzl et al. (1992) had already traced the occurrence of cell migration from a donor organ (where the 'alien' DNA is supposed to stay *in situ*) to the recipient's peripheral blood supply and claimed that microchimerism might be a factor in graft acceptance. Most subsequent studies, however, avoided upsetting orthodoxies and defended against claims of experimental contamination by asserting that although the process 'is common following liver transplantation ... it usually disappears within the first 3 weeks' (Alexander et al. 2008, 372). Alexander's Australian case, however, could scarcely be called one of microchimerism, in which the percentage of 'non-self' cells is very low, but a full-scale transmutation in which an assay of 250 peripheral blood cells at post-transplantation day 492 showed 'all of these cells were male' (Alexander et al. 2008, 371). Although the authors are highly cautious in offering any analysis of the case, perhaps understandably given the extent of their unsettling of biomedical givens, there is no doubt that their paper raises some urgent questions. Such a startling demonstration of genetic translocation, even in its rarity, suggests an intriguing new understanding of intracorporeal malleability, a recognition that borders are permeable, and that

genetic origins may be far from secure. The dominant fantasy of a pure, unified and unchangeable identity established at conception and secure until death begins to dissolve.

I want now to make the connections to the second term in my title, immunity. Its indissoluble and superficially antagonistic links with chimerism nevertheless points the way to an affirmative biopolitics and a new ecology of life that forces a rethinking of temporality. Where chimerism and microchimerism undo the binary and hierarchical nature of self/other, the conventional understanding of immunity, whether in biology, politics or ethics, is that it is precisely the science of self/nonsel discrimination. The term has a long history in the sphere of juridical politics to figure the one who is immune as exempt from certain communal obligations and laws (Cohen 2009). In its more recent usage in biomedicine it signals protection against threats to the integrity of the body and, following Macfarlane Burnet's work in the 1940s, a belief in the apparently natural antagonism of the self/non-self cellular relation. In other words, it speaks to the maintenance of the boundaries between the supposedly normal self and the pathological other. Unless artificially suppressed, the immune response is supposedly activated whenever the body encounters 'foreign' antigens, and its task is to mobilise an array of biochemical agents that eliminate the putative threat of otherness. In the mid-twentieth century, Peter Medawar had identified the immune system as the operative destroyer of hypothetically palliative non-self tissue. In the light of the relentless graft rejection experienced by injured post-war military personnel who required skin grafts, Medawar was motivated to find ways of securing induced immuno-tolerance. His endeavour was largely unsuccessful, but he did identify and name the phenomenon of enduring dizygotic twin chimerism in certain non-human mammals⁸ and even very rarely in humans, which he was able to link to *natural* immuno-tolerance. Medawar himself was perplexed by such occurrences, calling them a 'natural accident' and 'astonishing' (1960), and the insight was not further developed. Several more of his observations have been superseded, but what remains is the *doxa* of an apparently natural antagonism of the relation between self and non-self cells.

For many decades now, the immune system, as a feature of the biomedical imaginary, has evoked a series of pugnacious metaphors: on the one side invasion, outright warfare and intruding foreignness, and on the other a range of counter self-defence mechanisms, such as the body's own Natural Killer (NK) cells. This characteristic language of biomedical knowledge has been widely explored by many feminist scholars such as Donna Haraway (1989, 15), for whom such notions of a threatened self indicate that 'individuality is a strategic defense problem' in order to expose what is at stake in maintaining boundaries between the supposedly normal self and the pathological other. Emily Martin (1990), Lisa Weasel (2001) and more recently Susan Kelly (2012) have all commented on the emergence of the specific discourse of immunology, while Polly Matzinger (2001)⁹ has, like Haraway, offered an alternative model. Nonetheless, although the familiar image of confrontation has been progressively undermined by research findings that do not fit the embattled self-defence model, the very same metaphors still dominate popular discourse. As I have noted before, the problem,

is that while the body's immunological counter to the putative threat of otherness in the form of a bacterial infection, or even a carcinoma, might understandably evoke images of steadfast

defence, its hostile reaction to many therapeutic interventions such as tissue and organ transplants, skin grafts, or bone marrow implants creates biomedical as well as metaphorical trouble. (Shildrick 2015, 97)

