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Entropy and Empathy: Mediums of Transformation

An exegesis presented in partial fulfilment of the requirements for the degree of

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Raewyn Jean Martyn
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Abstract

In this creative practice-based PhD, bio-based plastics derived from plant and bacterial growth are developed into bio-based and biopolymer[1] mediums for painting, site-responsive intervention, and collaborative moving image work. Research questions focus on the long histories of plant-based and bacterial bio-based polymers (bioplastics) within creative and industrial practices. These histories are considered in relation to non-Indigenous artistic, scientific, and colonial worldviews and through tauiwi understanding of the continuums of Indigenous sciences and futurities.

Diffractive practice generates material attention to the past, present, and future of these materials. As a Pākehā artist and researcher working here in Aotearoa and internationally, I work to develop material understanding of the differences[2] within colonial and anti-colonial approaches to biopolymers and bioeconomy.[3] This includes my own family history of involvement with biopolymers, within colonial and creative contexts, diffracted with feminist new materialisms, affect theories, Indigenous and non-Indigenous science (see e.g., Barad, 2003 and 2014; Braidotti, 2011; Colman, 2006; Haraway, 2008 and 2016; Gauld, 2014; add Massumi 1995; Ahmed 2014; Liboiron 2019; Boasa-Dean 2020; Stewart 2020; Mercier 2022).

This PhD research asks "what can we learn about the materiality and ethics of biopolymers when using methodologies of diffraction?" (Haraway 1992; Barad 2014; Bozalek & Zembylas 2017; Geerts & van der Tuin, 2016, Taylor 2019). My studio work explores a range of material effects and affects, including the four-dimensional (timebased) qualities of biopolymers. This is influenced by systems theory within painting, where picture spaces that have historically reflected dominant social and economic systems—foregrounding particular representations and abstractions of capital (Fraser 2014) —can decompose. Questions about the significance of such material transformation and transition are understood through processes of entropy and empathy.

1 There is a difference between bio-based polymers and biopolymers--bio-based polymers are derived from biomaterials and biopolymers, which are raw or more directly extracted. For the purposes of this dissertation I will move between the two as relevant and also use bio-based polymers as a catch-all term.

2 Difference is understood through feminist revisions of Deleuze's differential field, where the 'ground' of reality involves multiplicity, where specific experiences and identities are established through recognition of substantive and material differences (Deleuze 1968).

3 non-Indigenous experience was specific to Aotearoa and difficult to contextualise in North America or Europe, where material and place-based relationships were different again.

Main Introduction

In this creative practice-based PhD, bio-based plastics derived from plant and bacterial growth have been developed into bio-based and biopolymer[4] mediums for painting, site-responsive intervention, a series of poems, and collaborative moving image works. The artworks featured in the Courtenay Place lightboxes (2019) and *Greywacke love poems: returns* (2019) were generated on site at Te Kopahou Reserve (the old Owhiro Bay quarry). This reserve was a site of colonial extraction and return with greywacke aggregate from this strata used for pathways, roading and building throughout Pōneke Wellington in the twentieth century.

This cycle of work was reconfigured for the exhibition component of this PhD, installed in the Adam Art Gallery stairwell (2021). The stairwell featured an architectonic skin—a thin layer of the quarry cliff face, bound in cellulose medium. This work reconstituted materials produced as part of the earlier phases of the project—plant-based

Fig. 1. Raewyn Martyn, detail of bacterial polyester used for *Greywacke love poems: returns* (2019–2021), at the old Owhiro Bay Quarry.

4 Biomaterials and biopolymers are raw materials while bio-based polymers are derived from raw materials. For the purposes of this dissertation I will use bio-based polymers as a catch-all term, and specify biopolymers where the distinction is important.

Fig. 2. Raewyn Martyn, *Greywacke Love Poems* (2019), Courtenay Place Lightboxes, Te Whanganui-a-Tara. Sixteen images on eight free-standing lightboxes.

