

Adventure: Biopolymer Aesthetics and Empathetic Materialism—Another World is Possible

Raewyn Martyn
Massey University

DOI: <https://doi.org/10.1344/jnmr.v2i1.33377>

Abstract

This paper discusses affective methodologies within a practice-based PhD research project using plant-based and bacterial biopolymers (bioplastics) for painting, site-responsive intervention, and collaborative video. Biopolymers have long material histories with a range of material qualities and affects that inform adventurous working methods. These methods and associated affects could be said to produce a biopolymer aesthetics and an empathetic materialism forms of onto-aesthetics involving what Elizabeth Grosz (2017) and Félix Guattari (2000) respectively term an onto-ethics and an ethico-aesthetics. In this paper, new materialisms are used to understand the pedagogical qualities of worlding through the artworks of the author, where biopolymer aesthetics generate adventure and bewilderment—aligning with Jack Halberstam’s (2020) idea of an aesthetics of bewilderment.

Keywords

Bioplastics; worlding; bewilderment; art; onto-aesthetics, empathetic materialism; affect.

Introduction

Biopolymers (bioplastics) are adventurous materials—water-loving, thermoplastic, and porous—that have different material sensitivities and languages compared to petrochemical polymers (commonly used in art during the 20th and early 21st centuries). In my artworks, these differences are evident in the instability of forms. This inherent instability risks deformation, challenges conventional thinking about the potential forms and deformations of matter, and generates learning through “groping experimentation” (Deleuze & Guattari, 1994, p. 44). This learning invigorates creative methods and habits, enabling adventurous methodologies to emerge over time. In this paper, I use my own biopolymer art practices to think with the kinds of bewilderment that can generate worlding. The experimental learning I propose here, is developed via an attempt to construct a systemic understanding of biomaterials at their molecular and social-ecological (molar) levels, as well as the way they come together and circulate as material affects. My attempt to generate a wild pedagogical art practice is built around the flows of matter and energy that Gilles Deleuze and Félix Guattari (1987 and 1994) articulate as geophilosophy. These flowing processes of thinking/learning/praxis are made evident in my investigation of the collaborative film made for Stef Animal’s track “Adventure”—from the album *Top Gear* (Animal, 2018; Charlton & Martyn, 2019)—and my work *Greywacke Love Poems: Returns* (Martyn, 2019b).

Working with biomaterials, I observe these materials’ instability in moments of entropy and empathy, which I consider as time-based processes (Whitehead et al., 1978) that are emblematic of Jack Halberstam’s aesthetics of bewilderment. In this aesthetics, disorientation is embraced as a form of disorder and “resistant ontology” (Halberstam, 2020, p. 25) that takes place beyond human aesthetics. Entropy and empathy, along with the material sensations of biopolymers, provoke a range of working methods that are also learning methods, including a responsive misuse and adaptation of materials, tools, and machines. Interrogating the affective qualities of artworks involves asking a series of questions: ‘What does the work do?’, ‘What does it do to the viewer?’, ‘To me?’, ‘To other artworks?’, ‘To a world?’ In answering these questions in relation to my art practice and concept-building involving biopolymers, I have identified affective methods of adventure, hydrophilia, plasticity, and porosity. These come together in my artwork and collaborative films to generate an empathetic materialism that produces

a wild biopolymer material aesthetics. I am proposing that these terms are forms of onto-aesthetics that involve what Elizabeth Grosz (2017) terms an onto-ethics and Guattari (2000) an ethico-aesthetics. These onto-ethical aesthetic engagements materialise and give form to socio-ecological engagement—"a matter-form relation, which extracts complex forms from a chaotic material" (Guattari, 1995, p. 28-29) and put them into onto-ethical practice. Petrochemical aesthetics and biopolymer aesthetics move between the geological and the biological, generating a geo- and bio-aesthetics where being and aesthetics are forms and forces of worlding beyond nature. Grosz (2008) urges artists to explore this uncanny worlding via the "sensation[s] embodied as and in material forms" (p. 60). To understand the materialisation of biopolymers, I more generally think through various feminist new materialisms (see e.g., Barad, 2003 and 2014; Braidotti, 2011; Colman, 2006; Gauld, 2014; Haraway, 2008 and 2016).

Grosz's (2008 and 2017) corporeal and incorporeal (material and immaterial) extensions of Deleuze and Guattari's geophilosophy (1987 and 1994), as well as Guattari's ecosophy (2000), have been particularly helpful to understand the kind of worlding that biopolymers encourage. Deleuzoguattarian (1994) geophilosophy considers the figure and ground relationships of philosophy and pedagogy: there, the ground of thinking is a deterritorialising and nomadic space, where ideas are taken and inhabited. This has helped me to navigate the extractive misadventure of English colonisation whereby concepts have been "acquired by inhabiting, by pitching one's tent, by contracting a habit" (Deleuze & Guattari, 1994, p. 92). My intention in this article is to use various feminist and Deleuzoguattarian new materialisms, alongside my own explorations of the malleability of biopolymers, to trouble neoliberal capitalism and coloniality's conceptual habits and material practices.

Polymers—plastics—whether they are bio-based or petrochemical, are entangled chains of molecules that can create flexible mass. Biopolymers are metabolised from waste by bacteria (for example, kombucha SCOBY cellulose and fermented polysaccharides or polyesters) that are found in the cell walls of plants as well as in the secretions of marine and terrestrial organisms. Humans have used biopolymers for a long time—almost as long as stone and glass (see Latterman, 2015). Working collaboratively at Scion, a crown research institute in Aotearoa, New Zealand, as an artisan-artist and non-scientist, enabled me to experiment with the different methods,

uses, and risks of biopolymers as well as their laboratory production processes. At Scion, I participated in the development of biopolymer materials using both plant and bacterial polymers, including hydrophilic plant-based cellulose paint medium and thermoplastic blends. This work as “an artisan and no longer as [just] an artist” has enabled me to connect the materials I work with to “forces of consistency and consolidation” as well as with forces of “deterritorialisation” (Deleuze & Guattari, 1987, p. 346). What captivates me about biopolymers, as an artist and artisan, are their material and conceptual capacities for entanglement.

To come together and be perceived as material, plastics go through a process called polymerisation where individual molecules called monomers assemble into three-dimensional chains known as polymers. The roots of this word are in the capacity to *share in something* (Wagner-Lawlor, 2017). These entangled chains create reconfigurable mass—changing arrangement, expanding, and contracting when triggered by factors like heat or hydration. Biopolymers are less fixed than petrochemical plastics (which are prone to a more permanent and insensitive fusion via heat setting). They readily move between two-dimensional and three-dimensional forms over time, allowing painting and sculpture to become four-dimensional. Such fugitive and highly sensitive cellulose materials, as well as the artworks made with them, can rehydrate over time, releasing their layered and embedded images. Thermoplastic biopolymer artworks divulge three-dimensional shape memories—plastic images and forms imprinted within their molecular arrangements, revealed, rather than set, through heat. My experiments with the rehydration and shape memory imprinting processes of biopolymers gestate a form of ethico-aesthetic learning that allow artworks and pedagogical practices to be made reconfigurable—enabling their matters and energies be released back into the wildness of cosmic, geological, and molecular flows.