In any case, the efficacy and binary closure of the self/non-self model takes no account of some notable and widely accepted anomalies. The most compelling of these include the phenomenon of autoimmunity where the body's *own* cells are seemingly misrecognised and responded to as other; the growing evidence of microchimerism following transplantation; the commensal microbial life in the gut; and the evidently *natural* tolerance between a pregnant woman and her foetus, despite their different HLA coding. As Emily Martin notes, the imagery of immuno-warfare waged against foreign intruders implies that the body is uniformly self-identical, 'hence the normal woman would destroy her foetus to return to a normal state of internal purity' (1990, 148). Clearly, this is not how the reproductive process proceeds and what is slowly emerging more widely is a shift, equally across biology and immuno-politics, from the notion of rigid and enduring corporeal boundaries, both external and internal, to permeable and leaky bodies.

Like every other authoritative discourse, bioscience invests in strategies of representation that finesse the empirical data to fit a particular discursive structure. I am not claiming, as Cohen (2009) wants to do, that the juridico-political concept of immunity has been inappropriately transplanted into an otherwise natural set of phenomena called biology. As a good Derridean, if not a good new materialist,¹⁰ I would reject that split between culture and nature, and see the two as codependent with no pure origin on either side. The point that Cohen makes, that the hypothesised late uptake of the concept of immunity by biology in relation to the human body naturalises the modernist subject as an independent entity necessarily engaged in self-defence, is nevertheless usefully provocative. It makes clear the intimate intertwining of our domains of knowledge production and raises the issue of how things could be Tierney 2016, otherwise.¹¹ I suggest that the rapidly growing evidence of those scenarios that do not fit the oppositional self/non-self paradigm, that throw into question not just the protective/defensive operations of the immune system, but the modernist normative context in which the inviolability of clear corporeal boundaries between self and other is taken as a given, presage perhaps a subtle shift in the imaginary itself. As Aryn Martin (2010) notes with regard to the microchimerism of foetal material in the maternal body, and vice versa, the bioscientific language that describes the process is slowly changing from metaphors of alien intrusion or invasion, which fit with conventional immunological discourse, to that of productive migration. Similarly, the circulation of non-identical DNA post-transplant and the wholesale visceral transformations that chimerism implies indicate not simply intercorporeality, but the irreducibility of embodiment into singular and static forms. If once the standard expectation would have been that such incursions could not be tolerated long-term without pathological consequences, there are now at least some indicators of beneficial effect. We might wonder if we could think of such cellular translocations as offering a different model that extends far beyond the privileging of modernist forms of human being. The significance is that if self and other are no longer distinct, if the very rigidity of the terms suggests a certain incoherence, then it is not just the space of the body

that is contested but the time of the body too. What does it mean for a body (whose body? which body?) to die?¹²

