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Toxic infrastructure

By the end of the Human Genome Project, determining the boundaries and mechanisms of heredity and gene expression had taken on new dimensions of complexity. Sequencing the coded regions of the genome did not offer a definitive account of why humans are what they are, and the results did not live up to the hype. Among other revelations, it seemed that accounting for biological complexity would mean understanding the genome as permeable and responsive to external shocks in ways that molecular biology had for a long time considered a peripheral branch of study. Sequencing coding DNA could only give a partial description of phenotype; to what extent are species differences determined by mechanisms of methylation (the silencing of parts of the genome), and the transgenerational inheritance of these genetic states? New questions around the influence of the environment – and the integrity of borders between organism and environment – have emerged (Richardson and Stevens 2016; Müller et al. 2017; Meloni 2019). The postgenomic condition has been characterized not only by the development and increasing availability of sequencing technologies, and the transport of these technologies from laboratories to homes, but also by an epistemic shift in the life sciences, where a panoply of environmental influences on the lifecourse are now scattered around mechanisms of genetic expression.

The large-scale investment in epigenetics and epigenomics over the last twenty years corresponds to an acceleration of anxiety at the level of international governance on the long-term effects of climate change and industrial toxicity. These effects have become global concerns, having been fractionally mitigated at peripheries. Various philosophical considerations of epigenetics have coalesced around ideas of proximity, plasticity and multiplicity. These are metaphors of indeterminacy and plurality, registering the uncertain scales of effect and ambiguities of cause when it comes to biological damage. They are also modes of narrating commonalities across borders of system, species and element in the postgenomic era, and of imagining how these commonalities are communicated

across borders. Contrary to a focus on the individual organism as a site for theorizing the unity of life, a shift towards thinking through the interactions and dependencies at the level of ecology has energized much recent critical and philosophical work on questions of relation and influence (Margulis 1991; Wheeler 2006, 2016; Hoffmeyer 2008; Stengers 2010; Thacker 2013; Malabou 2016; Haraway 2016). Opening up the programme metaphor to its investments in ideology, aesthetics and praxis has taken on new relevance in a growing consciousness of ecological emergencies, unevenly differentiated across the world-system.

Laying out the 'deep genealogies' of representational tussles within environmental epigenetics, Jörg Niewöhner and Margaret Lock note with caution the turn/return to 'the social' in molecular biology 'after a phase of largely technologically driven pragmatic reductionism' (2018, 683). To this, they offer the concept of 'situated biologies' – situating the material body in space, 'within different spatial scales' – and in patterns of practice, 'how human practices share the material human body in lasting ways,' often at moments of existential crisis (688, 691). In thinking this through, what is important is not typologizing the various and multiple influences that alter and affect embodiment. Instead, they suggest 'the environment' be defined '*in relation* to a second entity to which that environment *can be* environment' (691; emphasis mine). The idea of external environments acting upon the interiority of the organism (reduced to genome), to which the organism must adapt and respond, has shifted to a semiotic account of this process, whereby environments are constituted by relational effects. This is a transitional imaginary, whereby 'environment' is only ever a temporary placeholder for a certain kind of relation, rather than a fixed context determined by the calculation of cause and effect, which also 'challenges the biomedical assumption of a universal body' (682). This marks a very different point of departure from the Human Genome Project. Niewöhner and Lock's approach is useful here because as well as decentring an idea of a universal biomedical subject, they are also invested in decentring the molecular and (as) the biological from accounts of living processes.

At the level of narrative, the texts discussed in this chapter map a tension between an increasingly datafied account of reality, the obfuscation or reduction of accounts of what is called relationality, and the way that moments of sudden change or shock affect and form bodies through space and time. For Wendy Wheeler, 'science, which only deals with material particulars, cannot . . . offer us an account of relations at all. Neither can it offer us an account of immaterial causes, such as semiotic causes, of which relations are the prime example' (In Beaver,

Tønnessen and Hendlin 2015, 178). Drawing on biosemiotics theorists such as Thomas Sebeok and Jesper Hoffmeyer, Wheeler considers the current moment to necessitate a 'new conceptual schemata, and a different grasp of ontology of all living organisms as interpretive makers of their worlds, not as machines but as a kind of living poetry' (178). This turn involves engaging with aesthetic forms as epistemological interventions, 'living poetry' not just as metaphor but as an alternative description of how being takes form. The postgenomic represents both a biotechnological and epistemological shift, and it also brings questions of aesthetic form and cultural praxis to the foreground.

Narratives of emergency tend to organise around plots of relational transformation: the emergence of different ways of being with others, human and nonhuman, often fragile and temporary. A postgenomic imaginary emerged at global scale just over a decade before the end of the Human Genome Project, in the early hours of an April morning in 1987, in the Soviet periphery, when a nuclear reactor exploded in the Chernobyl Nuclear Power Station in Ukraine. I read Svetlana Alexievich's *Chernobyl Prayer* (1997) and Jeff VanderMeer's Southern Reach trilogy (2014) as interventions in forms of writing and narrating community, self and ecosystem after environmental disaster, the hyper-militarization of governmental responses to ecological crises, and the convergence of postgenomic imaginaries with theorizations of care, endurance, responsibility and relationality. These texts are about toxic infrastructure at the peripheries, where the body's architecture cannot be relied upon as a vessel for individual survival, while the genomic information it houses becomes increasingly irrelevant as illegible and unrecognizable forms emerge. Toxicity extends across form – fragmentation, redaction, ellipses, expansions, contaminations – through techniques that play out the slow submerging of narrative coherence. It makes necessary novel forms of characterization that move away from (liberal) developmental paradigms and (neoliberal/algorithmic) disaggregation to render characterization as a transitional process, without a fixed horizon or endgame in sight.

If the age of reductionism is indicated not only in the ways scientific knowledge has been put to social use since the Enlightenment, but also has conditioned the parameters for experimentation and the identification of experimental subjects, then the age of emergence opens the possibility of radically altering the framework within which life itself is understood and managed at the level of community, society and government. Wheeler suggests that this would oppose, first, the neoliberal formulation of the individual and the family and, second, the idea that 'reality is constructed in language' (Wheeler 2006, 26–7). For Wheeler,

this shift ‘provides us with a new way of thinking, not only about how complex systems work, but about how, in their biological manifestations and beyond, they are inter-related’ (27). As questions over responsibility and human survival have become a matter of sociological urgency, biology in the postgenomic era has begun to give alternative accounts of adaptation than those that uphold the selectionist paradigm. These questions shape this final chapter.

Chernobyl and the postgenomic condition

The fallout of Chernobyl spliced together two branches of post-war industrial science – nuclear physics and molecular biology – while the genomes of those in close proximity to the site and those thousands of miles away were exposed to large doses of radiation. The damage was not only irreparable but also unthinkable. There was no precedent for it, and redressal involved a seismic shift in understanding the long-term influence of nuclear fallout. Chernobyl exposed the brittleness of Big Science’s claims to be a facilitator of social development, causing devastation at a planetary scale that has expanded across ecosystems and time in ways that have still not been fully calculated. It was an assault to a coherent sense of form in national, sovereign governance, and the body politic over and outside Soviet borders.

The sovereignty ascribed to both gene and atom over the course of the twentieth century is symptomatic of an accelerated logic of reductionism, blinding some of their chief arbiters to the wider implications and consequences of their science. Chernobyl shook the certainties of both: atomic power as a peaceful energy source, and the genome as immutable code impermeable to external influences. While the genetic effects of radiation had been studied since the United States’s bombing of Hiroshima and Nagasaki, radiation exposure at Chernobyl went well beyond these levels. The extent of the damage was, and remains, incalculable, hidden or buried. After Chernobyl, a belief in the transcendence and unilateral good of atomized understandings of the world began to diminish.

While Chernobyl shook the idea of a fixed code more or less impermeable to external influences, it also altered social conditions for narrative, eluding genre. Information and data were either secret or illegible. Books disappeared from libraries, and tools for measuring radiation could not read post-explosion numbers. A cataclysm that brought the latter days of the Soviet Union to an end, Chernobyl fractured an already besieged sense of communal coherence,

and represented as much an onslaught to social forms of nation, region, locality and community as it did to biological life. The shock of Chernobyl encompassed health (biology), analogy (culture) and system (politics). The monumental task of repair has involved not only infrastructural mitigation – cordoning, compensation, burial and enclosure – but also grappling with a transformation of the imaginative possibilities of being in the world, more or less overnight. It has been identified as the moment when the fate of the Soviet Union was sealed, exposing the violence of state mismanagement as millions of lifeforms (human and nonhuman) were exposed to nuclear fallout.

Chernobyl was also a global crisis. A culture of secrecy prevailed: what levels of radiation were classed as dangerous, how far had radioactive fallout spread, and how could it be contained – if at all? In the case of Caesium 137, the health risk to humans increases over time once ingested, rather than decreasing. Radioactive rainclouds swept westwards with no regard for national borders or Iron Curtains, reaching as far as the west coast of Ireland. There, Iodine 131, and Caesium 134 and 137 found purchase in soils deficient in potassium and clay, ingested by cows through grass, contaminating Irish milk supplies. The Irish Dairy Board exported a number of dairy consignments to lower-income countries (Mexico, India, Thailand, Egypt, Ghana, Sri Lanka, Brazil, the Philippines and Ethiopia – the latter via famine aid), and some consignments were found to have high levels of radioactive contamination. Northern Sweden had the highest levels of Caesium 134 and 137 recorded outside the immediate disaster zone. Sami peoples of Lapland were forced to kill and bury the carcasses of thousands of reindeer, harming an Indigenous culture based around reindeer. This posed a threat to their survival as a community with a relative degree of autonomy (Linton 1988, 18), and to ‘their political strength and to a Sami cultural identity bound by material and symbolic connections between humans and reindeer’, in Sharon Stephens’s words (1987). The crisis redrew maps of environmental influence and biological proximity across the globe, marking a continuation of colonial infrastructures of material, biological and cultural annihilation. What exploded in the periphery of the Soviet Union spread quickly into the peripheries and semi-peripheries of the world-system, highlighting the ‘impossibility of predicting the complex global consequences of nuclear accidents as they transform the substance of people’s bodies and environments and the meaningful orders of their lives’ (Stephens 1987).