Introducing the terms biopolymer aesthetics and empathetic materialism, I reflect upon the parallel histories and aesthetics of conventional petrochemical polymers and the even longer histories of biopolymers within Indigenous and non-Western cultures. Understanding the geological, biological, and social histories of petrochemical and bio-based polymers acknowledges how we produce and sustain materiality through memory, habit, and industry (see Grosz, 2013). This understanding informs my practice of alloplastic worlding within a context of larger systemic and planetary

changes (Saldanha & Stark, 2016). Deleuze and Guattari's geophilosophy and ecosophy also help me understand how "self-organising material systems" (Protevi, 2001, p. 2) and various liberatory non-hierarchical systems may function in resistance to the forces of extractive colonial capitalism that sustain fossil fuel-derived petrochemical plastics (Coleman, 2013). In connection to the foregoing, I explore how, in the 21st century, circular and doughnut economic frameworks—which can be traced back to Guattari's ecological registers (also see Vare, 2020)—are being used to envision possible liberatory bioeconomy futures, where plasticity becomes a circular and symbiotic component in the making of a new Earth and in the framing of an ecosophic pedagogy (Guattari, 2000).

Adventure

Aotearoa New Zealand-based musician Stef Animal describes how the album *Top Gear* (2018), including the track "Adventure," draws from Maurice Sendak's trilogy of illustrated children's fantasy books exploring the adventure of childhood psychological development: the toddler phase in *The Night Kitchen* (1970); the pre-school phase in *Where the Wild Things Are* (1963); and the pre-adolescent phase in *Outside Over There* (1981). The music video for "Adventure," as seen in Figures 1, 2, and 4, explores this developmental adventurous and wild dynamic. It was filmed in infrared by filmmaker and artist Jess Charlton, who intuitively observed children encountering hydrophilic biopolymers for the first time, moving through developmental and adventurous processes of familiarisation, territorialisation, and creative destruction.

Each of the site-responsive biopolymer artworks discussed in this paper are formed through adventure with unfamiliar and unstable biopolymer materials that stand in for phases of adventurous development, while generating moments of extreme material fragility and precarity that elicit material empathy and learning (see Gauld, 2014). I am formulating an adventure methodology as a creative and pedagogical method of risk, involving affect-generating and affect-driven developmental processes. I see this as an extension of diffractive learning methodologies (see Barad, 2014; Geerts & van der Tuin, 2016), whereby a diffractive reading of texts or artworks can alter the flow of ideas, around and through each other, creating waves and new potential for thought and action. While diffraction and flow are temporal and physical processes, a

diffractive methodology applies this dynamic materiality to conceptual thinking and alters pedagogical processes by experimenting with inter-textual and interdisciplinary relationships (Barad, 2014). Adventure methodology is similarly time-based and physical, while also being spatially unfixed and open to the affective qualities of risk within research and learning. As with diffraction, encounters between materials and ideas may happen multiply and together over time—not as one singular diffraction or adventure. This allows adventure to redistribute affect through various locations, morphologies, and images of the paintings, sculptures, and site-based interventions.



Figure 1: *Greywacke Love Poems* (Martyn, 2019a). Courtney Place Lightboxes, Te Whanganui-a-Tara.
Sixteen images on eight free-standing lightboxes

Adventure may involve loss—breakage, injury, ephemerality, disorientation, and reorientation. These are the risky material affects of adventure methodology that play out over time. *Greywacke Love Poems* (2019a)—see figure 1 & 2—and *Greywacke Love Poems: Returns* (2019b)—see figures 4 & 7—reoriented audiences to the geological and social history of the disused Owhiro Bay Quarry within Te Whanganui-a-Tara's South Coast. Production of the artwork involved adaptation, misuse, and rematerialisation of industrial plastics extrusion processes to create a unique blend of plant and bacterial polymers with pigments ground down from greywacke rock-fall at the site. The project was a Wellington City Council Public Art Panel commission, made in collaboration with polymer scientists at SCION.

The remediated quarry cliff-face and coastline, a popular recreational weekend destination, present dramatic metamorphic strata and fault lines. The biodegradable artworks (Figures 4 and 7), appear and disappear into the coastal landscape for which they were commissioned, performing a kind of return and affective gesture of remediation and love. In both the lightboxes (Figures 1 and 2) and the coastal installation (Figures 4 and 7), the sedimentary and metamorphic processes of orogeny—mountain-building—are used as an analogy for how systems deform under pressure, while also invoking some of the affective qualities of lovemaking. The word adventure, manifest in these artworks, conjures images of caving and canyoning trips, suggesting a navigation through cavernous sedimentary rock forms, carved and made porous through geotrauma (the underground bifurcations and flows they enable and are subject to). According to Noys (1998, p. 504), such underground sites of adventure invoke Georges Bataille’s “bowels of the earth” and Deleuze and Guattari’s processes of sedimentation. The navigation of cave systems used within search and rescue misadventures involves forms of learning developed through habits of wayfinding and subterranean shape memory. *Greywacke Love Poems* (2019a) activate this pedagogical sensorama of wayfinding and shape memory—invoking loss and return akin to the shape memory of the bacterial thermoplastics (which are deformed and then returned to an earlier shape via a trigger temperature). *Greywacke Love Poems: Returns* (2019b) is ongoing exploration of some of the artworks’ slow degradation. The returns—independent of transaction—take place as redistribution, somewhere between gift, use, and loss.



Figure 2: *Greywacke Love Poems* (Martyn, 2019a). Courtney Place Lightboxes, Te Whanganui-a-Tara. Three of sixteen images on eight free-standing lightboxes

The pedagogical qualities of adventure involve experiential learning, where the world and its conditions emerge as adventure happens, always with the risk of loss. Biopolymer artworks involve characteristics and figures of instability, resonant with emergent systemic change, like the destabilisation of “petro-hegemony” (Haluza-Delay, 2012, p. 4). This destabiliation is activated by climate justice protests and alter-globalisation—where other worlds are made possible through grassroots and nomadic activism (see Lenco, 2012). These global activisms generate mandates for circular and doughnut economy models which visualise social and planetary boundaries (Raworth, 2017; Royal Society Te Apārangi, 2019). Such shifts are part of the presumed common task of working out what a practice of knowledge for the Anthropocene might be (Wark, 2020).

We can understand this common task as a pedagogical process of worlding, collapsing the space between subject and environment (Palmer & Hunter, 2018). The collapse of worlding happens through human and more-than-human encounters involving processes of expression and legibility that manifest physically and socially. To understand this collapse within the *Greywacke Love Poems* (2019a & 2019b) series, I think of Donna Haraway’s “tentacular worlding” (2016, p. 42) and the pedagogical synthesis of interspecies learning with “diverse earth-wide tentacular

powers and forces” (p. 101), as noted in *Staying with the Trouble*, where Haraway also notes that Indigenous creation stories already recognise more-than-human processes of worlding. In the notes of *Companion Species Manifesto* (2008), Haraway also acknowledges an unpublished manuscript by Paul B. Preciado that introduced her to the concept of alter-globalisation. Both alter-globalisation and Rosi Braidotti’s nomadic ethics (2011) are important frames for thinking about how artists use affect to activate alternate imaginaries and facilitate wilder forms of worlding.

Biopolymer artworks begin to imagine and manifest the way our relationships with plastics could have been and can become more symbiotic and *sympoietic* (Haraway, 2016, p. 125). The history of industrialised plastics can be understood through the misadventure of petro-hegemony and exclusion, enabled by ongoing extractive capitalism. I think about how biopolymer aesthetics could destabilise the narratives and aesthetic forms that sustain a petro-hegemonic world view. And more generally, how artists manipulate affects and narratives to influence our imaginaries every day, often thinking about how they can sustain the active and open forms of affect and risk that enable them to break with habits. The unpredictability of adventure and play become ways to avoid instrumentalisation of affect or the kinds of risk management that neutralise affect—at the same time acknowledging that adventure tourism and the arts are both industries that monetise affect, managing levels of risk to ensure sustainable and archivable, and profitable bewilderment.