In the next section, I shall look a little more closely at these issues through the concept of autoimmunity, which is the site at where the interface between immunology and chimerism appears most exposed. If immunity stands for the self-defensive rejection of alien intrusion, and (micro)chimerism speaks to the coexistence of self and other, then it would seem that the latter portends a puzzling failure, or at least inaction, in the former. Unless artificially suppressed as in organic transplantation, the biological immune response is supposed to be activated whenever the body encounters 'foreign' antigens, and its task is to mobilise an array of biochemical agents that eliminate the putative threat of otherness. As the obvious manifestation, however, of a self/other interface interior to the body, healthy pregnancy does not provoke the theoretically expected immune response. Substantial research in recent years has shown beyond any doubt that not only does foetal DNA enter the mother's body, but maternal DNA crosses the placental barrier in the opposite direction, without obvious pathological effect. This inconvenient observation of the intra-active circulation of maternal-foetal cells has been traditionally dismissed as being of very short duration and therefore insignificant in terms of ongoing health. More radical research, however, has shown that mismatched maternal and foetal DNA can remain in the mother or offspring's body for decades after pregnancy (Bianchi et al. 1996; Maloney et al. 1999), a phenomenon that demonstrates how the biological event of pregnancy has a temporal resonance far beyond the limited nine-month conjunction of maternal and foetal selves. Even more startling has been the discovery that women who have never been pregnant can carry male DNA that is, their XX cells have companion XY cells (Yan et al. 2005). As I have previously outlined (Shildrick 2015), this clear demonstration of microchimerism linked to reproduction, though I stress that it is only one area of observation, has provoked an ongoing split between clinical researchers who insist that it is linked to pathologies and those who believe that it may have a beneficial effect on health. Could it be possible then to think immunity and microchimerism in positive conjunction?

The testing ground for both sides of the argument is in the field of what are classed as autoimmune diseases, such as lupus, rheumatoid arthritis and multiple sclerosis. Here, the immune response is not directed against externally invading antigens (the aggressive language is all but unavoidable), but against its own self-components. For those who believe that microchimerism is always pathological, the discovery of significant evidence of non-self DNA at the site of lesions confirms their negative understanding. For the as-yet minority who see microchimerism as potentially protective and beneficial, the same evidence indicates that non-self cells migrate to sites of disruption to bolster and multiply the protective immunological responses. Indeed, there is emerging evidence that autoimmunity may not be the intrinsically self-destructive phenomenon that has long been assumed but that in addition to its pathological outcomes it may also serve a regular and necessary homeostatic function. In recent work, philosopher of biology, Thomas Pradeu (2012) has turned away from the atomistic self-identical understanding of the body to suggest an ecological model of highly heterogeneous and mutually assistive elements that autoreact to internal and external stimuli alike, *and* display high degrees of immuno-tolerance. His aim as he puts it, 'is to open up the immune system to its environment instead of viewing it as exclusively self-centred' (2012, 204). This fits precisely with the now recognised function of the microbiome, and in Pradeu's view autoimmunity

is no less routinely beneficial. Perhaps surprisingly, Pradeau claims that the actions of the immune system are what secure the unity of the organism as a biological individual, but not its uniqueness. This is a reversal of how I would understand the data, in which – as my earlier comments on the microbiome indicate – increasing degrees of heterogeneity intensify uniqueness.

Autoimmunity is concurrently proving a powerful discourse in the co-articulation and co-constitution of philosophy, politics and biology. Aside from a few exceptions like Pradeau, the focus has been more in line with traditional biomedicine in trying to theorise it as a turning against the self. In his Introduction to Roberto Esposito's text *Bios: Biopolitics and Philosophy*, Timothy Campbell lists the many critical theorists working on the concept of immunity and claims that 'the term quickly folds into autoimmunity, becoming the ultimate horizon in which contemporary politics inscribes itself' (Esposito 2008, viii). In Esposito's own use, what he calls the immunitary paradigm both protects and endangers the individual and socio-political collectives alike, but he is wary of too easily conflating immunity with autoimmunity. Immunity itself, through its shared Latin root *munus*, is intrinsically tied up with the concept of community such that the one cannot be thought without the other. The issue for political philosophy is that where the function of immunity is to protect life against external incursions, to ensure the continuity of community and selfhood, the risk lies in falling into an absolute refusal of difference which signals the decomposition of immunity into a highly damaging autoimmunity. In the attempt to preserve personal or communal identity (and remember the root word *idem* means 'the same') transformation is rejected and a kind of death-like stasis ensues. As Esposito (2006) sees it, the individual may feel the necessity to immunise herself against the demands and obligations of community life, isolating herself from what would sustain her. Far more damaging, however, is the collapse into a thanatopolitics, which ultimately sacrifices life and embraces death rather than be open to heterogeneity. For Esposito, as with many other European philosophers such as Agamben, the horrific unfolding of National Socialism is the prime example of thanatopolitics. In short, the Nazi project of immunising Aryan life was operationalised through the large-scale production of death, not only for the countless Others who were categorised as a threat to the illusory purity of the Reich, but ultimately for the Reich itself. The fear is that many politicians worldwide are again engaging in just such ruined strategies around the question of refugees and asylum seekers.¹³