After Chernobyl, ‘we shifted to another place in history’: the history of disasters (Alexievich, 27). The fallout necessitated new forms of political action and citizenship, highlighting the unevenly violent terms of living in

the Capitalocene, and the unsustainable demands on all kinds of lifeforms of maintaining toxic infrastructure. Narratives on and after Chernobyl register the uncertainty of the disaster's scale and reach. Who was responsible, and for what? Was the architecture of modern science itself to be brought to account? Responses to Chernobyl move between shadows of secrecy and gaps of illegibility – the cover-ups to mitigate panic and defection, and the lack of precedent and absence of data for understanding the long-term fallout. 'The three dimensional world fell apart,' writes Alexievich in her introduction to *Chernobyl Prayer*; nobody knew what had 'really happened' (26). This was a crisis not only of narrating the disaster (of what to say), but also of genre (of how to say it). Nick Rush-Cooper argues that in the case of Chernobyl, material encounters with radiation in the Zone 'do not take place through modalities of narrative, discourse, or gaze, but through exposure – an embodied vulnerability to that which we cannot sense' (2019, 218). Daniel Bürkner notes a persistent mischaracterization of the accident as 'a superhuman natural catastrophe' facilitated by what he calls Chernobyl's 'aesthetics of invisibility' (2014, 22). In the proliferation of photographic strategies of mythologization and photochemical displays of radioactivity, he argues, human systems fade into the background, the horizon taken up instead by mysterious and unthinkable shapes and substances that confound understanding and generate an affect of morbid wonder.

This embodied vulnerability and invisibility become constitutive of narrative forms marked by what Tamara Hundarova calls the 'Chernobyl Syndrome' (2001), which also deal with the problem of evidence in the post-Chernobyl world: its absence, obfuscation or illegibility. Was Chernobyl a war story, a horror story or a ghost story about vengeful forest spirits? Could it be redeemed through examples of collective heroism and national bravery, or through the effort of documentation as an end in and of itself? What to do now with the environment, with relations between human and nature now mediated by reciprocal contamination? Serhii Plokhy notes that while comparisons to wartime proliferated among locals, 'back then they knew who the enemy was, and the forest provided them with cover. Now danger was everywhere, and the forest, which had helped them survive during the Great Ukrainian Famine of 1932–3 and sheltered them against German reprisals, was the most dangerous place to be' (2019, 202). Central to all this was the evidence of disaster: what it looked like, how it might be measured, and how it could form the basis of legal interventions against the Soviet state, or welfare claims in post-Soviet Ukraine.

In a toxic present, where the periphery is a site of dumping and extraction, attending to the ways that narratives produced within it disturb and resist

these processes returns us once more to the question of time. In what forms of temporality can these sites find purchase outside the perpetual present that is imposed by these practices? What futures are possible, and how can pasts be mobilized towards transforming the present, rather than only repeating it? For Hundarova, Ukrainian literatures of the 1990s encounter an 'eschatological sense of an approaching end' in which 'all temporal things seem to be finished and fulfilled, and the present is only a reminder of them, a mere repetition or recombination of the past' (2001, 265). Countering the idea that new forms of time are no longer possible – and that time in some way has already come to an end – Alexievich and VanderMeer posit weird and toxic animacies between humans, nonhumans and the substances that move through them and transform them. As interventions against the philosophical construction of liberal humanism and the consequent order of taxonomies of life and nonlife around this model of humanity, these texts embark on a new epistemological project of humankind.

Imagining worlds where the category of humankind no longer holds the same dominion has become one of the principal philosophical problems of the twenty-first century, as recent work in new feminist materialisms and posthumanisms by Donna Haraway (2016), Karen Barad (2007), and Jane Bennett (2009) has explored. This problem is also thornily connected to long-term eviscerating dynamics of enclosure, extraction and annihilation of colonial-capitalist accumulation that have brought the current ecological emergency into being, as in Jason Moore's theorization of capitalist modernity working *through* nature, not acting upon it (2013). Sylvia Wynter's call for a new poetics of being human offers a thrilling theoretical injunction for tackling the problem of the human after biocentrism. She imagines a human released from its current biocentric formation, and a 'new and ecumenical human view that places the event of 1492 with a new frame of meaning not only of *natural* history, but also of a newly conceived *cultural* history specific and unique to our species' (1994, 7). She urges as a point of departure 'both the ecosystemic and global sociosystemic "interrelatedness" of our contemporary situation' to 'put forward a new world view of 1492 from the perspective of the species, and with reference to the interests of *its* well-being' (1994, 8). For Wynter, metaphors of interrelation not only facilitate crossings and traffic between humans and nonhumans to trouble the category and supremacy of human. The interrelation of ecological and economic challenges the explanation of human behaviour in an individualized mode of bio-ontogeny, and pushes instead towards understanding it '*in the process* of socialisation that institutes the individual as a human, and therefore,

always sociogenetic subject' (Wynter 1994, 47; see also Fanon 1952). It is my argument here that the postgenomic does not offer a new ontology of human being, but rather moves towards the recursive opening-out of being towards others as a description of adaptation.

At stake in this displacement, as I have argued throughout this book, is an intervention in 'the history of how we represent the life we live to ourselves' (Wynter 1994, 48). The mapping of peripheral toxic environments *as* peripheries brings the tug of war over adaptation and selection into sharp focus. It is becoming impossible to outsource climate change and industrial toxicity to the edges of the world-system, both practically and imaginatively. Hence, practices that have made survival possible in racialized peripheries now become sites of learning for the so-called Global North. What would it mean to be 'best fit' to survive in a radioactive wilderness, when borders between healthy and poisonous ecosystems cannot be reliably traced? Can an ethos of selection save the species, or does this moment call for a conceptual reworking of 'adaptation' and a reckoning with its modern discontents? These are some of the questions of Alexievich and VanderMeer's texts. Neither gives up on the idea of the human. They work through the long-term consequences of misinformation, exclusion and annihilating dynamics of the forms of governance that both induce and fail to repair the crises of the texts.

Adaptation, improvisation and epigenetics

While epigenetic research has become increasingly prominent in Anglo American biology since the 1990s, theory now described as epigenetic has developed alongside genetics as a counter explanation for inheritance for much of the twentieth century. Chromosomal rearrangements were first identified by geneticist H. J. Muller in the 1930s in his experiments on fruit flies in T. H. Morgan's *Drosophila* laboratory, and described as transposable elements by plant biologist Barbara McClintock from the 1940s. Transposable elements are sequences of DNA that move (jump) from one genomic site to another, which McClintock suggested play a regulatory role in determining which genes are expressed, and when (McClintock 1993).

Likewise, the frictive encounter between loss and adaptation has long been a site of literary experimentation: change is often painful, and requires letting things go so that new or different things can take their place. Adaptation has also been caught up in a Panglossian ideology of 'the best of all possible

worlds,' which Stephen Jay Gould and Richard Lewontin identify as endemic to twentieth-century Anglo American biology:

An adaptationist programme has dominated evolutionary thought in England and the United States during the past forty years. It is based on faith in the power of natural selection as an optimizing agent. It proceeds by breaking an organism into unitary 'traits' and proposing an adaptive story for each considered separately. (1979, 581)

This programme of reduction is fundamental to the logic of sequencing, isolating parts of the genome and determining their purpose and relative worth (or abnormality). This returns to sociobiology and the selfish gene: trait-thinking as a strategy of a society of control. In place of this, Gould and Lewontin advocate a pluralistic approach which, they argue, is closer to Darwin than the wholesale fetishization of natural selection as the principal mechanism of evolution. Some forms cannot be explained through a logic of purpose or use-value; they occur for reasons that are not always obvious or clearly beneficial, as 'secondary epiphenomena representing a fruitful use of available parts, not a cause of the entire system' (584). Rather than each aspect of a structure having a particular function, best fitted to the environment – natural selection as a mechanism for endless balance between organism and environment – nature has its own by-products: things that look like anomalies or as if they do not fit their context. The analogy Gould and Lewontin use is the spandrels formed by intersecting arches in cathedrals. In San Marco in Rome, these are filled in with incidental artwork, spaces produced by infrastructural constraints but not necessarily (or not obviously) productive.

At the level of literary analysis, this attention to parts that do not seem to serve a purpose is akin to making space for junk: the details that seem to lead nowhere, the red herrings of plot, the characters who disappear without trace. These incidental details play roles that are not always evident, seeming to fall out of significance when a plot takes a different turn – or perhaps even brush the thresholds of narrative rabbit holes that, were a reader to go down, might lead to a textual abyss. In these texts, it is in this sphere of the incidental and miscellaneous where meaning is in the process of being reworked. This is a different kind of adaptation to the one based on selection of those with traits better fitted to the surroundings. It involves an ongoing working out of possible routes: filling in where other functions have left off, not because one mechanism is better or worse than another, but because a situation demands it.

This was a subject Gould would expound on at much greater length ten years later, in his book on the fossils of the Burgess Shale, *Wonderful Life* (1989). The

book is as much a philosophical reflection on the role of contingency in the unfolding of life as it is a description of an extraordinary ecological anomaly. The Burgess Shale is a site in the Canadian Rockies which houses the fossils of evolutionary anomalies from the Precambrian era – the era before the Cambrian explosion that brought about the profusion of multicellular (eukaryotic) life through meiotic (sexual) reproduction. These are species that fell out of ecology, creatures with five eyes and phenotypic features with unfathomable functions, ‘grubby little creatures of a sea floor 530 million years old’ (1989, 52). ‘We greet them with awe,’ Gould writes, ‘because they are the Old Ones, and they are trying to tell us something’ (52). What is the message they carry? That the unfolding of life is not so much a developmental trajectory as a series of stops and starts – ‘a record punctuated by brief, sometimes geologically instantaneous, episodes of mass extinction and subsequent diversification’ – an ongoing cornucopia formed by speculative going-towards and moving-aways (54). His most radical deduction from the creatures of the Burgess Shale is that the evolution of *Homo sapiens* was not inevitable, but a phenomenon that emerged out of contingent and improbable circumstances. A parallel world – and perhaps many of them – exists in which the form of life that is called *Homo sapiens* does not.

One of the unresolved tensions between evolutionary and molecular biology is the question of the rate of mutation. If evolution happens via natural selection, and if selection works at the level of genes, the evolution can only really occur slowly, mutation by mutation, over a number of generations. A code fixed at the point of conception does not offer much in the way of flexibility. However, in epigenetic accounts of phenotypic flexibility, genes are activated or silenced by environmental influences. The inheritance of gene *states* as opposed to gene *products* has been theorised as a form of evolution that accounts for much speedier forms of adaptation, and more experimental forms of life (Jablonka and Lamb 2005). This is one way of accounting for the speed at which certain kinds of differential variation occur among members of the same species; or indeed, phenomena of comparable adaptations happening among species sharing the same ecosystem.

Two diverging pathways for genomics emerged in the immediate aftermath of the HGP. The different concerns and preoccupations of these pathways can be understood by distinguishing postgenomics first as a set of practices, methods and technologies within molecular biology, within the infrastructure set up by the proliferation of molecular biology laboratories from the 1950s, and massive investment in genomics from the 1980s; and second, postgenomics as the moment in the history and philosophy of biology that came after sequencing

of the human genome, particularly in the turn what had been known as ‘junk’ or non-coding DNA. The tensions between these pathways has led to one of the life sciences’ more debated topics – the meaning, relevance and scale of changes in the genome that do not involve mutations in the sequence itself, and that might be induced by influences outside the genome: epigenetics. Taking junk into account means living with the vast contingency of genomic functions – and often, their unknowability and illegibility – and thinking the genome as responsive and plastic, rather than more or less fixed. To use Evelyn Fox Keller’s formulation, the study of junk DNA allows a move from discussion of ‘gene action’, to thinking of the genome as a responsive organ involved in all kinds of interactions in and outside the body (Keller 2016). The focus of this chapter is the profound implications the postgenomic era has had on the kinds of relations that become perceptible, or that take on new kinds of significance; here, through the lens of environmental toxicity, ecological transformation and interpersonal responsibility.