Figure 3: “Adventure” (Charlton & Martyn, 2019). Adventuresomefilms. See <https://vimeo.com/379895739>. From Stef Animal’s 2018 album *Top Gear*, Fishrider Records

As an artist, affect studies offers me ways of understanding how artworks carry affect—by breaking it down into moments of affect rather than the *Gestalt* approach to affect within artworks and aesthetics. McKenzie Wark (2020) has written in *Sensoria* about the difficulty of discussing aesthetics with newer generations of students, where she finds that art historically-oriented terms like sublime or beautiful are less useful than references such as zany, cute, and interesting. I like to think of terms such as these coming together as intersecting references of affect, within the bewilderment of biopolymer aesthetics. Within affect studies, Maria Hynes and Scott Sharpe (2015) have described the risks of engineered affect, while also reminding us that affect exceeds use and holds onto the capacity to escape instrumentalisation. Within society's current affect-laden polarisation, both on the Left and Right, affect is often reduced to a reactionary social force, rather than being seen as an active and becoming one. Hynes and Sharpe describe how, despite “warnings about the underhand modulations and manipulations of affect, affect seems also for some to be germane to the solution of the problem” (p. 116). They hope, along with theorists Michael Hardt and Antonio Negri, that “the misadventures of affect under capitalism are not too overwhelming for the revolutionary collective subject” (p. 116).

Adventures and misadventures reveal what is important to us—we imagine what we might lose and hope to gain some clarity about what is at stake. This potential release of what we value, focuses us on protection and resistance. The cognitive dissonance between the desire for risk and the prevention of loss can open up and intensify our awareness of what is possible—increasing our capacity to imagine alternative paths.

Becoming aware of dissonance within personal habits is also important because habits become systemic methods and can create new systems of community behaviour, particularly within the affective materiality and intersubjective experiences of the arts. Systemic approaches to understanding affect, include emotional economies of affect, where feeling and experience circulate (see Ahmed 2004 and 2014), without immunity to the stasis and entropy that govern physical systems, where energy and matter might become either disordered or cease flow and sediment. Habits crystallise through contraction, in both the physical and social world. Grosz (2013) argues that human habits (and perhaps more-than-human habits as well) are forms of potentially creative contraction, where conditions, action and affect intersect. Grosz (p. 231) employs Henri Bergson's notion of vegetative consciousness to explain a

materiality of affect, memory and habit, which “consists in the contraction and synthesis of the elements it requires. Even the plant, in other words, has habits, modes of repeated engagement with its environment. ... a kind of memory, embodied in its cellulose structure.” In biopolymer art-making, habits operate like adventure memories within the creative intersection of mnemonic organic processes and disorderly/entropic physical processes.

Hydrophilia

Hydrophilic—water-loving—cellulose, creates a paint emulsion that dries into a paint-like film that can be applied to surfaces and later moistened for recomposition or rehydrated to become a fluid medium. Greater rehydration releases pigments into liquid flow, redistributing the image or pattern that was already present within the paint-film. During dehydration, the material contracts and brings pigment particles closer together, increasing definition of image and depth of colour. As the material moves between two-dimensional and three-dimensional forms, images or text may warp or distort.

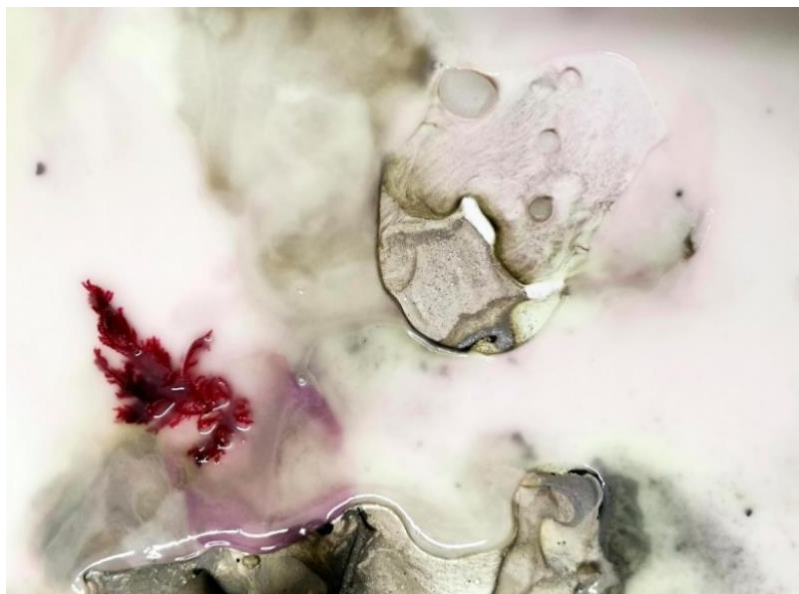


Figure 4: *Greywacke Love Poems: Returns* (Martyn, 2019b). An example of hydrophilia—cellulose during rehydration before installation at the coastline

The cellulose emulsion and films reconnect to the intimate history of celluloid film and photographic image-making. In my hydrophilic paintings, images develop and are

embedded through liquid distribution of pigment particles, imprints, oxidation, refraction, and other forms of light sensitivity. Taking inspiration from Malabou, for whom plasticity presents itself as “the most eloquent motor scheme for our time” (Malabou cited in Lawtoo, 2017, p. 1206; also see Malabou, 2010, p. 15; Malabou, 2011, p. 58), I draw from Deleuze and Guattari’s (1994) notion of a plant’s organic plasticity. A plant, as they write, contracts “the elements from which it originates—light, carbon, and the salts—and it fills itself with colors and odors that in each case qualify its variety, its composition” (p. 212). Malabou draws my attention to “the mimetic rivalry so openly visible in plasticity’s ‘refusal to submit to a model’” (cited in Lawtoo, 2017, p. 1206), while presenting plasticity as an alternative to writing; as a language-akin to those of flowering plants, constantly changing. Plastic image-making allows for impressions, mimesis, phantoms, and copies. The relationships between plasticity and mediums of reproduction like photography and printmaking resonate. By focusing on the material itself as an eloquent image, one locates the image embedded within the material itself—not reliant on a fixed surface coating or light sensitivity. The imprint or impression is internalised, at a molecular level. Affective methods of production are often indexical, allowing for traces to be made evident. This allows for processes to become visible within subjective and intersubjective experience.



Figure 5: *Adventure* (Charlton & Martyn, 2019). Still shot

The material affects of hydrophilic artworks provoke surprise, curiosity, and a desire to understand what the material is to decode the visceral skin-like stuff. For example, during the installation of the *Greywacke Love Poems: Returns* (2019b), passers-by

would stop and ask questions. Such spontaneous interactions were live events that flowed from the work's affective materiality. Someone asked if one piece was an octopus skin. Another person assumed it was a fungal problem that I was employed to remediate. I almost convinced a six-year-old that it was my pet seaweed. Several middle-aged Pākehā men were suspicious of my permissions. A local elder loved the work. Such multi-layered and unstable aesthetics often remain hidden in an art gallery. Yet, even for those viewers familiar with land art, the multiplicity of fugitive, ephemeral states in these biopolymer artworks retained an element of surprise.

Navigation of instability leads to adaptation of composition beyond a survival of the fittest mentality and materiality. The self-adhesive qualities of cellulose enable physical grafting of supports to sustain fragile or precarious structures. Hydrophilic methods emerge from these habit-forming adaptations of process. Habit "not only mediates nature and culture, inside and outside... habit constitutes a kind of substratum that supports and enables acts of great unpredictability" (Grosz, 2013, p. 226). Biopolymer aesthetics reconfigures and re-materialises polymers at molecular and formal levels (Martyn & O'Neill, 2019).