Fig. 3. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021. Image credit: photograph courtesy of Anne Noble.

cellulose and bacterial polyester, pigmented with greywacke ground down from old quarry rock fall. These materials were then grafted into the lower level of the gallery stairwell. All three parts of this work developed a four-dimensional approach to painting that uses entropy and empathy as mediums of transformation, which I will discuss later in this introduction.

Locating this research

In the main introduction to this exegesis, I begin by locating this research in Aotearoa, discussing my own position and family history, and how my work with Scion, a crown research laboratory in Rotorua, began. I then use a series of subheadings to introduce my methodology of diffraction, and to develop understanding of terms like biopolymer aesthetics, entropy and empathy, and plasticity. I also establish links between historical materialism, base materialism, and feminist new materialisms—all of which are relevant to biopolymer aesthetics and materialism.

The quarry's origins are within the same periods of colonisation and industrial revolution from which the plastics industry emerged in parallel with historical materialism, and process-based philosophies (Whitehead 1978; Ireland and Lyndon 2016, 3; Grindon 2010, 305; Chaput 2020). Te Kopahou Reserve's reclamation as recreational space has occurred as 'new' materialisms have grown out of Australian, European, and North American scholarship (see e.g., Barad, 2003 and 2014; Braidotti, 2011; Colman, 2006; Haraway, 2008 and 2015; Gauld, 2014). These movements have been critiqued for their slow acknowledgement that indigenous philosophies already refuse the binaries of the human and non-human (as well as nature and culture), which new materialisms seek to challenge (Todd 2016; Leong 2016; Buchanan 2019).

Artists in Aotearoa find themselves working in their own particular positions, at the cross currents of what has been the dominant settler-colonial futurity and ever-present Indigenous futurity. This is not to say that non-Indigenous artists are making claims to Indigenous futurity, but that there are artists working to move through and beyond inherited settler-colonial

Fig. 4, 5. Graeme Martyn's childhood schoolbook drawings, depicting New Zealand's primary industries (c1950s).

visions for the future. My own research questions have focused on the histories of plant-based and bacterial bio-based polymers within these personal, creative, and industrial practices, and the affective and aesthetic languages that emerge within them. This understanding can be read through non-Indigenous artistic, scientific, petro-hegemonic and colonial material worldviews (Povinelli 2016; Haluza-Delay 2012; Davis 2022) and the continuums of Indigenous arts and sciences (Smith 2012, 244; Maihi & Lander 2005; Tuck & Gaztambide-Fernández 2013; Lopesi 2021).[5]

As Pākehā and tangata Tiriti (people of the Treaty of Waitangi), my family's economic and creative lives are formed through processes of colonisation (Ngata 2020). In thinking about biopolymers from a personal perspective, I write about how my family arrived in Aotearoa from Scotland, Ireland, and England in the 1860s. By the 1920s, my great grandparents were establishing themselves as property owners via the economic mobility of colonisation, extractive industries, and war—including the paper and rubber my great grandfathers went on to use in their trades and businesses. Their transition into the middle-classes allowed more time for leisure and creative life, including my grandmother's painting, using early acrylic paints along with plant-based oils and watercolours. This family story also runs in parallel with 19th century industrialisation, and into the 20th century interwar period when there were radical shifts in dominant schools of material and aesthetic understanding.

In 2018, a plan for collaborative lab work at Scion, a crown research institute in Rotorua, was funded through Massey University's Strategic Research Fund, supported by my main PhD supervisor Heather Galbraith. Since 2019, I have worked in their laboratories with technician and scientist Beatrix Theobald, to extrude plant and bacterial polymers. We have mixed commercially available bio-based polymer pellets with pigments, including DIY pigments ground from greywacke rock fall at the disused Owhiro Bay

Fig. 6, 7. Documentation of lab work with Beatrix Theobald at Scion, a crown research institute in Rotorua. The film extruder machine at Scion is used to melt and blend pellets of bacterial and plant-based polymers. Pigments are added at intervals, creating a spectrum of colour as the mix moves through the machine and heated rollers press and stretch molten polymers into a thin film.