Since the 1990s, epigenetics has referred to the study of heritable alterations to genetic expression that do not involve changes in the nucleotide (DNA) sequence. Classical genetics and molecular biology rely on an understanding of DNA as a coding blueprint for the organism, fixed from the point of conception, based on a one-way flow of information from DNA to RNA to protein; research in epigenetics, on the other hand, has shown that gene expression can be influenced well past the point of conception by environmental factors, leading to heritable changes in future generations. In their thesis of four evolutionary dimensions, Eve Jablonka and Marion Lamb describe this heritable responsivity as a different kind of inheritance system involved in evolution. They argue, ‘not everything inherited is genetic’; rather, behavioural, epigenetic and symbolic can have both ‘direct and indirect influences on evolutionary change’ (2005, 107). This line of thinking would take post-Synthesis evolutionary theory away from a ‘gene-centred approach, because it is no longer necessary to attribute the adaptive evolution of every biological structure and activity, including human behaviour, to the selection of chance genetic variations that are blind to function’ (Jablonka and Lamb, 2), as in Richard Dawkins’s *The Blind Watchmaker* (1986).

Epigenetic descriptions of inheritance are part of a broader epistemological shift that Robert Laughlin has characterized as a shift from the age of reduction to emergence. Laughlin argues,

What we are seeing is a transformation of worldview in which the objective of understanding nature by breaking it down into smaller parts is supplanted by the objective of understanding how nature organises itself. (2005, 76)

This is a view of life as an emergent process unfolding across various levels of experience – genetic, epigenetic, symbolic and behavioural. While a reductionist standpoint requires that ‘physical law is the motivating impulse of the universe’ as an ever-present force without origin or explanation, emergent perspectives understand physical law as ‘a rule of collective behaviour’ (Laughlin, 80). Epigenetics is still heavily couched in the language (and ideologies) of molecular biology, but some of its more radical propositions highlight the insufficiency of the merely molecular to give a full account of life itself. Life cannot be reduced to code; it is thicker, messier and less easy to extract, exchange and manipulate than the rhetoric of industrialized genomics suggests. If the sovereignty of the atom has been challenged by its power of destruction, then the ideological sovereignty of the genome has been ruptured by its permeability to environmental, or non-genetic, influences and the question of programme by that of organization.

Life is fragile, and change is possible. This is the delicate hope with which Gould ends *Wonderful Life*. Evolution is a lottery, and humans are not its inevitable conclusion or crowning glory: ‘May our poor and improbable species find joy in its new-found fragility and good fortune!’ (263). This invitation turns the question of humanity from mechanisms of survival to what AbdouMalik Simone describes as rhythms of endurance among low-income urban communities in the Global South. Rather than building worlds in the name of permanence and improvement, social life among these communities is organized around ‘enduring through the absence of a world’: a process of ongoing reinvention without a sense of a coherent narrative, or a solid sense of place, nor stable category of home or claim to belonging (2018, 97). While survival – in a straightforwardly selectionist sense – involves a logic of enclosure (through resource capture, habitation, reproduction), endurance is about finding ways to be in time, and with no guarantees that this will ensure lasting security.

Both Gould and Simone attend to the political urgency of thinking with the periphery, whether this periphery speaks from millions of years ago, or from the informal and daily-wage sectors that sustain flows of exchange in megacities in the present. This is not to reify the periphery as a site of theoretical extraction. To attend to how places and temporalities that have been made invisible or unknowable, or seemingly unliveable by the dynamics of history is to come to a sense of the world that is not bound in ontological terms to the selectionist agendas that would perpetuate the ongoing creation of peripheries everywhere, for the benefit of an increasingly limited number of people.

Chernobyl Prayer and the Southern Reach trilogy construct peripheral imaginaries in landscapes that have moved beyond the bounds of human

control. In these landscapes, modern assertions about species borders, genomic immutability, and the prevailing power of natural selection as the primary mechanism of evolution are all put to the test. Their ultimate inadequacy as trustworthy descriptions of these lifeworlds – or in offering psychical, structural, biological or economic repair for those enduring within them – leads to the unravelling of a particular order of knowledge. Thinking with some of the key voices surrounding this book – and in particular, with Hartman, Wynter and Lowe – as well as to reiterate one of my central arguments: this order of knowledge has privileged a particular conception of the human that is in the process of being reconfigured. In Alexievich and VanderMeer's texts, this destruction involves attending to both the trenchant violence and enduring fragility of human lifeworlds as they disappear into ecosystems. What's key here is to consider peripheral imaginaries – and attending narratives of interruption, contingency and indefinite cohabitation – as a political frame where established categories of knowing the self, body, and world are forcibly suspended, and repositioning other ways of knowing.

Biomorphism is a key concept for the texts discussed here, an artistic and design practice that models infrastructure on biological forms, in the shapes and processes of living organisms. While the double helix has dominated representations of hereditary structure since the early 1950s, this has been accompanied by more unwieldy interpretations of living matter, its contours and connections. As the era of the genome gives way to messier accounts of where heredity is housed, the borders that seal it from external influences, the mechanisms that regulate it, and the influences that interrupt it, the aesthetic sovereignty of the double helix is increasingly being challenged by passages of influence in and out of – and within – cells that carry genetic information. The Chernobyl syndrome is not so much concerned with a logic of exposure (that is, an ideal molecular sphere exposed to the elements) as it is with aesthetics of interdependency – inscription, influence and indeterminate relations that cannot be captured through technologies that privilege enclosure, rather than extension. In both these texts, the periphery – as a site defined by its provision of raw materials (of labour, biomatter, and energetic resource) – becomes a technique of estranging the idea of a core programme or a sovereign code. This is not for the sake of an imaginary defined by networks and flows – that is, the kind of disaggregated model of Big Data where living forms are made to disappear into algorithms. Rather, peripheral biomorphism unravels the epistemological conditions of a world reduced to traits and atoms, making space for complexity as both a political proposition and aesthetic intervention.

Mutation and fragmentation in *Chernobyl Prayer*

Three themes dance dangerously in Alexievich's *Chernobyl Prayer*: sovereignty, the periphery and endurance. Chernobyl seems like an event from science fiction, and sections of *Chernobyl Prayer* read as if they have been lifted out of *Roadside Picnic*. The explosion site is called 'the Zone', evacuated of humans, filled with the carcasses of dead animals and cement graves, a toxic wasteland waiting to infiltrate the bodies of those who venture to traverse its borders: a sleeping monster. The book is organized into three sections, broken into monologues. These monologues were originally interviews between Alexievich and her subjects, and are presented stripped of her questions, fragments of accounts from a chorus of different voices, summarized by the author in the short titles she gives to each of them: 'monologue of a village on how they call the souls from heaven to weep and eat with them'; 'monologue on something more remote than Kolyma, Auschwitz, and the Holocaust'; 'monologue on a freak who is going to be loved anyway'. Each section ends with a choir – the soldiers' choir, the folk choir and the children's choir – where names become grouped together and the accounts are separated by line breaks.

Igor' Sukhikh calls this form 'collective testimony' (1989), which evades more empirical modes of data capture. Alexievich uses techniques of redaction and postponement to prevent the text standing as legal or medical evidence: delaying naming the interviewees, removing dates of interviews, removing names, recording silences or failures to speak, letting these absences exist in uncertain time. The sparseness of information reaches a crescendo at the end of each section in the choir sections, where the breaks between individual accounts are dissolved, and we are given only a list of names: a literary monument to the dead and dying. The only direct question that appears, from interviewer to subject, is in the first interview, 'The author interviews herself on missing history and why Chernobyl calls our view of the world into question' (24). The text's central question *is* this question – the questioning of human understanding, of the relation between human and world, and of human survival after disaster.

Irina Marchesini reads this as a new genre composed out of the necessity 'to communicate such collective trauma' (2017, 319). For Marchesini, *Chernobyl Prayer* is a 'novel-choir' where 'the voices of the witness sing in tune but, at the same time, are isolated' and also 'mediated by authorial control . . . deeply immersed in them' (319). This arresting description conveys the troubled aporia of agency generated – and exposed – by Chernobyl. Collective forms of memory offset by individual evidence: a strategy of a state in crisis, trying to

mitigate disaster by dealing with it on a case-by-case basis. ‘After Chernobyl, we began learning to say “I”’, says Natalia Roslova, chairwoman of a women’s committee of children (CP, 268). Authorial control is powerful, but also in pain, inextricable from the destruction. Sovereignty is in crisis, and this crisis extends across political, cultural, and biological realms: the deep corruption of the Soviet state, the fragmentation of cohesion between different cultures contained within it, and the short- and long-term damage to people’s bodies and those of their future children. The effects of radiation sickness spread across the body; those exposed ‘rarely had just one disease but instead a complex of illness swarming their bodies like a murder of crows’ (Brown 2019, 163). Complexes of illnesses and collectivities of trauma offered new imaginative alliances after Chernobyl, along with metaphors of swarming and contamination – metaphors that resonate with what S. Eben Kirksey and Stefan Helmreich have called ‘multispecies ethnographies’ (2010): the study of ‘the host of organisms whose lives and deaths are linked to human social worlds’ (2010, 545), bodies that cohabit with a multiplicity of other creatures, bacteria and chemicals that often cannot be read or identified. This is a conceptual bridge between anthropocentric ethnography and the dissolution of species borders into extrinsic life. In political terms, this would also rupture any kind of typological hierarchy of being fostered through the language of scientific racism. How could form keep up?

The illegibility of Chernobyl meant that there was no fixed genre through which to narrate it. Many of the voices of *Chernobyl Prayer* move their experiences of it across accident, war, horror, and mystery: ‘They call it an accident, but it was a war’ (CP, 177); ‘Horror is our natural habitat’; ‘I remember it as a war’ (CP, 200). Part of the difficulty of finding forms to imagine the disaster was the reality that there was nothing that could be done to repair it, to dial it back, to save its subjects from the ruins:

Chernobyl. There is not going to be a different world for us. At first, when they took the feet from us, we gave open expression to our pain; but now we live with the realisation that there is no other world for us, and we have nowhere else to go. The sense that we are now forever fated to live on the soil of Chernobyl is something new. A lost generation returns from war . . . do you remember Remarque? But it is a perplexed generation that lives with Chernobyl. We are dismayed. The only thing that has not changed here is human suffering. That is our only currency – non-convertible, of course! (CP, 179)

Chernobyl is an end in itself: there is no dreamworld in sight, no ideological utopia, no possibility of a different future. World-building is no longer an

option. The ground ('soil') renders this obsolete. When wars end, people return – fewer in numbers, accompanied by trauma. But there is no precedent for dealing with a war between the ground and human life. The exclusion from universal currency works as both an economic comment about a lack of access to international finance flows, as well as the non-convertibility of Chernobyl into universal descriptions of human experience.