The cyclical and responsive morphology of biopolymers resonates with their plant-based and biowaste origins, where within an ecosystem, plant morphology, or bacterial fermentation processes respond and adapt within site-specific conditions. The materials used in the works displayed at the old quarry site were reconstituted from previous biopolymer artworks, enabling the work to participate in a circular economy. In this way, material repurposed between artworks and projects might escape existing measures of value but also extend the cycles and reach of productivity. Despite these counterhegemonic tendencies, a circular economy nevertheless risks overlapping with the reproductive dystopia of neoliberalism in which labour, care, management, and materials are endlessly circulated and undervalued (Puig de La Bellacasa, 2017). In such a scenario, discrete artworks become another kind of zombie painting (Robinson, 2014). Repossessing materials, and methods therefore risks a constant restaging that might convert the adventure into entropy. Bearing this in mind, the provisional nature of the work is continuously foregrounded, keeping Wark's (2020, p. 11) common task for speculative artistic endeavours in mind; namely, that "the world might be known provisionally, speculatively, tentatively, without any one way of knowing having to be sovereign over the others." Nonetheless, again,

such risky and speculative ways of knowing and working characterise the neoliberal mantra of continuous adaptability and flexibility. In other words, adventuresome repurposing risks sustaining capitalism and its precarious systems rather than liberating and repurposing that precarity (Berry & Dunphy, 2018). This is where organic figurations such as *sympoiesis* and symbiosis “enlarges and displaces *autopoiesis* and all other self-forming and self-sustaining system fantasies” (Haraway, 2016, p. 125), moving assemblages beyond individualist or purely *autopoietic* precarious survival modes. As a biopolymer artist, as many artists throughout history, I see artmaking as embracing both autopoiesis and sympoiesis. It involves both subjective and intersubjective expression and often collaboration beyond the human.

Hydrophilia is part of a symbiotic earth-scale imaginary where loss is observed and understood through cycles of everyday erosion and less visible slow-grinding, hot-pressing, transformations of matter not necessarily perceived in the day-to-day. This scale of imaginary helps us understand human and more-than-human habits of learning and worlding. Symbiotic geologic plasticity is also present in what I am calling biopolymer aesthetics—with its Western/European roots in Bataille’s (1985, p. 45) “base materialism,” yet clearly predated in Indigenous bio-material relationships (Liboiron, 2019)—and within the cosmological timespan of what Emily Apter (2013, p. 132) has described as a “planetary aesthetics.”



Figure 6: *Greywacke Love Poems: Returns* (Martyn, 2019b). Cellulose from Fig. 4 seen again, after dehydration

As mentioned in the “Adventure” section earlier, affects of uncertainty and instability can prefigure progressive change, however, they can also prefigure further

governmentality that exploits uncertainty. This can accelerate aspects of neoliberal control within settler-colonial capitalist systems (see Berry & Dunphy, 2018). Two well-known examples of this are carbon trading and biotech patenting (Pellizzoni, 2017). However, as Hynes and Sharpe (2015, p. 116) observe, we might challenge this acceleration of control by actualising “affect’s resistant potentials.” As they explain with a nod to excessive base materialism, “the gift that affect theory offers to thinking lies in the fact that affect exceeds the economy of exchange to which intellectual thought is today so often subjected” (2015, p. 116).

As a publicly funded outdoor artwork, the intensity of labour and ongoing care operational within the installation of *Greywacke Love Poems: Returns* (2019b) was highly visible and often provoked unsolicited offers of help and conversations about the materiality of the work from passers-by. This enabled me to add another affective layer to the work by reframing the act of biopolymer creation beyond the human, toward an open-ended creationism that challenges assumptions of what technology or what plastic is beyond the binary of nature and culture. Stories that artists and designers tell about their materials exercise powers of creation and narratives that inform subsequent use. Material narratives are part of what Felicity Colman (2006, p. 169) calls the “morpho-sorcery” of forms.

States of hydrophilia and events of orogeny are connected through planetary processes within the hydrosphere and geosphere (Parikka, 2016) matter circulates between these spheres and within processes of entropy—as also evident in artist Robert Smithson’s (1973) writings. For my creative purposes, I think of entropy alongside empathy; namely, as habitual and intuitive methods of working, emerging within and creating systems at a range of scales. These moments of creativity may be born of excess and negative entropy (negentropy), as new energy enters a closed system. Deleuze and Guattari, noting that excessive matter and forces have fed creation across multiple scales and temporalities state that “when forces become necessarily cosmic, material becomes necessarily molecular” (1987, p. 343). They do not see a linear evolution at work, rather a creative repurposing of materials or methods whereby “what was composed in an assemblage, what was still only composed, becomes a component of a new assemblage” (p. 347). This systemic approach, which informs my own work, has been developed with deeper consideration of media materialism and labour by Jussi Parikka (2016).

Plasticity is life

Our sense of the worlding that has come before us—and what is possible in the future—can be altered by lesser-known and revised material histories. The alter-modern project that influenced Haraway's (2016) tentacular worlding necessitates a refusal of petro-hegemonic narratives. In the 21st century, bio-based plastics are often referred to as new materials when actually they are old materials. Indigenous peoples' use of biopolymer materials—seaweed, natural rubber, and plant or bark-based cellulosic materials—predates petrochemical plastics. In this longer history of creative use, we see working methods of plasticity that are sensitive to the more-than-human lively nature of polymers.

The parallel industrial histories of bio-based and petrochemical plastics are tales of dominance, where potential alternate plasticities were excluded and obscured by oil industry interests (Latterman, 2015). Public understanding of plasticity is now destabilised and enlarged by the proliferation of things like bioplastic packaging and increased visibility of bio-based art materials (see Materials, 2020). Within transitions to a bio-based economy (bioeconomy), biopolymers are adapted to existing petrochemical infrastructures—in a kind of petromimicry. Meanwhile, public awareness of plastic pollution motivates manufacturers to differentiate new materials through green colour coding and natural textures, flipping the biomimicry of early petrochemical plastics that were developed to mimic tortoiseshell, circumventing the scarcity of the shells and reach a broader market (Meikle, 1995). Bioplastic aesthetics continue to be responsive to markets—code switching between petromimicry and biomimicry, during production and marketing (Wagner-Lawlor, 2017).

Both bacterial and cellulosic bioplastics can be generated through symbiotic processing of waste streams, or through extractive feed-sources and forest use. In 1926, French biopolymer researcher Maurice Lemoigne began to regenerate waste streams into bacterial thermo-plastics, like those used within *Greywacke Love Poems: Returns* (2019b). Lemoigne's work arises in parallel to Bataille's base materialism, in the wake of Marxist historical materialism. Renewed attention to this work opens a non-linear understanding of this context in relation to feminist new materialist thought, which can be used to consider the symbiotic qualities of more-than-human and bio-based material.



Figure 7: Greywacke Love Poems: Returns (Martyn, 2019b). Bacterial thermoplastic heat forming. Image courtesy of Johanna Mechen

Bataille, as Noys (1998) also explains, understood that base matter and its affects are excessive yet often hidden. According to Melillo (2014), Bataille extended the metaphors of 19th century metabolic rift to claim that human waste had become disconnected from the metabolism of local pastoral spaces. Roland Barthes' (1972) meditations on petrochemical plastics works with Bataille's base materialism (1985, p. 45), speculating on the past, present and future of bio-based plastics. For Barthes, base and superstructure exist in material entanglement, as the active nature of base matter means it does not stay put in a binary of high and low. This structural imaginary becomes anarchic, foreshadowing artist Gordon Matta Clark's 1970s notion of anarchitecture (see Halberstam, 2020; Martyn, 2013). As Noys (1998, p. 503) observes, this entanglement is a risky adventure that overburdens the affective potential of matter with revolutionary intent, creating an "unstable discourse, which ...provide[s] a cultural medium to carry the contagion of base matter, in the same way that a virus or a bacteria are grown and developed ... [as] an infectious thought."