5 The term futurities is used to understand the historical dynamics and ideologies behind future scenarios. An understanding of both settler-colonial futurities and Indigenous futurities can navigate systemic biases (Tuck & Gaztambide-Fernández 2013). A sixteenth century use of the word futurity spoke of affections being extended beyond someone's personal existence, beyond their immediate space and time (De Montaigne & Hazlitt 1879).

quarry, on Te Whanganui-a-Tara's South Coast.[6]

The work of Māori scientists and artists (and Indigenous peoples within Te Moananui-a-kiwa, and elsewhere), highlights the need for Pākehā and tauiwi to rethink and reconnect their relationships and responsibilities to plastics, in whatever ways are possible (Muru-Lanning 2022). Through my work with Scion, I came into conversation with Ngāi Tūhoe scientist Teina Boasa-Dean who has taken ideas of doughnut and circular economies and visualises them as spirals that include spiritual dimensions and whakapapa. For Māori, whakapapa is an important way of understanding connections with fossil-based plastics that were once living organisms (Ngata and Liboiron 2020; Boasa-Dean 2020).[7] Pākehā and tauiwi can also think through their own stories and histories, following their throughlines (or circular, spiralling motions) toward reconnection, informing material actions.

This PhD makes an original contribution by interweaving aspects of scientific collaboration, new materialism, art history and aesthetics, with anti-colonial and autoethnographic understanding. In Sections Three, Four, and Five, I think through a range of historical artworks with feminist new materialism in mind, using diffractive and divergent thinking to generate contemporary and historical understandings (de Vries & Lubart 2017).[8] This approach has enabled theoretical concerns to materialise within the production of biopolymer art materials and artwork, informing development and use of terms like biopolymer materialism and biopolymer aesthetics.[9] These terms are used to describe the materialisation of a range of affects and effects within select creative histories of biopolymers, including my own work.

Diffraction

Throughout the three phases of *Greywacke love poems* (2019-2021), I have been developing a methodology informed by existing processes of diffractive reading, writing, and practice (Haraway 1992; Barad 2014; Bozalek & Zembylas 2017; Geerts & van der Tuin, 2016). As a process within physics, diffraction produces waves when light, liquid, and air meet, or when entirely different sources meet

6 Sampling of this rock fall occurred in conversation with mana whenua, Wellington City Council and geologists. The film extruder machine at Scion is used to melt and blend pellets of bacterial and plant-based polymers. Pigments are added at intervals, creating a spectrum of colour as the mix moves through the machine and heated rollers press and stretch molten polymers into a thin film.

7 Highlighted in research collaborations between Tina Ngata (Ngāti Porou), and Max Liboiron (Métis) who runs the CLEAR Lab, a feminist and anti-colonial laboratory in Newfoundland, Canada (Liboiron 2020).

8 Recent research into creative methodologies within both arts and sciences identifies and/or assigns a binary between divergent and convergent thinking#, while also acknowledging that within globaliszed and multicultural education (and research) contexts, there are cultural biases toward these modes of thought and exploration, and within what is conceived as creative. de Vries, H. B., & Lubart, T. I. (2017). Scientific Creativity: Divergent and Convergent Thinking and the Impact of Culture. *The Journal of Creative Behavior*. https://doi.org/10.1002/jocb.184

9 Most existing biopolymer research has occurred within STEM (Science Technology Engineering and Mathematics), and STEAM (Science Technology Engineering Arts and Mathematics) contexts, where art is added to enhance the creativity of STEM, often prioritising ongoing colonial industrial and economic applications and outcomes. "In its inception, the arts were suggested as an addition to STEM in order to enhance student learning and interest in STEM fields. This description implicitly places the arts as a subservient discipline to STEM disciplines. In order for arts education to be given equal priority in STEAM, scholars must shift their language from one that "adds arts to STEM" to describing STEAM as a pedagogical approach that integrates five disciplines (Science, Technology, Engineering, Arts, and Mathematics) equally". (Perignat 2019).

Fig. 8. Raewyn Martyn, *Medium*, diffractive detail (2016).

and diffract. Within reading and writing, diffraction gestures to a series of interruptions within the flow of ideas. For example, you're reading and you pause to consider a paragraph from an entirely different text—not necessarily texts that sit in binary opposition to each other, but that provide some relevant differences to each other. These intertextual differences flow around and through each other, creating waves within a field of research and practice, generating changes in thought and action. One of the reasons I chose diffraction as a method is that it already exists in the physical flows of paint mediums, and in my reading, looking, thinking, and writing.