Here, perplexity rather than loss contours the situation – what to do with the world, in the world, when the future has been cancelled, and when the conditions of the present are fraught with uncertainty and disinformation? This is not just about a lack of information, or secrecy, but the forms in which information arrived – 'in doses', as Anne Speckhard writes, 'often with considerable delay following the accident, and in most cases in contradictory and fragmented ways' (2005). This is a post-truth regime engendered by uneven and unguaranteed modes of transmission and receipt, where everyone is an expert and no one can be trusted. It leaves those who live between informational doses from unverified sources in limbo, waiting for an account of reality that will enable them to reconstruct what has been blown up – descriptions that, when they come, invariably leave them with no place to go.

Having 'no place to go' is one of the recurring motifs in Simone's study, where the value of action and labour is perpetually out of sight and difficult to determine. Instead of this, a sense of being missing in action prevails, amidst 'longings for extinction and desperate boosts of immune systems' (2018, 7). Collectives are temporary and fragile, and any sense of the political is bound up with the radical precarity and uncertainty of dwelling and living. Political declarations and manifestoes only go so far in delineating the scale and spaces and time-zones of political action, tools to be taken up and put down when necessary, as a given situation demands: 'it is necessary', Simone writes, 'to consider the shape-shifting "bodies" of collective enactment, all of the ways in which people and things can and might operate in concert' (127), and in ways that do not necessarily appear as established forms of intervention. Bodies that shift towards, and merge with, and fall away from each other; bodies that are fraught with all sorts of internal contradictory dynamics. Collectives that emerge out of shared articulations of the conditions for enduring the present, rather than in the name of futures that cannot be imagined, much less guaranteed. This is the peripheral imaginary invoked by disasters whose scale and temporality cannot be known or enclosed.

As with genetic ancestry testing, the uncertainty of evidence can be generative of political claims in itself. On the peripheries, evidence has a troubled status: 'what does it mean to collect evidence of harmful situations?' (Simone, 122). In

Life Exposed, Adriana Petryna identifies the emergence of ‘biological citizenship’ in post-Soviet Ukraine in the aftermath of Chernobyl (2002). Knowledge about the impact of radiation on biological processes and health became a political resource, and a way for citizens to ‘stake their claims for social equity in a harsh market transition’ (Petryna, 4). Access to state welfare was often contingent on proximity to the exclusion zone. Officially, the number of deaths directly caused by Chernobyl remains one hundred; in practice, a multitude of legal, medical and welfare frameworks were put in place for managing its long-term effects.

Petryna’s argument is that access to these frameworks – in the midst of all sorts of precarity induced by Ukraine’s new dependence on international finance organizations – began to organize a model of citizenship and to legitimize emerging democratic institutions in post-socialist contexts (7). Technologies of diagnosis, knowledge of symptoms and legal literacy formed a toolkit for enduring – unevenly – the new realities of a radioactive present, and for gaining access to welfare (Petryna, 15). Alongside this, the state used images of children born without limbs – humans estranged from recognizable forms – to assert its own claim to legitimacy: these radioactive mutations were the inheritance of Soviet corruption inscribed on the bodies of the young. Biological malformation became a way of asserting the sovereignty of a newly independent Ukraine: ‘Such images reminded viewers of the cause of physical suffering. Out of the mire and mess of Soviet mismanagement of Chernobyl had come a dreadful accumulation of diverse malformations’ (Petryna, 9). These examples show how Chernobyl was instrumentalized as both national origin story, and strategy for keeping going in a present without guarantees.

This latter point – living without guarantees – gets at the broader ontological crisis posed by the Chernobyl explosion, in the emergence of a reality that did not permit imaginative space for world-building, remaking or repair, much less improvement – in either social or biological senses. People carried on living there because of a lack of options (one of Alexievich’s subjects calls the exclusion zone ‘the great Atlantis of the peasantry’), and because of the caesuras it placed in cultural narratives of living a good life. The idea that life can be narrated as a series of hurdles to be overcome, or that things will work themselves out in due course, is a hope that recurs throughout the book’s fragments, the most proximate sense of a world beyond Chernobyl:

Our neighbours laid a new floor that year from the local forest, they tested it: the background radiation level was a hundred times over the safety limit. Nobody tore up those floorboards, they just carried on living there. Everything will sort itself out, they reckon. (CP, 131)

This description lends new meaning to ecological cohabitation. Following Moore (2013), the waste products of industrial capitalism work in and through nature, the radioactive trees constituting toxic infrastructure of human dwelling. This periphery's reliance on raw materials sourced locally embeds it more deeply into the violent and annihilating outcomes of core industrial science programmes. The inhabitants of this toxic site cannot hide from radiation, as if from bombs or shrapnel: 'it's everywhere. In the bread, the salt . . . we breathe radiation, we eat radiation. . . . Everything has been contaminated. Now we're faced with working out how on earth we should live here' (CP, 133). 'Here' does not just mean the geographical site, but 'in' the world as such – in bodies that are living with unknown effects, 'here' as in a particular moment in time when the order of things seems to have been suspended and its full weight hangs over the present.

The unknowability of Chernobyl's long-term effects on health had a market logic. In 1992, John Gofman called out the dazzling scale of 'biomedical un-knowledge' around nuclear pollution, which he defines as 'an abbreviation for all the findings which are the opposite of what is true about health and disease' (1992). Biomedical un-knowledge has become a tool for capitalizing on disasters – nuclear-related and others – while the uncertainty around possible health effects enables political apathy around scientific programmes (Yaroshinskaya 1995). It is not in the interests of governments with large nuclear energy programmes for their citizens to know too much about the health risks of their investments. M. Susan Lindee notes that the US government kept information about Chernobyl secret because of its Cold War defence programme (1994, 243). The focus on mismanagement at Chernobyl was not just a way of apportioning blame to a few individuals (or, in the West, the entire Soviet state), but a strategy for not talking about the larger question of how and if nuclear power should be used at all, given its annihilating potential (Yaroshinskaya 1995). The narrative of accident and disaster was a way of isolating and catastrophizing the situation as singular case, rather than a systemic time bomb.

The market logic went further: the Chernobyl explosion 'created a natural experiment with human populations', in Lindee's words (243). Humans (and nonhumans) living in its fallout became sources of data for the effects of large doses of radiation. An unnamed person in 'The Folk Choir' relates finding out from a family member in Russia that scientists are "using you as 'black boxes'", making them into experimental test subjects for learning more about the effects of radiation. The person responds: 'We think we are living life like everyone else. We walk around, go to work, fall in love. . . . But no! Actually, we are recording data for the future' (CP, 188). This is the sense of the future articulated for those

who lived past the explosion – one whose biomedical, energetic and military infrastructure (its industrial programmes) will be shaped in part by the data of destruction extracted in the nuclear periphery. The more recent emphasis on biodiversity around Chernobyl corroborates this: it becomes an enclosed space for speculating on all kinds of nonhuman flourishing made possible by nuclear modernity, a way of closing down the more difficult questions around the long-term effects on human heredity. There are many data available on nonhuman lifeforms and communities around Chernobyl; the data on humans are less easy to identify.

And yet, people also knew. In Ploky's *Chenobyl: History of a Tragedy*, the former head of agricultural administration in Kyiv, Vasyl Synko, recalls the speed and force of evacuations: "Everyone knew that every day and hour spent in the zone would have a deadly effect on the organism of every individual" (2019, 202). The effect of high doses of ionizing radiation on humans can mean changes to genetic structure, which might be passed down to subsequent generations; that is, the genomes of people exposed to radiation in the fallout of the explosion may alter the genomes of their future offspring, and it is unclear whether these alterations are permanent. Much of this was known before the explosion; indeed, the biological effects of radiation were well known by the late 1940s (Lindee 1994; Shevchenko 1999). Studies on the effects of radiation on genetic structure had been ongoing since the 1930s, in T. H. Morgan and Hermann Muller's fruit fly laboratory at Columbia University. More than this, radiation was developed as a way of treating cancer, 'a technology for the manipulation of the hereditary material' (Lindee, 59). But most pertinently, the genetic effects of radiation on humans had been a large area of study, particularly in the United States, since the bombings of Hiroshima and Nagasaki in 1945. The Atomic Bomb Casualty Commission (ABCC) was set up in 1946 under Truman, with a focus on scientific research rather than biomedical intervention, and genetics was one of its central areas of study. But as Lindee points out, studies on genetic mutation before the development of molecular technologies were hampered by difficulties of evidencing changes, which was done through selective breeding through which genetic structure was inferred.

What does 'mutation' mean in these contexts? In the sense understood by a genealogy of studies on the effects of radiation, it did not mean any hereditary change in genetic material, but a deleterious or 'specifically threatening change' – in Lindee's words, 'a dangerous morphological trait with implications for the future of the species' (170). Survivors of Hiroshima and Nagasaki and their descendants were being scrutinized through a partial lens, which came with all

sorts of assumptions about normative morphology, but with a limited purview of what a significant mutation would look like (i.e. not sterility, reduced fertility, 'minor' malformations and so on). The ABCC study was focused specifically on mutations that would add to the 'load of the human gene pool' (Lindee, 191), rather than on events that might have genetic implications, but would not lead to evolutionary changes long-term.

What the ABCC was looking for were not general or already-known issues that might be exacerbated or made heritable through radiation, but for – in Lindee's words – 'genetic monsters' (60). The commission was imbued with a particular imaginary around what genetic mutation meant, more attuned to Godzilla and other science-fictional horrors than to the (supposedly) more low-grade effects already in evidence. The study was criticized for this narrow focus: pouring research resources into work that would not benefit the communities and ecosystems directly affected by the effects of radiation, but which were rather focused on more grotesque manifestations. This highlighted, too, a fixation on the creation of new forms of life through US techno-science.

The Chernobyl Syndrome is a punctuation mark in historical time: the end of a hegemonic order of knowledge that has governed global articulations of subjectivity, selfhood and political participation since the European Renaissance, sustained through colonial capitalism. This punctuation mark was formed not by the shock itself, but through new intimacies between body and environment, where it became vital to traverse the epistemological rupture between infrastructural enclosure and bodily inscription (the mind-body analogy imposed onto Man's relationship with Nature). These intimacies and their devastating implications about the fragility and unevenness of human sociality expose the infrastructure of the present as unsustainable. Chernobyl was not the exception, but brought the implicit violence of this infrastructure to global awareness. Hence the need to double down on keeping its full implications – and its data – secret.