This infectious thought shapes human memory and epigenetics, which carry intergenerational forms of gene behaviour that respond to changes in environmental, material, and social conditions, as well as affective regimes. This adaptive plasticity is somewhat akin to shape memory in bacterial biopolymers. The bacterial thermoplastic biopolymers, and polysaccharide blends used in *Greywacke Love Poems: Returns* (2019b), reconfigured through heat, trigger shape-memories at predetermined heat

settings, revealing a plasticity that exists in recognition of a resiliency which involves flexibility but also resistance, deformation, reformation—wilder capacities to reconfigure. Both Barthes and Malabou think about the plasticity of childhood and the ways that children experience trauma and interact with the world beyond trauma (see Wagner-Lawlor, 2017, p. 77). Jennifer Wagner-Lawlor (2017, p. 74) notes that Barthes (1972) derided the shift from wooden toys to plastic toys and she suggests that he thought of plastic as anaesthetic. Malabou's understanding is less anaesthetic: plastics "bring together the origin, as their name indicates, and the future [in their] capacit[ies] for self re-form" and lend themselves to a kind of "biological alter-globalisation" (2008, p. 80; 2011, p. 73). Such an alter-globalisation might involve the kind of more-than-human/intergenerational solidarity already present within Indigenous thinking where plastics derived from fossil ancestors are considered kin (Liboiron, 2019).

Contemporary popularisation of plasticity is described by Wagner-Lawlor as a form of "utopian anticipation" (2017, p. 67) whereby utopian artworks and fictions generate political motivations or a type of prefigurative politics (Leach, 2013). I have been thinking about biopolymer aesthetics as a prefigurative materialisation of movements toward a circular economy. In the 21st century, circular and doughnut economic frameworks are being used to envision possible bioeconomy futures, where plasticity involves circular, symbiotic regenerative thresholds.

In Aotearoa New Zealand, the reconfigurations of coloniality and material histories can be seen in Indigenous scientist Teina Boasa-Dean's Ngāi Tūhoe te ao Māori—Tūhoe tribe Māori world view—iterations of doughnut economics (Project Moonshot, 2020) where the circle and doughnut become takarangi (concentric spirals). Boasa-Dean contributed to the 2019 Global Circular Economies Summit in Rotorua, where conversations between scientists were pivotal in navigating spaces between settler-colonial futurity and Indigenous futurities. *Greywacke Love Poems: Returns* (2019b) was made within a disestablished site of colonial extraction. The bacterial polyester used to make the artworks was produced through bacterial metabolisation of waste streams. Installed at the quarry, the artwork points toward symbiotic regeneration, and reproduction. Yet this creativity, as noted, points toward neoliberal motifs of continuous flexibility. When scaled up, industrial bio-based production risks further venturing into endlessly adaptable extractive capitalism, as is evident in a recent

discussion of bioenergy plants (see Walmsley, 2020). Biomaterials and associated knowledges are figured within ongoing narratives of coloniality (as manifest in neoliberal extractivism) and its dualist relationship with nature. To date, while Anthropocene scholarship and the new materialisms have highlighted the role of capitalism, they have been slow to acknowledge Indigenous cosmology (Haraway, 2016; Todd, 2016). This has motivated me to think about how artworks (and artists) contend with their material relations to coloniality and extractive capitalism and how affects are generated within these specific relations. My argument is that recognising the dissonance and resonances between the habits and affects of materiality and neoliberal regimes might lead to a more robust alter-global imagination that follows alongside the kin-making material relations of Indigenous thought.



Figure 8: *Greywacke Love Poems: Returns* (Martyn, 2019b). Cellulose from Fig. 4 & 6. seen installed at the old quarry site

Porosity

Biomaterials are often porous and membrane-like, and in the studio this porosity generates working methods and interfaces where affective processes and regenerative practices allow another world to be possible (see Haraway, 2008). We might talk about such affective interfaces, in a physical and psychic sense that may include more-than-human figures and grounds (Derrida & Caws, 1994). Grosz (2008,

p. 70) enlarges this kind of interface via Deleuze and Guattari, into a “plane of composition”—the site of compound sensations like artworks; sexual selection; and the mobilisation of territorialising and deterritorialising forces. Like Grosz, Bataille’s imaginary also enlarges the interface of human and more-than-human sensations.

Bataille’s work (see e.g., 1985) is often about things that pass between things, about the differences and relations that create excretions and separations. “The notion of the (heterogeneous) foreign body permits one to note the elementary subjective identity between types of excrement (sperm, menstrual blood, urine, faecal matter) ...a half-decomposed cadaver fleeing through the night in a luminous shroud” (p. 94). Bataille’s collapse of the binary relationship between eroticism and death is a model for a collapse of entropy and empathy; a collapse of the material and immaterial, including biological and sexual selection, which are both corporeal and incorporeal. Interpretations of Bataille’s abject affects can reinforce a heteronormative othering (Gutiérrez-Albilla, 2008), rather than an inclusive collapse. The limitations of Bataille’s eroticism have led artist Lisi Raskin (2014) to write about Audre Lorde’s *Uses of the Erotic* (1993), which reclaims the liberatory potential of erotic affect from plasticised sensation and instrumentalisation—this also calls for experiments in bioplastic sensation.

In 2012, I was making large-scale wall paintings by peeling back skin-like layers of acrylic latex house paint. These works often generated an affective narrative of collapse between the liveness of skin and its excretions, and something death-like. The paint transformed from two-dimensional surface into three-dimensional material—membrane-like sheets of surface; layered and extended or fallen. The paint became unfamiliar, seamless coating transformed into material waste—not usually visible as such. In the wake of the 2008 economic crisis, this artistic praxis seemed to materialise a necessary grief. It also became a provocation: to create a painting that could become fluid again.

Within established painting and sculptural practices, such fluidity, reuse and misuse of plastic and skin-like materials is evident in the work of a number of artists such as Eva Hesse (*Aught*, 1968), Lynda Benglis (*Fallen Painting*, 1968), Christine Hellyar (*Flotsam and Jetsum*, 1970), Linda Besemer (*Fold #7: Optical Objectile*, 1998), Margie Livingston (*Folded Painting, small*, 2009), and Helen Calder (*Orange Skin (125 fl. oz*, 2009)). These works combine a mixed-use of petrochemical and natural latex with gestures that include formless pouring, delamination, moulding, casting, and stretching. My explorative use of biopolymers includes these gestures and further deformations and transformations. For example, a sheath of biopolymer paint delaminated within my installation *Climate Change Heartbreak Poems 2006-2013* (2019d, Figure 9) could subsequently be rehydrated to become liquid again, without use of harsh solvents.