It is helpful to think about the differences between diffraction and reflection, whether in the context of light waves or liquid waves or sound waves: *Reflection involves a change in direction of waves when they bounce off a barrier; refraction of waves involves a change in the direction of waves as they pass from one medium to another; and diffraction involves a change in direction of waves as they pass through an opening* ***or around*** *a barrier in their path. (Reflection, Refraction, and Diffraction*, n.d.*)*. Imagine these diffracting waves are a disturbance within a medium or media—a pool of water, a bucket of warm mud, or, a printed text that's been put on the table in front of you (*Diffraction - Physics Video*, n.d). Disturbance enters the medium

(or text), changing its surface tension or surface interpretation. This outward disturbance troubles perceived or assumed boundaries of the puddle, or within a text, and between sources and knowledge systems (Haraway 1992; Barad 2014; Bozalek & Zembylas 2017).

Applied to thinking, reading, and looking, diffraction offers an alternative to one-way reflection, where thought, affect, emotion, and critique bounce backwards like light off a single mirrored surface. Sometimes one-way reflection is useful, and sometimes you want multifaceted surfaces, crossing paths of light, and slower waves. In an interview, Karen Barad says:

> *Critique is all too often not a deconstructive practice, that is, a practice of reading for the constitutive exclusions of those ideas we cannot do without, but a destructive practice meant to dismiss, to turn aside, to put someone or something down…building on a suggestion of Donna Haraway, what I propose is the practice of diffraction, of reading diffractively for patterns of differences that make a difference.*
> (Dolphijn & Tuin 2013, 49).

Arts-based diffractive practice and praxis move between all sorts of boundaries and binaries that have been constructed within creative and intellectual life. Praxis involves actions that move between theory and practises, and contemporary art practices are often also art praxis because many artists actively move between theory and practice in the development and production of their work (Kaiser & Thiele 2014,166). Processes of diffractive practice can involve but are not limited to: observation, collaboration, studio work, lab work, proposal writing, exhibition, project-based, site response, use of social media, discursive texts, and analysis of established practice (Murris & Bozalek 2019).

I have attempted to diffract aspects of the past, present and future of biopolymers with personal experiences and narratives, including my own life experiences, and family history within creative practices and economic systems. This approach indirectly draws on methodologies of artistic autoethnography (Bartleet 2021; Pithouse-Morgan et al 2021), and involves fields of knowledge that are not my own area of personal experience, including both non-Indigenous science and industry, and Indigenous anti-colonial science. As a non-scientist, I use diffractive praxis to develop a systemic understanding of bio-based polymers at their molecular and social-ecological (molar) levels, as well as the way they come together and circulate as material affects (Deleuze & Guattari 1987, 4). Understanding materials in this way is similar to the role of an artisan (Deleuze & Guattari 1987, 345), which I discuss in Section One.

Biopolymer Aesthetics

Biopolymers are present within living things like trees, algae, and fermentations of waste, while bio-based polymers are synthesised by humans. Bio-

based plastics are often made using raw materials that already include biopolymers and/or production methods that are modelled off naturally occurring processes like fermentation (Nakajima, Dijkstra, & Loos. 2017). Human use of plant-based, bacterial, and animal polymers dates back at least 12,000 years to early plant and animal glues, and leathers (Lattermann 2015; Sakr, Akmal A., et al. 2018). Locating these materials within non-Indigenous art history and aesthetics, I have focused on biomorphic and polymorphic histories within 20th century painting, spanning from surrealism, into process-based work, and more recent practices.[10]