This punctuation mark appears in a shift in representing biological forms – human and nonhuman. Hundarova defines biomorphism as 'using the morphology of the human body for the topographic inscription of memory traces' (2001, 267). Memory – the domain of the mind – is lured down from its nesting place in the world of thoughts and imagination to form the processes and dynamics that form the body's geometries and, beyond this, the conditions for its interdependencies with and within others. This strange and dangerously illegible memory-scape unravels the idea of far-off signals that encode raw

material, bringing the processes that determine our biosocial lives into the warp and woof of the everyday. Memory and morphology are coextensive.

Bodies need to take on new meanings after Chernobyl because the meaning of their bodies after the disaster is required to lose relevance. Bodies become sites of political and economic contestation about the extent of Chernobyl's damage and with it, state responsibility. In 'Monologue on the old prophecies', a mother describes her daughter born 'like a little living sack, stitched up on all sides, without a single slit, only the eyes were open' (CP, 95) – no genitals and only one kidney. Doctors have classed her as 'disabled from childhood':

What do they mean, 'disabled from childhood'? She's disabled from Chernobyl. I've studied my family tree: there hasn't been a case like this, they've all lived to eighty or ninety, my grandfather lived to ninety-four. . . . They've called me crazy, laughed at me. They said children like that were born even in ancient Greece, ancient China. One official shouted, 'You're after Chernobyl benefits! Chernobyl money!' I'm amazed I didn't faint in his office, die of a heart attack. But I mustn't allow that. (CP, 96)

This passage lays out four articulations of time: the developmental time of childhood, the genealogical time of family history, time that draws continuity between ancient and modern lifeworlds, and the time of Chernobyl. Chernobyl figures here as an abruption in chronological time, on the other side of which lies a new set of behaviours ('laughed at me') and responsibilities ('benefits! . . . money!'). Chernobyl has been allocated a space in time, but accessing this time is conditional on obscure evidentiary and legal mechanisms of proving causality. The woman's daughter, nameless doctors and officials have implied, is some kind of evolutionary throwback, rather than a new form of human generated out of exposure to radiation through the contamination of her mother's body.

This goes back to Lindee's point about the fixation on (and here, denial of) the creation of novel phenotypes as a result of radiation. An improbable and quasi-mythical evolutionary lineage – the 'old prophecies' of ancient times about children born without organs or limbs – is invoked as a way of minimizing state responsibility. The representatives of conflicting explanations circle around each other in syntax, not touching: the abusive words of the official are cordoned into quote marks, setting down a border between the mother and her claim, 'two states divided by barbed wire: one, the Zone itself; the other, everywhere else' (CP, 268). The psychic cost of living with the perpetuation of state gags around an open secret manifests in faintness, shock and anger, the 'mess of emotions' the mother experiences when she sees other pregnant women, and 'a

neighbour's pregnant dog': 'surprise and horror, envy and joy, there's even some vindictiveness' (CP, 97). There is nowhere to put the truth, nor any coherent narrative with which to register trauma. The time of Chernobyl is a restricted zone, and this denial of access engenders testimony with a sense of no place to go, and no time to head towards.

What is interesting here is the articulation of multiple configurations of time – developmental, ancient, genealogical and the time of the disaster – in the attempts by the doctors, and officials, and the mother to try to place the daughter's body in time. There is no finite explanation for her form, and no resolution given in the narrative. In the text, she exists between these time-zones. The biopolitical placement of her body in developmental and genealogical time conflicts with the mythic temporality of prophecies from the past coming true in the present, and atomic time, which is (here) unknown and unquantifiable in terms of long-term effects on biological life. There is an epigenetic analogy: codes that are permeable by influences external to their programme, biological processes that express or silence parts of the genome, that draw old forms into the present long buried deep in the genome's 'junk' DNA, and the speed at which environmental influences (broadly speaking) can lead to alterations in genetic structure. This analogy is made possible by the simultaneity of time-zones in the mother's testimony. The Chernobyl syndrome extends across morphological and metaphorical realms: fast-moving adaptations in the genetic structure, across generations and a synchronicity of conflicting measurements of time that those affected by it are compelled to endure.

The postgenomic condition is not only centred on vast tracts of genomic data amassed through sequencing technologies, new testing devices and precision medicine. It also concerns forms of synchronicity in narrating human experience. In the passage above, the rupture between the biochronology of biopolitics – formed by developmental and genealogical time – the mythic time of ancient history, and the shock-time of disaster are suspended together. This suspension is a site of deep anxiety, and even psychic disintegration. This, as Simone argues, is characteristic of lifeworlds of the periphery: uninhabitable, which 'endure through the absence of a world . . . stubbornly holding onto its constant demise' (2019, 94). The postgenomic condition goes beyond new descriptions of ontology: it traverses the edges of biopolitical certainties of management and control, rewriting or writing over scientific justifications for political economies based on survival and selection.

I'll move to VanderMeer's Southern Reach trilogy through an intertextual segue, a moment in Alexievich's text when a biologist describes her thesis on the

behaviour of wasps as an analogy for the difficulty of 'breaking away from what you are used to' (CP, 206):

I spent two months on an uninhabited island. I had my own personal wasps' nest there. They accepted me as a member of their family after a week of sizing me up. They didn't allow anyone closer than three metres, but within a week I was allowed to within ten centimetres. I fed them jam from a matchstick. 'Do not destroy an anthill: it is a splendid alien life form,' was a favourite saying of our lecturer. A wasps' nest is linked with everything in the forest, and I too gradually become part of the environment. A baby mouse would run up and sit on the edge of my trainers. He was wild, a forest animal, but he already saw me as part of the landscape. I had been sitting here yesterday, I was sitting here today and I would be sitting here again tomorrow. (CP, 206)

This passage crosses between two spheres of reality: the language of habitation and property – 'uninhabited', 'my own personal', and 'their family' – and of bordering – 'sizing me up' – transforms into the vocabulary of interdependency – 'linked with everything', 'becoming part' and 'part of'. The 'I' of the passage becomes increasingly detached from a grammar of action. At first, this is a simple reversal between her and the wasps: the nest goes from being 'my own personal wasps' nest', with its stark and colonial overtones, to the habitation of a particular family, with its own logic and regulations around what and whom should be admitted. This sphere of property and habitation fixed to a particular site is marked by affects of suspicion and permission. This is a gentle lure that might make a reader forget the more violent implications of a biologist observing wasps, bracketing her endeavours in a benign form of scientific investigation. There is even a pay-off for the wasps: jam from a matchstick, an image playing on the absurdity of scale as a way of generating sympathy for the encounter between species.

The passage takes a turn in the middle of the paragraph, through a memory of a moment of teaching by an authority figure that, it is implied, is trusted by the biologist. The lecturer's words are delivered like a proverb, an analogical placeholder for a broader moral message. This message is that we do not know the creatures with whom we cohabit ('alien lifeform'), and that they are things of wonder rather than sites of fear ('splendid'), so we should not try to destroy them. 'Anthill' here is less of an architectural description than a synecdoche for a miniature ecosystem and nonhuman community. Like Kropotkin's description of an alien planet based on mutual aid, this quasi-proverb transports the reader – via the biologist – into an alternative social system. Here, the passage moves to

metaphors of linkage, rather than property, and of the impossibility of severing the wasps from the broader system they inhabit.

In another context, this might read as romanticizing, reifying or anthropomorphizing, but this example is shared in the context of people getting used to a radical and traumatic change in their relationship with their surroundings. The biologist is asking the listener to bear with her in this scene as she, too, becomes part of the memory. This happens, grammatically, in the *gerund*, somewhere between doing and being done to: 'I had been sitting . . . I was sitting . . . I would be sitting here again' – a past that continues as long as the baby mouse that has become used to her presence enough not to fear it, to take it as 'part of the landscape', continues to visit the edge of her trainers, and as long as she can continue to narrate this memory. This is a scene of endurance, full of uncertainties and unknowns, upon which the biologist can draw in the present: a memory of a body sitting in the same place at the same time each day, extending across past perfect, past continuous and the future anterior. The emphasis here is as much on the way that time, rather than the space of the forest, becomes a site for articulating modes of cohabitation, or sharing space, between lifeforms organized around different social systems.

Transitional characterization in the Southern Reach trilogy

The Southern Reach trilogy is also organized around a mysterious event, and the subsequent contamination of an American coastal periphery. The trilogy unfolds on a site of land a few kilometres long – 'part of a wilderness that lay adjacent to a military base' (VanderMeer 2014a, 94) – which the government has cordoned off and designated as 'Area X'. *Annihilation*, the first book, follows a team of four experts, a biologist, a psychologist, a surveyor and an anthropologist – all women – as they head into Area X, and is focalized through the perspective of the biologist, whose name is given much later in the narrative. The first book ends with all the experts dead save the biologist, and the production of her genetic clone in Area X. Original and clone go their separate ways: the biologist stays, and the clone 'returns' to the other side of the border. The team of experts have been sent in by a clandestine government body known as the Southern Reach, 'so secret that it has almost been forgotten', and *Authority's* narrative is focalized through its new head, Control, whose efforts to control the spread of Area X past the borders manufactured by his organization are failing. The third book, *Acceptance*, follows Control and the biologist's clone into Area X as they

search for the original biologist. When they find her – or what remains of her – ‘she’ has transformed into a massive eco-monster, benign and on the move, a materialization of the larger story the books tell about the forms and practices of slippage between lifeforms laid bare by an unspecified systemic disaster. Like a quasi-proverb arriving unexpectedly in a memory, becoming part of metaphorical infrastructure for living in the present, these forms and practices cannot rely fully on the evidentiary economy of its authority figures (nation, agency or scientific expert).

My reading here will focus on what I call transitional characterization in the Southern Reach series, whereby the stability and reliability of character as a narrative object is placed under various sorts of pressure. This is part of the series’ attention to what Jon Hegglund calls ‘the contingency of ‘human’ as a narratological category’ (in James and Morel 2020, 42). There are all sorts of transitions, displacements and disappearances in the narrative. For Hegglund, ‘the narrative works to erode our confidence in the category of the human through the narrative description of the storyworld, and indeed, through the narrator’s retrospective description of her own embodied experientiality within the storyworld’ (38). This is a helpful point of departure for understanding what these figures of transition, disappearance and displacement are up to. The word ‘erode’ is key: across the series, there is a gradual process of cognitive estrangement from the kinds of certainties offered by knowing that a character is human, and all the implications about the sovereignty of information that this category brings with it.