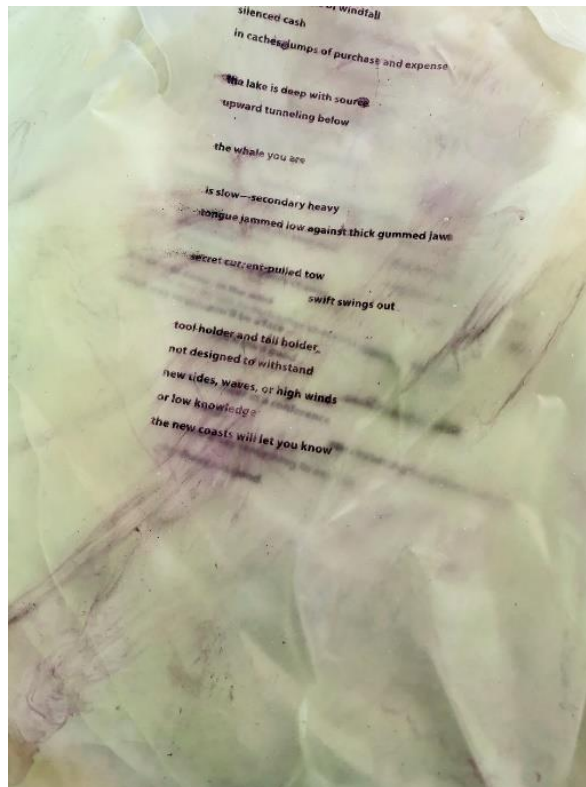


Figure 9: *Climate Change Heartbreak Poems 2006-2013* (Martyn, 2019d). Poems embedded within seawater and cellulose sheets. The purple pigment is drawn up into the pale green cellulose substrate as it dries. The colours reference the “purple oceans and green skies” climate scenario (Copenhagen Meets, 2012). The sheets were installed in the reading nook of Gus Fisher Art Gallery at University of Auckland as part of the group exhibition *The Slipping Away* (2019), curated by Lisa Beauchamp

Bifurcations—the forking of flows—are a key part of the visual language of biopolymers. Forked flows are generated when the liquid emulsion is poured or disturbed—akin to the bifurcated paintings of United States-based artist Lynda Benglis (see Richmond, 2015). Bifurcation is evident in industrialised plasticity and is evident in the bifurcation fallacies of social contexts, whereby false dilemmas may be created through omission or ignorance. Physical entropy and affective empathy can be understood as forking processes too, running in parallel or apart, becoming confluences or oxbow lakes, moving between scales and forms of material flow (Turpin, 2010). I think of entropy and empathy as interrelated processes and as emergent proceedings, that produce and process traumatic affects (Whitehead, 1929). Material empathy develops understanding of how materials generate and behave in relation to social and physical forces or “quanta” (Deleuze & Guattari, 1987, p. 88) that are figured into creative practices.

Empathy is often initiated by events that articulate change or forking processes within a system or entity in the direction of creative flux, entropy, or negentropy. It extends into more-than-human encounters like geo-aesthetics, where we understand geological processes better after witnessing a landslide, or the strata exposed during an earthquake. For Robert Smithson, the “mind and the earth are in a constant state of erosion, mental rivers wear away abstract banks, brain waves undermine cliffs of thought, ideas decompose into stones of unknowing, and conceptual crystallizations break apart into deposits of gritty reason” (in Turpin, 2012, p. 174). Smithson’s entropy includes in-between spaces of non-site—between the self and non-self, the individual and collective. Here we can detect the influence of Bataille’s (1985, p. 35) base materialism; a more-than-human politics that “brought back to the subterranean action of economic facts, the ‘old-mole’ revolution [that] hollows out chambers in a decomposed soil repugnant to the delicate nose of the utopians.”



Figure 10: *Biobitumen: A Greywacke Love Poem* (Martyn, 2019c). Still shot from the film made for Circuit Aura Festival 2019 with photography by filmmaker Rachel O'Neill

Within current theories of an affective turn, exercising empathy creates affects within events (Gauld, 2014). Visible or articulated processes like emotional labour and solidarity, are affective at an interpersonal and interspecies level, as well as at a societal and environmental ecological scale. This affective turn is evident in the processes of entropy and empathy that biopolymer artworks evince; a making-visible that foregrounds “the persistent sense that there must be something more than this, that it didn’t have to be this way, or that things might have been otherwise” (Kramer 2017, p.120). This material/affective response to the breakdown of forms requires us to find the spaces in which we can mourn and pass through, where experience is not fixed in “what had to be” (p.120).

While I lived in the Netherlands in 2016-2017, I read Edith Stein’s *On the Problem of Empathy* (1989), first published in 1917. Stein lived in the Netherlands until 1942, when she was taken to Auschwitz and killed. While reading Stein, I thought about my family history across the fields in Belgium and France, where my great-grandfather had been in 1916 and 1917, with a contingent of cannon fodder from the colonies, participating in a war that created the social and political vulnerabilities that lead to fascism (Martyn, 2018a). My great grandfather lost his arm on those fields in 1917; an event that probably saved his life. It made me wonder about the epigenetics of those events, across time and space, and the art-making and writing of myself and my European peers—many of whom were also grandchildren of that generation. Diffracting Stein and my family history, I was brought into thinking about the synthesis of knowledge politics, aspects of empathy, mourning, and ethics of care (Puig de La

Bellacasa, 2017). This has resonances in the contemporary context in which empathy and kindness are invoked and critiqued, as academics and artists seek affective ways through neoliberal inequality, austerity, and the rise of far-right populism (see Kukar, 2018).

Conclusion

Methodologies of adventure reorient, disorientate, and bewilder us via pedagogical and affective processes that involve “groping experimentation” (Deleuze & Guattari, 1994, p. 44). This learning is manifest within biopolymer aesthetics, where making and becoming happen at the interface of regeneration and decomposition, as I argued and as is evident in the music video for *Adventure* (2019) and in *Greywacke Love Poems: Returns* (2019b). The deformations within artworks like *Adventure* (2019) and *Greywacke Love Poems* (2019a) contribute to a prefigurative politics of reorientation, regeneration, and redistribution. The so-called *returns* within *Greywacke Love Poems: Returns* (2019b), cannot be a regressive return to a past state, or a return on investment—it is a return to fluid cycles and the folding more-than-human processes of orogeny (mountain building).

In the context of the COVID-19 crisis, the language of economic recovery is being reconsidered because it assumes a backward lens and an attempt to return to the status quo. Instead, activists, thinkers, and artists—those who are working within paradigm shifts necessitated by ecological and social crises—are reorienting toward the language of regeneration (Stephenson, 2020). Like Malabou’s lively and plastic “paradigms of recovery” (Malabou, 2011, p. 73-74) the current shifts language might dismantle and sow different seeds, triggering different genetic compositions, mutation, and a bifurcation of economic and ecologic trajectories. Taken together, such risks constitute a creative and pedagogical bewildering that I have attempted to make evident in my exploration of biopolymer artworks. While writing this paper, I have conceptualised empathetic materialism as a type of feminist materialist entropy that segues with Halberstam’s aesthetics of bewilderment (2020). In this confluence, a kind of nomadic thought (Braidotti, 2011) informs both material self-organisation, creative disorder, and the symbiosis of tentacular learning and worlding (Haraway, 2016). The biopolymer aesthetics I have foregrounded, allow conditions of entropy, habit, and

bifurcation to come together, generating a kind of pedagogical bewilderment that bridges between affective, psychological, collective, and environmental ecologies—making other worlds of thinking and doing possible.

Acknowledgements

With thanks to Matter Journal, Evelien Geerts, Delphi Carstens and the anonymous reviewers who generously supported the development of this article.