It is important to note, nonetheless, that Esposito does not see it as inevitable that immunity degrades into autoimmunity. He too references the maternal-foetal relationship as an affirmative mode of conceptualising immunity. As he writes:

[it becomes] the figure of a cohabitation with difference, an emblem for a different means of thinking about community. This is most literally introduced with a reference to biologists who think of the immune system as an ecosystem or a social community – not just a defensive system, but a system of 'self-alteration'. (2011, 169)

And he believes that the only way to defer death, to, in effect, disorder temporality, is to be 'reborn continually in different guises' (2008, 181). The finitude and limits of mortality would be superseded precisely by the recombinatory intra-action of immunity. There is no evidence that Esposito has ever considered microchimerism as such but his conclusions are precisely what microchimerism effects. What Esposito explicitly seeks is an affirmative

biopolitics that sees hope in forestalling autoimmunity, while for Derrida, in contrast, the trajectory is unavoidable. In biology, as he notes, the process of autoimmunisation 'consists for a living organism ... of protecting itself against its self-protection by destroying its own immune system' and he posits what he calls a 'general logic of autoimmunization' that extends to every community (Derrida 2003, 94).

I find Derrida's work extremely rich in its implications and, although the precise term *autoimmunity* is most associated with his response to the deadly event of 9/11 and its aftermath, it runs as a theme through his texts long before. The whole concept of the 'other within', which is fundamental to Derridean thought, and his understanding of the relation between the host and the guest in his analysis of hospitality sets up a model in which the self is never finally secure. In *Spectres of Marx*, for example, Derrida writes:

to protect its life ... [the self] is necessarily led to welcome the other within ... it must therefore take the immune defenses apparently meant for the non-ego, the enemy, the opposite, the adversary and direct them at once *for itself and against itself*. (1994, 177)

It is as though autoimmunity is the spectre that never ceases to haunt the self, and it comes at the possible cost of instantiating the monstrous, of exposing the self to autodestruction. Now this seems as though it would preclude any affirmative bioethics, that it would necessarily fracture life and posit death at the heart of all being. Derrida does indeed refer to our present ethics as thanato-ethics (1993, 60) but it would be wrong to suppose that he sees autoimmunity as wholly negative with death as an implacable end. On the contrary, the very spectrality that characterises his texts and disrupts identity to the self speaks to a very different take on temporality, not as teleology, but as irregular and unpredictable traces and recurrence. Autoimmunity, for Derrida, is unavoidable but at the same time it is what holds open not simply the question of alterity now but the very possibility of futurity, the undecidable *a-venir* where we cannot know who or what will come. As he puts it: 'Without autoimmunity ... nothing would ever happen or arrive; we would no longer wait, await, or expect, no longer expect one another, or expect any event' (2005, 152).

It is not, I think, that Derrida is any less desirous of the affirmative than Esposito but that he refuses to prise apart what is positive and what negative. In this respect his work on hospitality, which is intimately related to the question of immunity, is highly apposite. For Derrida the ethical imperative is to offer an absolute hospitality with no ifs and buts, no limiting provisos as to whom or what our thresholds should be open. But that means welcoming not just those who conventionally appeal to our better community instincts, but also welcoming the monstrous *arrivant*; the refugee who may turn out to be a terrorist, the one who may bomb our city centres or murder us in our beds. But the real point of course, as Derrida insists, is that absolute hospitality is both necessary and impossible. Because we cannot avoid immunising ourselves against others and falling into autoimmunity, our future horizons are undecidable, potentially destructive and monstrous *and* the point of positive aspiration. In an article comparing Esposito's and Derrida's understanding of autoimmunity, Penelope Deutscher sums it up like this: 'It is because we are open to disaster that we are open to transformation. But the reverse also must hold. If we are open to transformation, we are open to disaster' (2013, 63). I whole-heartedly agree but would want to reverse the emphasis of her equation.