VanderMeer does not give up on the category of human. Rather, the texts are interested in how narrative-making becomes a site for negotiating its borders. VanderMeer’s technique of transitional characterization shifts the political stakes of character building to questions of toxic influence and ecological violence, and allows for affect to take up similar demarcations of narrative space as characters do. In these extended possibilities for characterization, discontinuities between character and person open up in ways that are similar to the abruptions to genealogy and property in Chapter 5. As Hegglund argues, in these texts there is ‘an openness to the ways in which narrative actively and dynamically constructs distinctions between subjects and objects, figure and background, characters and storyworld’ (30). The effect of this openness is not to flatten out relations to a field of radical indeterminacy and to leave it there; rather, VanderMeer is interested in what Beer calls ‘the inextricable web of affinities’ which ‘exists not only as interconnection in space but as succession in time’, and consequently, in ‘a sense of multiple latent relations which are permitted to remain latent’ (2010, 156–7,

161). Relations which are permitted to remain latent offer an extraordinary feint to the demands of making code visible and legible; keeping mystery embedded in narrative, without the grounding of characters taking up and making use of the miscellaneous resources they find themselves amidst, often because they are unable to make sense of them. 'The maze is what matters' (Beer, 167), a gesture that attends to Aran Ward Sell's observation of a distinction in the novels between foregrounding 'malign human influence' in an often correspondingly malign ecosystem, rather than 'human mastery' over a generically 'good' Nature (2018, 98). The texts decentre and regionalize 'human' control, while keeping in sight the muscle memory of destruction that continues to mould experience.

The biologist is an expert in transitional environments: environments that border land and sea. Area X, which the biologist calls a 'rich biosphere', has 'transitioned several times, meaning that it was home to a complexity of ecosystems' (VanderMeer 2014a, 11–12, 30) – there are forests, swamps, salt marshes and beaches in close proximity, low tides that run up to deer and otters, and creatures that have adapted to the post-disaster habitat. The humans have long since left, evacuated by the Southern Reach, and the only ones who go in are those on expeditions. The biologist and her team are the twelfth Southern Reach expedition to Area X, and all the others have disappeared. While in Area X, they are prohibited from attempting any kind of communication to the outside world 'for fear of some irrevocable contamination' (VanderMeer 2014a, 7). How contamination happens, what it is, and what the long-term effects will be are unclear, and this lack of understanding and prevailing sense of uncertainty about what is going on in Area X facilitate an acceleration of emergency powers, and a logic of sacrifice is applied to those going in. If the biologist's team survives, it will be because they are the 'best fit' to survive the environment and to adapt to its conditions. If they do not, the idea is that precautions will prevent them from spreading the contamination further, and the Southern Reach will – at some point – be able to extract the data they collect, just as the biologist's team does for those on previous expeditions.

Placing a biologist at the centre of the narrative – someone who (it seems) could not know more about the environment they are investigating than anyone else, one of the most qualified people for this particular job – heightens the anticipation when inexplicable things start happening. Early on, an enormous wild boar charges down a trail towards them:

I had the startling impression of some presence in the way its gaze seemed turned inward and its head wilfully pulled to the left as if there were an invisible

bridle. A kind of electricity sparked in its eyes that I could not credit as real.
(VanderMeer 2014a, 17)

This description is the first of many in the series when techno-scientific vocabulary cannot lasso the strange forms of Area X. The boar seems to the biologist to be guided by a force that is just about perceptible – ‘some presence’ – but which remains outside the realm of her comprehension. The idea of an invisible bridle reads as a dark joke on Darwin’s co-option of Adam Smith’s invisible hand, the mysterious force that guides markets, societies and (for Darwin) evolution towards good outcomes via individual actions (an individualized account of emergence as an equalizing force for income distribution) (Smith 1759). The boar seems possessed: not by a spiritual force, but a manmade one – electricity, or at least a force that resembles it. This moment temporarily expands the compressed mysteries of Area X, mysteries not confined to the site. What unknown futures have been cancelled or sacrificed for the sake of a society that has based its biopolitics on economic metaphors, and its industrial development on the extractive processes necessary to generate electric power? Is it the electricity in the boar’s eyes that is not credible, or the eyes themselves; that is, does the biologist’s doubt reflect her own uncertainty, or the reality of Area X itself?

The boar becomes a conduit for a swarm of displaced metaphors that fail to carry the biologist over to empirical deduction, figures of speech vying for space as the creature heads off into the underbrush. She tries to find explanations from ‘entirely rational biological theories’ and past experiences, but finds herself instead ‘staring into the future again’ (VanderMeer 2014a, 17). This segue – from the natural laws of post-Enlightenment science to new biophysical possibilities in an unknown future – is the epistemological pivot on which the entire series turns. Like *Chernobyl Prayer*, it is the pivot between illegibility and secrecy: what cannot be read, and what cannot be told. Area X frustrates practices of decoding and established parameters of measurement, while being managed (ostensibly) by an organization whose practices are wrapped in secrecy.

What distinguishes Area X from the Chernobyl exclusion zone, or at least that draws out new emphases, is that illegibility and secrecy are not as easily distinguished, as the reader is never entirely sure what is keeping secrets, and what kinds of reading might be possible. This comes out in one of the text’s first red herrings: the words on the wall of ‘the tower’, the ruined building that the team come across early on in *Annihilation* that tunnels into the ground, taken over by massive structures of flora and fauna. Descending a dark stairway covered

with 'sparkling green vines' ('sparkling' again conveying a form of otherworldly, or electric, power), the biologist and the anthropologist realize that the vines are words 'in cursive, the letters raised about six inches off the wall':

As I came close, did it surprise me that I could understand the language the words were written in? Yes. Did it fill me with a kind of elation and dread intertwined? Yes. I tried to suppress the thousand new questions rising up inside of me. In as calm a voice as I could manage, aware of the importance of that moment, I read from the beginning, aloud:

'Where lies the strangling fruit that came from the hand of the sinner I shall bring forth the seeds of the dead to share with the worms that . . .'

Then the darkness took it.

Alongside the biologist's elation and dread, illegibility and secrecy are intertwined at this moment. The words invite decipherment, but they are data without context. This is a meta-genomic image: a script encoded by another script (the vine's DNA), its cursive form shadowing the curves of intertwined helixes. In *Acceptance*, the origin of this script is revealed, and it represents the conditions of possibility for the forms that grow out from it in Area X. Part of their lure is that the full picture is not available. Directly afterwards, the biologist inhales some of the matter that comes out the vines, and this is the moment when she becomes part of Area X – when the possibility of her leaving is cancelled. In many ways, this is the merging of script and growth, a play on the idea of environmental influence insofar as separation of life and genome is figured as impossible. This comes to stand for the moment of the biologist's annihilation, which figures more specifically as the gradual annihilation of her sense of a separate self, as she moves through the landscape and closer to giving up her only motivation for coming into Area X: finding her husband.

Somewhere towards the centre of the narrative lie three love stories: between the biologist and her husband, between Control/John and Ghost Bird – the biologist's clone, and between the lighthouse keeper Saul and his lover Charlie. For the biologist, love is like working out a secret, a process of decoding, turning over data, traversing the distance in her marriage before Area X, in the hope that it might bring her closer to finding her husband inside. Identities and memories pass between these couples – Ghost Bird is born with all the biologist's memories and skills intact; like Ivan in 'Another's Memory', they 'come to her second hand' (VanderMeer 2014c, 30). Her name comes from the nickname the biologist's husband used for her, a reference to her absence in their marriage. Devoid of context, these memories are only useful information to Ghost Bird, which

Control/John attempts to extract from her, first in a series of interrogations, and subsequently on their joint expedition into Area X. She is able to select relevant data without their accompanying emotions: 'The biologist had been married but Ghost Bird wasn't, released from responsibility from any of that' (VanderMeer 2014c, 36). Like Ivan, she doesn't always agree with her original's decisions: 'Why had her other self been so careless with the words on the wall?' (VanderMeer 2014c, 36). Why, a reader is invited to ask, would the biologist be capable of such carelessness at such a pivotal moment of the plot? This sounds like grouching between siblings, the muttered grumbles of one sister to another, not despite their proximity but because of it. But it is also a recursive moment, taking us back to the moment in the first book when the biologist encounters the words on the wall, telling us to go back and reread it, to find something different to what appeared in the first encounter between the wall's words. Why did the biologist lean closer, allowing 'a tiny spray of golden spores' to spew out of a nodule in the "W"? This was the moment of contamination, where the biologist is seduced by the possibility of deciphering a code, while establishing the possibility of Ghost Bird's existence.

In *Annihilation*, relationships are full of silences, made up of the things characters do not tell each other, or the things they do not know that they need to know about themselves. These silences extend to the relationship between reader and narrator. The secrets that the biologist kept in her marriage create a dynamic that encompasses the connection between her and her implied reader: 'At one point', she remembers, 'my husband began to call me the ghost bird, which was his way of teasing me for not being present enough in his life' (VanderMeer 2014a, 109). Her narrative becomes a way of filling this absence, the reader becoming a substitute partner while she searches for the one she has lost. Her absence in their marriage was marked by an attention to data, a fixation on analysis, 'existing apart' while able 'to appear social' when out with her husband and their friends (VanderMeer 2014a, 109). This constant fixation on working things out – to process the data in ways that correspond to her sense of reality – drives her away from him, while all her medic husband wants is 'to be of use' to others: a first responder or a triage nurse (VanderMeer 2014a, 57). This was his reason for going on the eleventh expedition. When his clone reappears, he comes back to their kitchen, next to the refrigerator, drinking milk out of the carton, still in his expedition clothes; later, it is established that the clones come back to places that were particularly meaningful or important to their originals. The husband fixes on the part of the house that facilitates nourishment; in contrast, when Ghost Bird appears, it is in an abandoned parking lot where the

biologist used to go on solitary walks, 'a patch of urban wilderness', keeping it secret from her husband (157).

The first book of the Southern Reach trilogy is a portrait of a marriage dissolving, told through the analogy of a person returning after a time away, transformed in ways that neither party can fully grasp or explain. This analogy extends across genetic and social descriptions: the husband's genetic code has returned, with some of the original's memories, but not all of them. The distance between them loops around the silences in their marriage before his expedition (secrets), and the silences of incomprehension after it (illegibility), and this new illegibility cannot be confirmed by genetic deduction. In terms of his DNA, he is the 'same' person, but a version that has been somehow contaminated by forgetfulness and distance. Not yet realizing that this is not really her husband, but rather his genetic copy, the biologist encourages him to remember how he left Area X and got back to their house. He cannot give her answers: 'There was an odd calm about him, punctured only by moments of remote panic when, in asking him what had happened, he recognised that his amnesia was unnatural' (VanderMeer 2014a, 56). This description moves across biological and social: it implies that some kind of contamination has effected a shift in personality, a rewriting of code ('punctured only by moments'), and an obliteration of memory. The strange formulation, 'remote panic', feels unrecognizable – what kind of panic can be perceived while remaining far off? – and a fusion of psychological state and spatial configuration. The character is clearly vulnerable, but in ways that cannot quite be delineated or diagnosed. His psychic world, at this point, turns only between 'odd calm' and 'remote panic', neither of which can give the biologist data for deductions.