Bibliography

- Ahmed, Sara (2004). Affective economies. *Social Text*, 22(2), 117-139.
- Ahmed, Sara (2014). *The cultural politics of emotion*. Edinburgh University Press.
- Animal, Stef (2018). *Adventure*, on Top Gear [MP3]. Fishrider Records.
- Asafo, Dylan (2020, November 19). The cruel violence of 'kindness' and 'unity.' Retrieved from: <https://www.newsroom.co.nz/ideasroom/the-cruel-violence-of-kindness-and-unity>.
- Apter, Emily (2013). Planetary dysphoria. *Third Text*, 27(1), 131-140. <https://doi.org/10.1080/09528822.2013.752197>.
- Barad, Karen (2003). Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society*, 28(3), 801-831. <https://doi.org/10.1086/345321>.
- Barad, Karen (2014). Diffracting diffraction: Cutting together-apart. *Parallax*, 20(3), 168-187. <https://doi.org/10.1080/13534645.2014.927623>.
- Barthes, Roland (1972). *Critical essays*. Northwestern University Press.
- Bataille, Georges & Stoekl, Allan (1985). *Visions of excess: Selected writings, 1927-1939*. University of Minnesota Press.
- Benglis, Lynda (2015). *Fallen painting* [poured pigmented latex, 355 x 69 ¼ in. (901.7 x 175.9 cm)]. Albright-Knox Art Gallery, Buffalo, NY. In Susan Richmond (1968). *Lynda Benglis: Beyond process*, I. B. Tauris & Company, Limited.
- Berry, Josephine & Dunphy, Niamh (2018). *Art and (bare) life: A biopolitical inquiry*. Sternberg Press.
- Besemer, Linda (1998). Fold #7: Optical objectile [acrylic on aluminium]. *Artnet*. Retrieved from: <http://www.artnet.com/Magazine/reviews/zinsser/zinsser11-7-7.asp>.

Braidotti, Rosi (2011). *Nomadic theory: The portable Rosi Braidotti*. Columbia University Press.

Calder, Helen (2009). *Orange Skin (125 fl. Oz)* [acrylic, enamel & stainless steel]. Collection Chartwell Collection, Auckland Art Gallery Toi o Tāmaki. Auckland Art Gallery Toi o Tāmaki. Retrieved from: <https://www.aucklandartgallery.com/explore-art-and-ideas/artwork/16403/orange-skin-125-floz>.

Charlton, Jess & Martyn, Raewyn (2019). *Adventure*. Adventuresomefilms. See <https://vimeo.com/379895739>.

Colman, Felicity (2006). Affective entropy. *Angelaki*, 11(1), 169-178. <https://doi.org/10.1080/09697250600798060>.

Coleman, Rebecca (2013). *Deleuze and research methodologies*. Edinburgh University Press.

Copenhagen meets (2012). With purple oceans and green skies. *HuffPost*. Retrieved from https://www.huffpost.com/entry/copenhagen-meets-em2012em_b_377407.

Deleuze, Gilles & Guattari, Félix (1987). *A thousand plateaus: capitalism and schizophrenia*. (B. Massumi, Trans.). University of Minnesota Press. Originally published in French 1980.

Deleuze, Gilles & Guattari, Félix (1994). *What is philosophy?* (G. Burchell & H. Tomlinson, Trans.). Columbia University Press. Originally published in French in 1991.

Derrida, Jacques & Caws, Mary Ann (1994). Maddening the subjectile. *Yale French Studies*, 84, 154-171. <https://doi.org/10.2307/2930185>.

Fifield, Anna (2019). New Zealand's prime minister receives worldwide praise for her response to the mosque shootings. *The Washington Post*.

Gauld, Quanta (2014). Empathy beyond the human: Interactivity and kinetic art in the context of a global crisis. *Technoetic Arts: A Journal of Speculative Research*, 12(2/3), 389-398. https://doi.org/10.1386/tear.12.2-3.389_1.

Geerts, Evelien & van der Tuin, Iris (2016). Diffraction & reading diffractively. *New Materialism Almanac*. Retrieved November 25, 2020. Retrieved from: <https://newmaterialism.eu/almanac/d/diffraction.html>.

Goh, Irving (2008). Strange ecology in Deleuze-Guattari's *A thousand plateaus*. In B. Herzogenrath (Ed.), *An (un)Likely alliance: Thinking environment(s) with Deleuze/Guattari* (pp.196-215). Cambridge Scholars Press.

Grosz, Elizabeth (2008). *Chaos, territory, art: Deleuze and the framing of the earth*. Columbia University Press.

Grosz, Elizabeth (2013). Habit today: Ravaissou, Bergson, Deleuze and us. *Body & Society*, 19(2-3), 217-39. <https://doi.org/10.1177/1357034X12472544>.

Grosz, Elizabeth (2017). *The incorporeal: Ontology, ethics, and the limits of materialism*. Columbia University Press.

Guattari, Félix (1995). *Chaosmosis: An ethico-aesthetic paradigm*. (P. Bains & J. Pefanis, Trans.). Indiana University Press. Originally published in French in 1992.

Guattari, Félix (2000). *The three ecologies*. (I. Pindar and P. Sutton, Trans.). Continuum. Originally published in French in 1989.

Gutiérrez-Albilla, Julián D. (2008). Abjection and the politics of feminist and queer subjectivities in contemporary art. *Angelaki*, 13(1), 65-84. <https://doi.org/10.1080/09697250802156075>.

Haraway, Donna J. (2008). *When species meet*. University of Minnesota Press.

Haraway, Donna J. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.

Halberstam, Jack (2020). *Wild things: The disorder of desire*. Duke University Press.

Haluza-Delay, Randolph (2012). Giving consent in the petrostate: Hegemony and Alberta oil sands. *Journal for Activist Science and Technology Education*, 4(1), 1-6.

Hellyar, Christine (1970). *Flotsam and Jetsum* [Cloth and latex]. In E. Hanfling, *Four decades on*. *Art New Zealand* (142), 30.

Hesse, Eva (1968). *Aught* [latex and filler over canvas stuffed with polyethylene sheeting, rope, and unidentified materials]. University of California, Berkeley Art Museum, San Francisco, CA.

Hynes, Maria & Sharpe, Scott (2015). AFFECT: an unworkable concept. *Angelaki*, 20(3), 115-129. <https://doi.org/10.1080/0969725X.2015.1065129>.

Kukar, Polina (2018). Against empathy: The case for rational compassion. *Philosophical Psychology*, 31(3), 479-482. <https://doi.org/10.1080/09515089.2018.1442923>.

Kramer, Sina (2017). *Excluded within: The (un)intelligibility of radical political actors*. Oxford University Press.

Lattermann, Günter (2015). Glass and plastics—a concise comparison of two kinds of polymeric materials. *E-Plastory – Journal of Plastics History*.

Lawtoo, Nidesh (2017). The plasticity of mimesis. *MLN*, 132(5), 1201-1224. <https://doi.org/10.1353/mln.2017.0092>.

Leach, Darcy K. (2013). Prefigurative politics. *The Wiley-Blackwell Encyclopedia of Social and Political Movements*. <https://doi.org/10.1002/9780470674871.wbespm167>.

Lenco, Peter (2012). *Deleuze and world politics: Alter-globalizations and nomad science*. Routledge; Harvard Library Bibliographic Dataset.

Liboiron, Max (2019). Anti-Colonial science & the ubiquity of plastic. *Frank News*. Retrieved from: <http://www.franknews.us/interviews/206/anti-colonial-science-the-ubiquity-of-plastic>.

Livingston, Margie (1998). *Folded painting, small* [acrylic, 2.5"x6.5"x7.5"]. *Artist Trust* (n. d.). Retrieved from: <https://artisttrust.org/artists/margie-livingston/>.

Lorde, Audre (1993). The uses of the erotic: The erotic as power. In H. Abelove, M. Aina Barale, and D. Halperin (Eds.), *The lesbian and gay studies reader* (pp. 339-343). Routledge. Originally delivered as a paper in 1978.