Earlier I raised the question of what it means for a body to die, and now the most cogent question becomes: is death a disaster? On a personal level, it may always be understood that way and without doubt biomedicine will continue with its efforts to prolong life, to stave off the inevitable cessation of breathing, and that is precisely what drives the research on immunity and microchimerism. Most of us are at one with the Western logos understanding of death as an end. When Heidegger described life as 'being toward death', he reflected our immersion in human exceptionalism and questions of authenticity and mortality. For Derrida, however, the aporia of death suggests something else, 'which no longer has the form of the movement that consists in passing, traversing or transiting' (1993, 8). So what does it signify for death if the materiality, the viscosity of our own bodies is inherently and irreducibly multiple? And what if, as I've been suggesting, the anticipated temporal predictability of chrononormativity (Freeman 2010) were displaced by a non-sequential mode of becoming? Chrononormativity seems to usefully encapsulate the parameters of trauma, death and mourning which I see as dependent on the closed frameworks within which life course as conventionally understood. That is, the temporal processes of reproduction, kinship, inheritability, and lineage within relatively stable social structures and power relations. (Micro)chimerism and a new thinking of immunity disrupt all those things, with the span of a life (what life? whose life?) no longer self-evident; with conception and gestation being the site of intensive microchimeric exchanges and immuno-tolerance; with kinship claimed between transplant donors and recipients across age, race and ethnicity; with the dimensions of genetic inheritability and lineage radically multiplied not simply between humans but across species. Although the focus remains the human body, the move towards a posthumanism is inexorably underway. And as Esposito notes: 'Flesh is constitutively plural, multiple and deformed. It is ... from this point of view that one can begin to imagine an affirmative biopolitics' (2006, 52). It speaks to a new ecology of life.

On a theoretical level, the move that is emerging is away from a philosophy of biology that tries to pin down the essence of life, to a biophilosophy 'concerned with articulating those things that ceaselessly transform life' (Thacker 2015, 126). In other words, the project is to elaborate a hitherto unregarded network of relations that dispenses with the boundaries of singular location and time and reimagines the concept of living outside oneself. In an embodied hauntology, the other is always within, but equally the self (if we can still call it that) externalises its becoming. If the conditions for ethical agency are not dependent on the present normative structures, could we think an atemporal bioethics of coexistence rather than one of successive existence that is faced always with its own finitude? As Tierney concludes: 'rather than redeeming, or worse, defeating death, an affirmative biopolitical stance ought to embrace death as it does life, as a gift' (2015, 20). Rather than fearing death, could an affirmative biopolitical stance embrace death as potential? At very least the rethinking of microchimerism and immunity entails a different kind of ethics where we should actively seek to 'enter into modes of relation with multiple others' (Braidotti 2015, 34). And there is no reason to stop at human others. Once we acknowledge that life and death itself is unlimited in its material manifestations, and that all forms of existence, human and non-human, are intra-active at levels beyond regular control, then there are no grounds for privileged distinctions between one living entity and another. In short, we do not have to accept that the conditions for political and ethical agency are dependent on the normative structures that currently surround us.