During studio and exhibition work I have asked: what is biopolymer materialism, in practice, and what is materialised? What is the role of play and improvisation? In addition to these questions, I have worked to develop an understanding of biopolymer aesthetics—where aesthetics is defined as the provocation of feeling and consciousness (Buck-Morrs 1992; Heyes 2020). As an artist, I like to think of material affects coming together, within the larger formation of aesthetic experience. Affect studies (Hynes and Sharpe 2015), helps me understand how artworks carry affect into the social and political world, breaking artworks down into moments of affect rather than a more singular or holistic *gestalt* approach to artworks and aesthetics (Arnheim 1981).[11] I have thought through affect theory alongside feminist and Marxist new materialism to understand how artists use affective methods, and how affect circulates beyond those moments of production (see e.g Massumi 1995; Barad, 2003 and 2014; Braidotti, 2011; Colman, 2006; Haraway, 2008 and 2016; Gauld, 2014; Heyes 2020; Schaefer 2019; Chaput 2020).

Bio-based polymers are often highly sensitive to temperature and humidity and their sensitivity generates radical physical effects and changes in form that also generate affects, provoking emotional response. The inherent instability of biopolymers risks deformation, challenges conventional thinking about the potential forms and deformations of matter and necessitates learning through *groping experimentation* (Deleuze & Guattari, 1994, p. 44).

Entropy and Empathy

Entropy and empathy are processes where human and more-than-human understanding intersect. In the six sections of this exegesis, I have developed the biopolymer aesthetics and materialism introduced above, as practices of being—or, onto-aesthetics—involving what Elizabeth Grosz (2017) and Félix Guattari (2000) respectively term an onto-ethics and an ethico-aesthetics. These onto-aesthetics contribute to human and more-than-human worlding that can inform social, ecological

10 I have focused on artists connected to the histories of feminist material practices, while also acknowledging select artists involved in more recent forms of bioart (Mitchell 2010).

11 McKenzie Wark (2020) has written 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 – Sian Ngai's list of affects associated with the plasticity of late capitalist consumerism (Ngai 2010, 294).

and economic processes in small everyday ways, and within larger systems like circular economy and doughnut economics, for example. I locate material processes of entropy and empathy, biopolymer aesthetics, and polymorphism within desires for ongoing social, economic, and ecological paradigm shifts, refusals of petro-hegemony, extraction, capitalism, and coloniality.

In Section Five, I propose that entropy and entropy are both active affective processes within social, creative, and productive systems—including pictorial systems and aesthetics. I consider these as time-based systemic processes and mediums of transformation (Whitehead et al., 1978). As processes, they help compose and decompose our emotional and aesthetic relations,[12] by producing, reproducing, and reconfiguring affects and actions.

Between 2020 and 2022, many people experienced moments where our personal lives were altered by the biological and economic realities of the global pandemic—the circulation and reproduction of life-threatening viral matter. Moments of personal and collective grief were met with empathy as a necessary part of the emotional processes and social contracts that allowed communities to survive. At the same time, the pandemic exposed limits to that empathy, and as with climate change, the ongoing impacts of the pandemic have been felt unevenly, with access to vaccines limited to those countries who can afford them (Tatar, Moosa et al. 2021). This draws urgent attention to both local and global economic systems, and how they function within human-generated ecological and health crises.[13]

Completing a PhD during this time, my work hasn't become 'about' the pandemic or climate change, but these crises have focused my thinking about the limits of empathy, and this has shaped my thinking about empathy as a process within art making. I have sought to understand how systemic precarity and unstable materials materialise their associated affects and in Section One I begin to discuss this with reference to Marxist new materialism (Chaput 2020).

The diffractive methods I introduced earlier, have sought to create space for different affects—not just reflective or reactive ones—like the affects of care, repair, and empathy. Meanwhile, Josephine Berry, Niamh Dunphy, and Patricia Stuelke have provided critique of the wider discourse of care and the 'reparative turn', including the ways repair can sustain colonial capitalist systems and reinforce or maintain neoliberal systems of governance (Sedgwick 2003, 128; Stuelke 2021; Berry and Dunphy 2018; Lobb 2017).[14] In Section One and Five, I discuss how these critiques inform my understanding of entropy and empathy as affective methods.

12 Within the material world more generally, and with bio-based materials in particular.

13 This scale of systems thinking renews my interest in systems thinking within creative practices and for considering systems of affect (Capra & Luisi 2014).