This distance reverberates between them across time. 'He now contained within him the distance he'd accused me of,' an oscillation of affect between partners, distance as entity or character or even topography, one expressive while the other fades away, doomed to miss each other (VanderMeer 2014a, 56):

After a time, I couldn't take it any longer. I took off his clothes, made him shower, then led him into the bedroom and made love to him with me on top. I was trying to reclaim remnants of the man I remembered, the one who, so unlike me, was outgoing and impetuous and always wanted to be of use. The man who had been a passionate recreational sailor, and for two weeks out of the year went with friends to the coast to go boating. I could find none of that in him now. (VanderMeer 2014a, 57)

This passage is about dominance, time and a desperate, violent procedure of trying to jog someone's memory. It is driven by the biologist's claiming of time in

a series of starkly acquisitive and forceful actions, where all actions are carried out by the speaking I. The husband is made into an object; the pronoun 'he' does not appear, stripped out of her memories. The passage turns on the contrast between a spectral personality – someone characterized by being generally 'outgoing and impetuous' who 'always wanted to be of use': a description frozen in time, a snapshot of a person perpetually in motion. The person she finds now is reduced to a 'him' to whom things are done.

This is character building in the ruins of a relationship, the reconstruction of a person through someone else's memory of them, who can exist only as an object in contrast to them ('so unlike me'), whose passion and care take up the biologist's horizon of nostalgia. In the meantime, the present enforces the evacuation of those attributes through some kind of invisible contamination of the person who was. Nature appears as a site of leisure, a place to be used for socializing and outdoor pursuits. The word 'recreational' has a double meaning here, indicating both an activity done in spare time, as well as a transformation, or making anew. The husband was making trips to the coasts whose purpose was explicitly transformational, suggesting an inevitability to this final scene when he returns one last time from the coast back to their house, now changed into something else.

In postgenomic terms, the idea of character that remains stable across a lifetime – or which develops according to a relatively stable programme determined at birth – diminishes with the possibility that character is subject to 'the *chanciness* of consequences' (Beer, 202). Character development is one of the last defences of the liberal order, the place where certainties of an individuated self can be placed, those certainties premised on uneven constitutions of human difference. Rather than showing the annihilating logic of this fiction in the era of the genome, VanderMeer moves the fixation into a different set of concerns, more radical in their approach to ecology than those of genomic dystopias. This shift from character to ecology corresponds to Michel Serres's question at the beginning of *The Natural Contract*: 'Does anyone ever say *where* the master and slave fight it out?' (1995, 3; italics mine). Dialectics of self-determination cannot take place in a conceptual vacuum. In his readings of VanderMeer's weird fiction, Benjamin J. Robertson has theorized this as 'abdifference':

The 'ab-' in abdifference designates a movement away, a constantly renewed flight from difference and from everything particular and toward nothing in particular, a movement without trajectory within a space without markers. It is a nonattitude, a nonrelation, a means of identifying the measureless gap between the human with its knowledge practices and the weird planet without a capacity to be known. (2018, 134–5)

Living in abdifference is necessarily a state of uncertainty, but this uncertainty can be reconfigured from 'detachment from knowledge' (and the implication that something can be worked out) to the impossibility of reading the world. This returns to the question of living at and in the periphery, where – to follow Simone – flight towards 'nothing in particular' means that there is no stable or fixed horizon, no end that will fulfil the speculations of the present.

What connects Robertson and Simone's arguments is an acknowledgement of the weirdness of the incommensurability between knowledge and the messy work of living. For some, it has never been possible to know 'the globe' as such, and knowledge about its totality is repeatedly shown to be unreliable, untrustworthy or in motion. Reorienting lines of flight from the global periphery – Area X, Chernobyl, the Urban South – is to approach this impossibility and consider its implications for praxis, 'a series of rhythms that enable surprising, frustrating, sometimes confusing, sentiments and practices of residents caring for and enduring with one another' (Simone 2018, 137). VanderMeer's periphery is a site where character development cannot be relied on, and where characters that enter Area X as apparently whole and stable units gradually disintegrate and are remade into new forms across psychological and biological levels of transformation. This is not for the sake of endless self-fashioning as for Bron in *Triton*; transitional characterization at the periphery portrays, instead, sociogenetic constitutions across interrelations of economy and ecology.

Characters do not just transition between environments. Lived experiences transition between characters: the Area X-produced doubles offer different routes and courses of action to their originals. The melancholy of the biologist in the first book – the enormity of her loss propelling her into Area X – is offset by the love story in the final volume of the series, *Acceptance*. There, the narrative is guided by the (often comic) development of a new relationship between (the hopelessly out of) Control/John and Ghost Bird, as the two trek through Area X in search of the biologist. Their dynamic mirrors that of the biologist and her husband, a shared synergy of contrasts that de-individualizes the problems that drove the biologist and her husband apart. Like her original, in Area X Ghost Bird is constantly on the search for 'more data'; Control wants to get somewhere, 'as if a destination meant something', Ghost Bird notes wryly, while keeping distance between them as they make their way through an unknown territory (VanderMeer 2014c, 28). He, in contrast, notes a 'brightness' inside her, and a 'corresponding darkness inside of him' (VanderMeer 2014b, 221). This Manichean opposition is not to be trusted. It is a contrast formed by their shared experience of having to manage a crisis, and the security of Control's ad

hoc characterization does not hold for long. The sense of symmetry between the couples fades into something less stable. They are not individuals placed in opposition to each other, but points that shift on a topography which seems itself to be being remade anew. At times the biologist and her husband come closer together, and at points Ghost Bird and the biologist; these proximities are influenced by and dependent on the territory of Area X. The shape constituted by these relations is, in geometrical terms, in flux, the length of the lines between them contracting and expanding.

This movement is to do with the interdependency of the characters with each other and the shifting terrain of Area X's ecosystem. In the Southern Reach's headquarters, Control learns a theory that goes some way to describing this interdependency, epigenetic in its formulation. He hears a fellow scientist – who will later go mad – say what he hears as 'the terror, the terror' (close to Kurtz's 'the horror, the horror'). It turns out that Whitby was actually saying 'the terroir, terroir', a term from oenology:

It means the specific characteristics of a place – the geography, geology, and climate that, in concert with the vine's own genetic propensities, can create a startling, deep, original vintage . . . Terroir's direct translation is 'a sense of place', and what it means is the sum effects of a localised environment, inasmuch as they impact the qualities of a particular product. Yes, that can mean wine, but what if you applied those criteria to thinking about Area X? (VanderMeer 2014b, 131)

This is a rare moment of explanation in a narrative without much in the way of reliable analysis. The analogy is embedded in an ideology of cultivation – of harnessing the particularity of place in order to create a particularly desirable and competitive product for circulation. This sense of place is centred, implicitly, in the vantage point of the vineyard owner who curates their vines according to knowledge of their locality. The understanding that a plant's hereditary material is 'in concert with' local environments has long been an accepted truth in a multibillion dollar industry. Why not apply this to the processes of accelerated adaptation produced through localized contexts going on in Area X?

Much of *Authority* takes place with the headquarters of the Southern Reach, a complex of interrogation rooms replete with one-way glass, laboratories and offices without windows, a 'dingy bizarre building with its worn green carpet' suffused with a 'sense of diminishment', where the sun 'half-heartedly pushed through the high rectangular windows', a space of blockage, disrepair and artifice that echoes, if weakly, a dying forest (VanderMeer 2014b, 5). It is an

enclosed space, full of data that do not make sense, a non-place that repeats state forms of sovereign violence in architecture designed to contain (Augé 1992). The people there all seem to be running away from something into this dimly lit half-life full of secrets and loss. In this space, seemingly impervious to infiltration and contamination, the only way that absence can be recorded is as damage, death or annihilation. The Southern Reach is a space of sealed data, where practices of conversion and analysis take place; a space, even, of cultivation, where the material of Area X might be cultured into something useful, even valuable.

The cultivation metaphor invoked in Whitby's theory of terroir ends up driving him mad. The underlying assumption is that the kinds of biological dynamics at work, at pace, in Area X are producing novel forms of life that might also be attached to particular calculations of surplus value. This is epigenetics for niche-market capitalism: "no two wines can be exactly the same because no combination of elements can be exactly the same," says Whitby (VanderMeer 2014b, 131). It is a way of domesticating what appears from the hermetic chambers of the Southern Reach to be a biological monstrosity, an unprecedented event, which has resisted years of scientific analysis. Control/John is unconvinced:

The border had come down in the early morning, on a day, a date, that no one outside of the Southern Reach remembered or commemorated. Just that one inexplicable event had killed an estimated fifteen hundred people. How did you factor ghosts into any terroir? Did they deepen the flavour, or did they make things dry, chalky, irreconcilable? (VanderMeer 2014b, 133)

The exchange between Whitby and Control/John stands in for all the other moments of attempted scientific deduction, and the way that theories from the core are impressed upon peripheral spaces, while leaving out, ignoring or downplaying anomalies – the spaces and events and happenings left unaccounted for. Whitby is trying to make Area X work in a way that would make sense the violence of its operations. Control/John's train of thought in the passage above reveals an agitation, not only around cause and effect but also towards events happening simultaneously whose lack of legibility leads to a lack of memorialization. The history of Area X is disappearing because this history cannot be made sense of. For this reason, Area X cannot be made into culture, and if it cannot be made into culture, then it threatens to make the existence of all those lost by it and through it spectral. Whitby's epigenetic explanation via a metaphor of cultivation – and its implicitly extractivist logic – implies that there is the possibility of domesticating Area X's processes, for research and for

profit, and upholding a colonial–capitalist time-regime as the basis for a theory of cultivation rooted in fantasies of individual self-transformation.

Control/John resists this instrumentalization of epigenetics for extractive purposes, because he senses that something different is happening with and through the matter of Area X. If Area X is simply a case of large-scale ecological cultivation, why is there a need to seal off the Southern Reach from its influence, and what is the reason for its violence? His unspoken rejoinder to Whitby comes through metaphors of texture and time (chalk and date), rather than product and space (wine and ground). This is a regime that privileges what can be produced, and the kinds of spaces necessary for production, and which invisibilizes the processes of labour and the extractions of time that production demands.