For Braidotti this clearly implies a shift of temporal gears, and she makes the point that once we get away from oppositional thought, we are no longer 'tied to the present by negation. Ethical relations ... are the driving forces that concretize actual, material relations and can thus constitute a network, web, or rhizome of interconnection with others' (2015, 35). Our possible futures are yet to be explored, but as Braidotti insists:

What is positive in the ethics of affirmation is the belief that negative affects can be transformed. This implies a dynamic view of all affects, even the traumas that freeze us in pain, horror, or mourning. (2015, 51)

Without a reimagined temporality, we are stuck with the somatic facts of pain, death and mourning, but the narrative need not end there. It is finally about the extent to which we can rethink the modernist boundaries of selfhood and embrace the possibilities of transformation. In the non-teleological time of becoming, the insults of being may be less acute.¹⁴ And really it is not a choice but simply the ecology of life, whether human or otherwise. The risk and vulnerability of life and the fractures in personal teleology are unavoidable, and we cannot simply choose interdependence. Rather they all exemplify the chimerical context in which we live. And that speaks to both a familiar destructive and yet generative potential, which we have hardly begun to explore.

I will give the last word to Grosz (2004, 14): 'the more clearly we understand our temporal location as beings straddling the past and the future without the security of a stable and abiding present, the more transformation becomes conceivable'.

Notes

1. Very rarely, a female mule may produce offspring although the incidence is almost negligible. The problem is that horse and donkey chromosomes are sufficiently unlike to adequately pair up in the gametes and, that as there are 63 parental chromosomes, there is always one that remains unpaired.
2. Recent *National Geographic* figures suggest that figures have been wildly over-estimated and that the ratio may be as low as 1:1 (Greshko 2016).
3. See also Yu et al. (2002) and Norton and Zehner (2008) for a highly bioscientific report of a similar phenomenon and a cultural studies take respectively.
4. See also Rotman (2008) for a popular science commentary on the case.
5. Immunosuppression is usually life long after transplantation supposedly to prevent an immune reaction in which the antigens of the recipient body would seek to destroy the antigens of the donor organ.
6. HLA – Human Leukocyte Antigens – are the major agents of the immunological system and are coded for and expressed by a group of genes on a single chromosome.
7. It is not the case that clinical evidence of the translocation of genetic material is limited to a single direction. By studying female to male donations, Quaini et al. (2002) show how a heart graft may be genetically transformed by the incorporation of the recipient's existing markers. Unlike the systemic chimerism studied by Alexander et al. (2014), the chimerism here (identified by the 'out of place' presence of Y chromosomes) occurred within the heart itself. Once again, however, and contrary to existing doxa, the suggestion is that this unexpected chimerism 'could regenerate myocardium and sustain cardiac performance' (Quaini et al. 2002, 5).
8. A recent report in *PNAS*, announcing the newly sequenced genome of the marmoset monkey refers to its 'unique' capacity to produce 'dizygotic twins that exchange hematopoietic stem cells *in utero*, a process that leads to lifelong chimerism' (Harris et al. 2014). This is odd as Medawar himself, referring to earlier work by R.D. Owen in 1945, was well aware of the similar process in dizygotic twin cattle (Medawar 1960).

9. While I have some reservations about Matzinger's 'danger model' of the immune system, it does speak to an enhanced ecological understanding. Rather than launching a general onslaught against all non-self elements, '(w)e become a habitat, welcoming the presence of useful commensal organisms and allowing the passage of harmless, opportunistic ones' (2001, 8).
10. Pace Jamieson (2015), who argues that it is new materialism that challenges the putative distinctions made by Cohen. Though I broadly agree with her, the same conclusions can be reached via a feminist uptake of Derrida and others that applies the deconstructive drive to substantive contexts.
11. See Goffey (2015) for a helpful overview of the relation between bioscientific and humanities understanding of immunity.
12. I am reminded of Dolly the sheep, cloned from her 'mother' at the Roslin Institute in 1996. When she died well before the normal life span of her breed, which sheep exactly had expired?
13. I am acutely aware, however, of Derrida's warning that the immunity paradigm makes us all complicit: that in seeking to immunise communal life, it is too easy to demand the regulation of immigration and asylum, as Derrida adds 'as they say they do, unanimously, on the left and on the right' (Derrida and Stiegler 2002, 19).
14. This clearly goes in the direction Deleuzian philosophy which I have explored in a similar mode elsewhere (see Shildrick 2015).

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