14 Eve Kosofsky Sedgwick develops the idea of reparative reading as another alternative to the reflective and 'paranoid' reading encouraged by critical theory.

Fig. 9, 10. Raewyn Martyn, 'Hydrophilia and the Loveseat' as part of *Greywacke love poems: returns* (2019–2021), at the old Owhiro Bay Quarry.

I describe affective methods like adventure and hydrophilia, within my artwork and collaborations. These methods have emerged over time (in four dimensions), as I respond to moments of material entropy and instability which generate polymorphic forms. I propose that the effects and affects of these material methods generate empathy (Gauld, 2014) and biopolymer material aesthetics, relevant to both intimate and planetary scale aesthetics (Colman, 2006). Thinking about these entropic and empathetic dynamics has provoked questions about composition within painting: decomposition, reconfiguration, reconstitution, contraction and derangement—found at work in the Adam Art Gallery stairwell. My thinking about decomposition has helped me understand this work through material and compositional methods of decreation (Weil 2002), compositionism (Latour 2010), and the derangement that Amitav Ghosh links to climate crisis (2016).

Plasticity

"It's probably cellulose" has been something of a running joke with my friends over the past five years. The more I learn about biopolymers like cellulose—their past, present, future—the more I understand them and their various plastic forms as matter that exceeds easy determinations or identifiers. Plasticity exceeds fixed form, it is a quality that allows for changes in form through moulding, deformation, and resistance, whether that be within a material world of plant life, objects and materials, or internally, within our own organisms as we metabolise plant life, and in the neural plasticity of our brains (Malabou 2008, p. 80; 2011, p. 73). As part of this plastic world, biopolymers and their bio-based derivatives[15] can be described as hyperobjects, matter that reaches beyond fixed formation and temporality (Morton 2013, 174). And importantly, reaches beyond narrow colonial academic lenses from which the term hyperobject emerged or was necessitated by (Behar 2016, 10-11).

'Plasticity' can be understood in material, biological, social and philosophical terms (Davis 2022).[16] Speculative understandings of excess and plasticity, not bound to industry, are found in theories and philosophies of mind and the arts, particularly in the early 20th century with base materialism (Bataille 1985, P. 45) and Alfred Jarry's pataphysics—imaginary and speculative science (Shanken 2013; Lewis 2020), and Barthes subsequent writings (Barthes 1972, 97-98). Both Jarry and Bataille informed, and were informed by, surrealism, with its biomorphic and polymorphous forms. Such plasticity and polymorphy was already present within Indigenous and non-western practices, both in form and material, with biopolymers like rubber and leather used for culturally-specific

15 There is a difference between bio-based polymers and biopolymers--bio-based polymers are derived from biomaterials and biopolymers, which are raw or more directly extracted. For the purposes of this dissertation I will move between the two as relevant and also use bio-based polymers as a catch-all term.

16 As noted earlier, in Aotearoa, Pākehā and tauiwi speculative and creative understanding, is influenced by a range of international influences and the Indigenous scholarship occurring within Aotearoa, Te Moananui-a-Kiwa, and beyond (Jones 2020; Kiddle et al. 2020).

objects and activities that moved freely between utilitarian, creative, and recreational forms (*Wonderful Things*, n.d.). I consider biopolymer aesthetics and materialism as developments of base materialism (Bataille 1985) present in post-minimalist and process-based work (that emerged just before the Deleuze and Guattari's 'explosive materialism') and early theories of science and technology studies and feminist new materialism, while Mark Fisher's Gothic Materialism is another model for the coining of terms (Deleuze & Guattari 1987, 346; Pestre 2004; Dolphijn & v. d. Tuin; Fisher 1999).