At the end of *Authority*, Control/John realizes that even the strict protocols of the Southern Reach, with its sealed environments and body suits, cannot guarantee immunity. Looking for Whitby, Control arrives at the double doors that lead to the science division; reaching for the handle, he finds nothing to grasp onto: ‘there were no doors where there had always been doors before. Only wall. And the wall was soft and breathing under the touch of his hand’ (VanderMeer 2014b, 290). This is a monstrous moment: a character rushing headlong through the corridors of the place he assumes is separate from what is happening directly outside it, behind the border of Area X, in a position of surveillance – a position of control – to find this outside bearing in and sealing him off from the area of the Southern Reach, the space that is supposed to yield answers. Instead, a living substance that breathes, and whose breath seems somehow connected to his presence. This is the moment that the analogy of whatever life-force is sweeping through Area X and past its supposed border – the analogy of contamination, of human impotence, of the insufficiency of modern reductionism, of the complexity and vast mystery of life on earth and its processes – moves over the border to empirical object. The haunting has become real, the monster has arrived; the ghostly incantation – ‘where lies the strangling fruit’ – is among the living. He realizes, ‘the Southern Reach hadn’t been a redoubt but instead some kind of slow incubator . . . placing trust in a word like border had been a mistake, a trap. A slow unravelling of terms unrecognised until too late’ (VanderMeer 2014b, 297). They have put their trust not only in the possibility of deciphering code but also in ensuring immunity through code (the syntax of boundaries, the architecture of the Southern Reach). The idea of the border does not retain its significance – it has fallen out of the semiotic economy. All along they were infiltrated by a presence – ‘some presence’ – that lay undetected.

The theme of an undetected presence begins to take up equivalent space to the novels' characters. In the final book of the trilogy, *Acceptance*, not all characters are visible or embodied. The third novel considers character as a process of constitution, where the borders between influence and actor are not determined by the constraints of plot. Identities shift, and not always in the way they have been programmed to, in response to aspects of the environment that are not always explained. The beginning of *Acceptance* reimagines Area X's ghosts, affects and hauntings as aspects of the environment that influence and alter its 'real' characters.

The book begins with another complementary pair, Suzanne and Henry – one a scientist and the other 'an investigator of the uncanny' (VanderMeer 2014c, 14) – decades before the events of the first book, and before Area X has been evacuated of humans. They have come to 'analyse and survey' what Suzanne calls 'prebiotic particles', and what Henry calls 'ghost energy' in the area (15). We meet them through Saul, the lighthouse keeper, who finds the two of them and their activities – séances and documentations – 'tiresome and increasingly predictable', and their theories of 'necromantic doubling' – 'which had to do with building a room of mirrors and darkness' – incomprehensible and 'lightweight' (14, 15). He has noticed something strange in the area since he moved to the lighthouse four years prior, but is now distracted by his relationship with a local man, Charlie, and the 'afterglow' of his nights with him (17). He does not understand what Suzanne and Henry might be so intent on finding, these outsiders getting caught up in their own imaginations. After all, this landscape can trick the mind:

He knew the history of the coast here, the way that distance and silence magnified the mundane. How into those spaces and the fog and the empty line of the beach thoughts could turn to the uncanny and begin to create a story out of nothing. (VanderMeer 2014c, 14)

In the early parts of *Acceptance*, the uncanny is a character, an object in space rather than a description of sense or perception. Here, 'the history of the coast' and 'the uncanny' are made into corresponding things placed in contrast, representations of this space that offer different experiences of it, as if two characters turning up at different times to deliver different messages – not unlike the double act of Suzanne and Henry.

Much of the series' narrative tension is generated by the conflict between reality as determined by empirical data, and what matters in a given context. Saul's rumination seems to be a pragmatic stance on how to keep sane in a

place whose physical and sensory properties – spaces and fog and the empty line of beach – might prompt flights of imagination. In this sense, creating a story out of nothing is a textual joke about writing: this is, after all, a narrative about an explosion that came from ‘nowhere’. The full stop that leads into an incomplete sentence marks a border between knowing and unknowing. A word like ‘mundane’ grounds these thoughts, attached to ‘magnified’ through a brief alliteration, a phrase that seeks to contain and reduce fear and uncertainty. The full stop takes the place of an absent ‘and’ – mundane, and how . . . – cutting these two characters off from each other (history and the uncanny). This missing ‘and’ finds itself in the asyndeton of the second sentence, an anxious listing of details in an alienating and vacant stretch of land, as if looking for something solid to grasp. And yet ‘nothing’ hangs over the final part of the sentence, corresponding to the ‘nowhere’ on the book’s final page, ‘Because you are nowhere’ (337). Does Area X ‘exist’ in the way the world has been imagined to exist, or does it force a suspension of any certainty around reality and its manifestations? Saul’s rationalization gradually gives way to a realization that he is sharing the landscape with characters that he cannot see or fully perceive.

The uncanny-as-character becomes a way for the unexpressed and silenced to take up space in *Acceptance*. In this final instalment, Area X’s mystery is no longer the narrative’s driving force. The narrative is constructed around hearing and seeing silent and invisible forms brought into the Area alongside their expressed and visible counterparts. Time moves differently in Area X, recalling a moment in *Chernobyl Prayer* when one woman observes changes in older women still living in the Zone who ‘refuse to abandon their cottages, their families’ graveyards’, who have come to expect treats and gifts from aid workers passing through, and who ‘have a special relationship with time and death’ (CP, 271). It is not that these women have become part of their environment, or that the act of staying in a toxic site is being romanticized; rather, they are living in a slower time, making the most of small opportunities to hustle – ‘they have learned to talk’ and ‘some have become real film stars’ (271) – while also encountering dying in the gerund, an event that is ongoing, attending to their dead loved ones as if they continue to take up space among the living. It is a collocation of different forms and experiences of time, in a phenomenology of dying that extends and contracts as the context necessitates. The spectre of death cannot be held at a remove; it is part of the relationship these women have with the ‘weird planet’ they find their homes transported to, part of the infrastructure of their dwellings, and has become their sense of place.

The abandoned lot that offers a site of refuge for the biologist in *Annihilation* also offers a way into thinking this, returning in altered form: the island that she travels to in *Acceptance*. At this point, she has found her husband's journal, and is moving across Area X in search of him. Coming across 'something pale and grub-like and monstrous [that] flailed and moaned' in a small patch of dirt, she realizes that it is the psychologist (VanderMeer 2014c, 161). The creature is in agony, traumatized and wounded, and to the biologist, 'it looked like a mistake, a misfire by an Area X that had assimilated so much so beautifully and so seamlessly' (162). She feels no pity for the creature's pain, and wonders instead whether 'what this expedition member had brought to Area X had contributed to this final state' (163). The suggestion here is some form of biosynthesis between individual and ecology – a synthesis that has caused all sorts of other transformations of those arriving in Area X and in those outside it. This synthesis does not work for the best possible outcome. The resulting forms express what might have been hidden away or concealed. Area X has the power to read experience as code: it is the territory that knows how to decode its interlopers and to incorporate them into it, rather than the other way round.

Biomorphism extends from the words on the wall of the tower to species transforming into other species, a speculative reflection on the genetic proximity of humans to nonhuman lifeforms. Swimming to the island, the biologist finds her husband, or at least a form that resembles him, 'if not in the form in which I had known him' (VanderMeer 2014c, 167). This is the intertextual moment between the biologist of *Chernobyl Prayer* doing her fieldwork on an uninhabited island, visited daily by a mouse, and the biologist in *Annihilation*. On another island unpopulated by humans, the biologist finds evidence of another human presence, 'the blackened ash of an old fire' in a small cove, where she seeks shelter (168). An owl has been hovering near her since her arrival, 'huge, four pounds at least', and ends up 'perched opposite me across the fire, atop my backpack' (168–9). It has brought her a rabbit to eat. If the husband's place in the home had been the kitchen, the space associated with the provision of food, then this owl seems to be taking on a similar role, hunting for the biologist. The reader has already been prepared for this moment by the transformed appearance of the psychologist. The owl stays, 'always watching over me, always nearby. Always a little closer, a little tamer, but never completely tame,' dropping twigs at her feet like small gifts, constantly re-establishing contact (169). Their relationship starts to be more reciprocal as she spends more and more time on the island. Empirical proof that this is her husband never arrives, but the relationship stands in for the one that disintegrated outside Area X. It becomes a relationship of reparation,

a recognition of some kind that eases the biologist's prior loss. It lasts thirty years, roughly the time they would have had left in their marriage, before the owl becomes old and dies.

Area X becomes a space of wish-fulfilment. Just as it is not clear whether or not the owl is some form of the husband, it is not certain whether these conspicuously convenient transformations of psychologist and husband are not in some way creations of the biologist's imagination, 'out of nothing'. Is the uncanny-as-character taking figments and fragments out of her memory and rearranging the reality of Area X to correspond to it? What is clear is that logic-work based on scientific reason cannot help her survive; instead, her survival becomes 'predicated on hurting myself', a way of sustaining her identity as an autonomous being (179). Part of this desire to remain separate from the surroundings comes from her desire to coexist – in a situation of contrast – with the owl, their differences pronounced and rearticulated over the course of a lifetime. Once he dies (and he has become 'he' rather than 'it' by this point), the biologist gives up the form she protected through pain and suffering, and moves into something else. This gap of thirty years, a calculable measurement of time, is the fulfilment of the fantasy that she brought with her into Area X – a fantasy of proximity, and of finally being able to reciprocate, of reunion and of living out a life. It is fulfilled on a vector, without guarantees, somewhere between what makes sense and what cannot be proved, in a quiet periphery.

In the Southern Reach trilogy, characterization is constituted by ongoing acts of mediation and compromise, rather than a definitive sense of reaching a clear horizon. This vast Area where wish-fulfilment happens 'in concert with' the annihilation of self is the primary metaphor of the series, and the question left open at the end. At its most philosophically captivating, it makes space for a plurality of tactics that might lead to all sorts of unpredictable and possibly illegible transformations, like birds that might change, mid-flight, into different species of winged creatures. Rather than taking this literally – or, more specifically – taxonomically (that is, organisms as products in space), these transformations gesture to forms of time that do not just accelerate or slow down evolutionary change, but through which a whole panoply of possible forms silenced or emerging might be expressed, depending on circumstances; that is, depending on chance junctures of different trajectories available at a given moment. Unlike the disappearance of the subject into algorithms, this form of characterization has more in common with those fossils at the Burgess Shale: weird, complex experiments of life that may go nowhere, but which lived, and whose living left traces, and that show us that 'contingency matters where it counts most', where

‘a million scenarios’ might play out, ‘each perfectly sensible’ (Gould 1989, 321). Making these million scenarios both possible and sensible is the peculiar task of speculative aesthetics.

VanderMeer and Alexievich’s narratives of peripheral shock take place in contexts where the full picture is not available, where evidence and procedures of data collection cannot be relied on, and where various kinds of silence, absence and refusal come to stand in as characters that influence events and trajectories. These are worlds on the make, where the profound ontological insecurity of not being able to access information necessitates a radical reconsideration of what can be known, and whether reality can ever be fully constituted by breaking it down into its smallest component parts. Enduring in these texts is not a matter of manipulating the smallest possible scale, but of moving between scales – massive and molecular. Recourse to a romanticized ecological vision of human futures is not available; these are violent topographies whose power over life remains largely invisible. Unlike Smith’s invisible hand, they are not directed towards ‘good’ outcomes, nor are they centred on individual flourishing. It is this with which metaphors of the postgenomic era now grapple.