Malabou, Catherine (2010). *Plasticity at the dusk of writing: Dialectic, destruction, deconstruction*. Columbia University Press.

Malabou, Catherine (2011). *Changing difference*. Polity.

Martyn, Raewyn (2013). DAY FOLDER [Thesis]. Virginia Commonwealth University. <https://doi.org/10.25772/ANS6-EG27>.

Martyn, Raewyn (2018a). Elite professional players. In H. Verleger, & A. Xylanthé (Eds.), *Margaret van Eyck: Renaming an institution, a case study (Volume two: Comments, contexts, and connections)* (pp. 121-126). Peradam Press.

Martyn, Raewyn (2019a). *Greywacke love poems*. Courtney Place Lightboxes, Te Whanganui-a-Tara. Sixteen images on eight free-standing lightboxes.

Martyn, Raewyn (2019b). *Greywacke love poems: Returns*. Installation at the old Owhiro Bay quarry site on the south coast of Te Whanganui-a-Tara.

Martyn, Raewyn (2019c) *Biobitumen: A greywacke love poem* (2019c). a film made for Circuit Aotearoa New Zealand Aura Festival 2019.

Martyn, Raewyn (2019d). *Climate Change Heartbreak Poems 2006-2013*. As part of the group exhibition *The Slipping Away* (2019), curated by Lisa Beauchamp at Gus Fisher Gallery, University of Auckland.

Martyn, Raewyn, O'Neill, Rachel & Kan, Gregory (2018). *Not standing still*. Ōtepoti Dunedin: Blue Oyster Art Project Space.

Martyn, Raewyn, O'Neill, Rachel & Knox, Johanna (2019). *Greywacke love poems: Returns*, 2019 [book].

Materials—Future Materials Bank (n. d.). Retrieved November 28, 2020, from <https://www.futurematerialsbank.com/>.

Meikle, Jeffrey L. (1995). *American plastic: A cultural history*. Rutgers University Press.

Melillo, Edward (2016, April 11). Nutrient rifts. *Discard Studies*. <https://discardstudies.com/2016/04/11/nutrient-rifts/>.

Noys, Benjamin (1998). Georges Bataille's base materialism. *Cultural Values*, 2(4), 499-517. <https://doi.org/10.1080/14797589809359312>.

Palmer, Helen, & Hunter, Vicky (2018, March 16). Worlding. *New Materialism Almanac*. Retrieved from <https://newmaterialism.eu/almanac/w/worlding.html>.

Parikka, Jussi (2016). *A geology of media*. University of Minnesota Press.

Pellizzoni, Luigi (2017). New materialism and runaway capitalism: A critical assessment. *Soft Power*, 4(1), 63-80.

Project Moonshot (2020, April 29). An Indigenous view on doughnut economics from New Zealand. *Project Moonshot*. Retrieved from: <https://www.projectmoonshot.city/post/an-indigenous-view-on-doughnut-economics-from-new-zealand>.

Protevi, J. (2001). The geophilosophies of Deleuze and Guattari. In *Fifty-Sixth Annual Meeting Association of American Geographers Southeastern Division*, Lexington, KY. Retrieved from <http://www.protevi.com/john/SEDAAG.pdf>.

Puig de La Bellacasa, María (2017). *Matters of care: Speculative ethics in more than human worlds*. University of Minnesota Press.

Raskin, Lisi (2014, September 4). Updating (the) uses of the erotic from Georges Bataille and Jean Genet to Audre Lorde and bell hooks. *The Brooklyn Rail*.

Rattray, Erik (Producer) & Henson, Jim (Director). (1986). *Labyrinth* [Motion Picture]. United Kingdom & United States: Henson Associates, Inc – Lucasfilm Ltd.

Richmond, Susan (2015). *Lynda Benglis: Beyond process*. Bloomsbury Publishing.

Robinson, Walter (2014). Flipping and the rise of zombie formalism. *Artspace*. Retrieved from: http://www.artspace.com/magazine/contributors/the_rise_of_zombie_formalism.

Royal Society Te Apārangi Parliamentary Speaker's Science Forum June 2019 (n.d.). Retrieved May 17, 2020. Retrieved from <https://www.youtube.com/watch?v=CAi-HlqBHPw&feature=youtu.be>.

Saldanha, Arun & Stark, Hannah (2016). A new earth: Deleuze and Guattari in the Anthropocene. *Deleuze Studies*, 10(4), 427-439. <https://doi.org/10.3366/dls.2016.0237>.

Sendak, Maurice (1963). *Where the wild things are*. Story and pictures of Maurice Sendak. Harper & Row.

Sendak, Maurice (1970). *In the night kitchen*. Harper & Row.

Sendak, Maurice (1981). *Outside over there*. Harper & Row.

Smithson, Robert (1973). Entropy made visible. *On Site* (Vol. 4).

Stein, Edith (1989). *On the problem of empathy* (W. Stein, Trans.). The Hague.

Stephenson, Fiona (2020). How to regenerate our economy. *Sustainable Business Network*. <https://sustainable.org.nz/sustainable-business-news/how-to-regenerate-our-economy/>.

Todd, Zoe (2016). An Indigenous feminist's take on the ontological turn: 'Ontology' is just another word for colonialism. *Journal of Historical Sociology*, 29(1), 4-22. <https://doi.org/10.1111/johs.12124>.

Turpin, Stephen (2010). Aesthetics of expenditure: Art, philosophy, and the infinite faculty [Thesis]. University of Toronto. <https://tspace.library.utoronto.ca/handle/1807/24901>.

Turpin, Etienne (2012). Robert Smithson's abstract geology: revisiting the premonitory politics of the Triassic. In E. Ellsworth & J. Kruse (Eds.), *Making the geologic now* (pp. 173-178). Punctum.

Vare, Paul (2020). Resilience and society. In A. ahmed Shafi, T. Middleton, R. Millican, & S. Templeton (Eds.), *Reconsidering resilience in education: An exploration using the dynamic interactive model of resilience* (pp. 39-57). Springer International Publishing. https://doi.org/10.1007/978-3-030-49236-6_3.

Walmsley, Kate (2020, August 23). Why industrial anaerobic digestion is not the answer to food waste. *The Spinoff*. <https://thespinoff.co.nz/food/23-08-2020/why-industrial-anaerobic-digestion-is-not-the-answer-to-food-waste/>.

Wagner-Lawlor, Jennifer A. (2017). The persistence of utopia: Plasticity and difference from Roland Barthes to Catherine Malabou. *Journal of French and Francophone Philosophy*, 25(2), 67-86. <https://doi.org/10.5195/jffp.2017.804>.

Wark, McKenzie (2020). *Sensoria: Thinkers for the twentieth-first century*. Verso.

Weiner, Richard R. (2019). Abjection, precarity and populist mood. *The European Legacy*, 24(5), 553-562. <https://doi.org/10.1080/10848770.2018.1554392>.

Whitehead, Alfred, N. (1978). *Process and reality: An essay in cosmology* (D. Griffin, & D. W. Sherburne, Eds.). Free Press.

Author information

Raewyn Martyn (raewyn.martyn@gmail.com)

Raewyn Martyn—www.walkerfalls.wordpress.com—is an artist living in Te Whanganui-a-Tara Wellington. She works in attentive occupation of sites to produce works that change over time. Surface often transforms into material, decomposing, reconfiguring, and reproducing. Raewyn has an MFA in Painting and Printmaking from VCUArts (United States) and she is a PhD candidate at Massey University College of Creative Arts (New Zealand).