Roland Barthes (Barthes 1972, 97-98), derided the shift from wooden toys to plastic toys—Jennifer Wagner-Lawlor suggests that he thought plastic lacked feeling (2017, 74). Recent writing by Catherine Malabou reminds us that plasticity also involves resistance and memory (Malabou 2000; 2010). She develops a less anaesthetic understanding of modern plastics with their capacity to bring themselves together and to self-reform, with a focus on plastic's sensitivity and shapeshifting capacities (Malabou 2008, p. 80; 2011, p. 73). Malabou uses her understanding of neurobiology, neuroplasticity and epigenetics to rework the ideological framing of plasticity (Malabou 2000; 2010). She differentiates creative and transformative plasticity from the qualities of flexibility, elasticity, and repetitive reproduction that are closely associated with the values of colonising and capitalist production.

I also see aspects of biopolymer aesthetics and materialism in both contemporary geologic and bio-based and bioart art practices, and their antecedents in land art and site-responsive practices. I reference the work of non-Indigenous artists like Michelle Stuart (*Sayreville Quarry Quartet* 1976), Christine Hellyar (*Situations* 1969; *Rock, Candy Beach* 1971, p4), and Robert Smithson (*Glue Pour* 1969); and the

Fig. 11, 12. Raewyn Martyn, *Climate change heartbreak poems* (2007–2013).

influence of Indigenous artists and collectives in Aotearoa, including the Kauae Raro Collective.

The practice-based components of this PhD involve a review of the gestures found within mid-late twentieth century artist practises, along with use of different deformations and transformations that are possible with biobased polymers. For example, a sheath of biopolymer paint delaminated within my installation *Climate Change Heartbreak Poems* 2006-2013 (2019) could subsequently be rehydrated and bottled for reuse. Biopolymer aesthetics are intimately connected with the polymer aesthetics developed in post-war practices. In the period of interwar and postwar non-Indigenous art history that I have focused on, polymer aesthetics of fluidity, reuse and misuse of plastic and skin-like materials are evident in work by Louise Bourgeois (*Portrait* 1963), Eva Hesse (*Aught* 1968), Lynda Benglis (*Fallen Painting*, 1968), Senga Nengudi (*Water Composition II* 1969-1970), and Christine Hellyar (Flotsam and Jetsum, 1970, p34). In Section One, I expand this discussion to include artists working more recently, with petrochemical, biobased, and bioactive materials.

In Aotearoa, artists have been working with biopolymers and biomaterials since arriving on these shores—I'm going to focus on more recent work. In Section Three, I link these practices through ideas of hydrophilia (love of water) via a localised and intersectional hydrofeminism, biomorphism, and geochoreography (Crenshaw 1990; Neimanis 2017; Hamilton Faris 2021),[17] and in Section Four I give some examples of Aotearoa artists who work in four dimensions.

The bacterial polyester thermoplastics used in

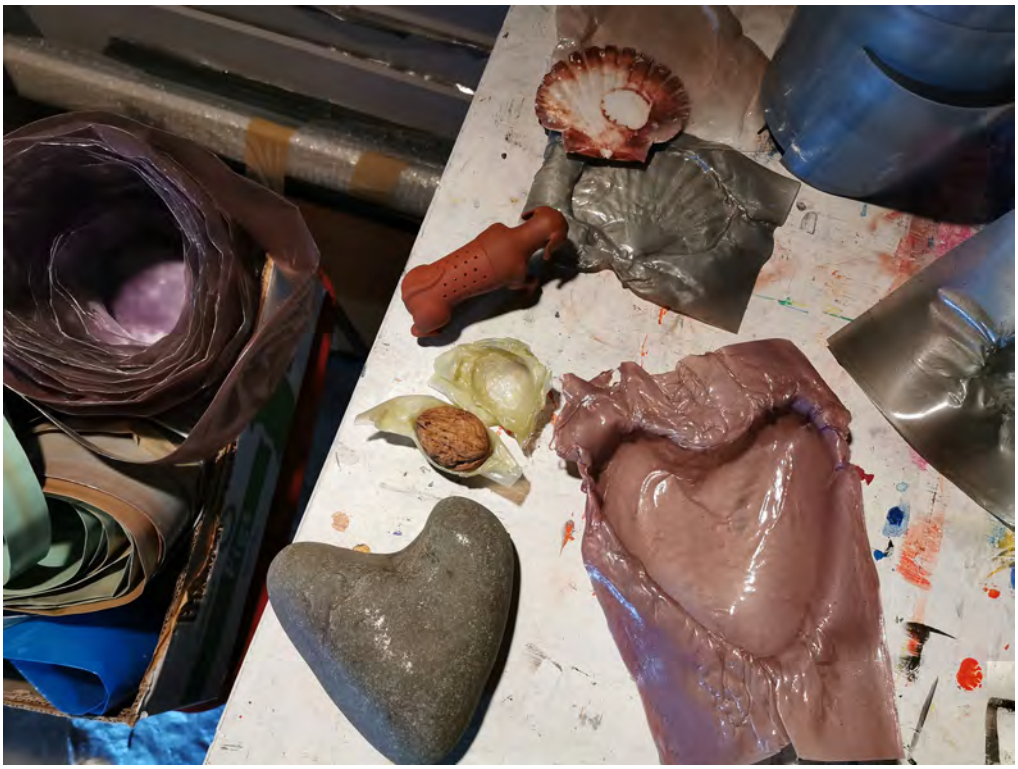


Fig. 13. Examples of shape memory, with bacterial polyester molded around a rock. This mold has been reheated, peeled off the rock to be deformed, and then reheated again to return it to the molded shape. These qualities were also explored in playful experiments at home—making chocolate molds, soap holders, etc., during the 2020 lockdown.

17 Hydrofeminism is necessarily localised and intersectional – acknowledging the involvement of race, class, and gender diversity (Crenshaw 1990).

parts of *Greywacke love poems: returns* (2019) have four-dimensional qualities like shape memory, the capacity to move between different shapes, triggered through temperature changes. They can change shape, and/or become kinetic, moving in response to heat or moisture. Shape memory is used in 4D printing, providing three and four-dimensional materiality to digital images and designs. In Sections Three and Four, I describe how aspects of hydrophilia and four-dimensional painting are also found in earlier histories of plasticity, including Paul Klee's 'polyphonic painting' (Caliandro 2019, 19), and Carolee Schneemann's 'kinetic painting'(*Exhibition Film*, 2017; *Raw Materials*, 2019). I propose a larger idea of transitional painting, that develops from the four-dimensional qualities developed by artists like Schneeman and Rosemary Mayer (Sneed & Warsh, 2018; *Exhibition Film*, 2017; *Raw Materials,* 2019) in the 1970s, into the provisional and transitive painting of the 2000s (images moving between mediums and media) (Joselit 2009; Rubenstein 2009; 2012; Graw, Birnbaum, Geimer 2014; Graw et al. 2016).

In Section Six, Antonin Artaud's idea of the subjectile becomes a way to discuss the potential for bioactive membranes and interfaces in artworks, specifically the grounds of paintings. Both material and membrane-like (physical grounds), and also conceptual and affective ones. The transitivity mentioned above, allows for an open-ended materialisation within these grounds. The subjectile generates both shared (intersubjective) and discrete (subjective) realities, at a time in history where our sense of shared realities can feel tenuous or fragile.

New and old materialisms

The history of industrialised plastics and their creative use runs parallel to theories of materialism from the 19th century onward. Colonisation of Indigenous peoples, their land and resources, fuelled developments of scientific and anthropological materialism that fed into theories of historical materialism (Basile 2017; Gooch 2020). More speculative theories of materialism also emerged early in the 20th century, including personalism and process philosophy (Whitehead et al. 1978), and base materialism (Bataille 1985), alongside phenomenological studies of empathy (Stein 1989). Recently, these have been extended to consider more-than-human materialism, empathy, and aesthetics (Gauld 2014).

The material histories developed in Sections One and Two, show that petrochemical and bio-based plastics move between ecological, geological, industrial and cultural contexts. The somewhat fleeting material optimism of biopolymers invoke "hauntology" with a past, present, and future that is somehow both immediate and also, just out of reach (Derrida 2006, 10, Fisher 2014).

19th century industrialisation set the scene for the economic dominance of the oil industry, its petroleum-derived plastics and chemicals, carbon emissions, and post-consumer waste streams. The

apparent latency of bio-based plastics within the 20th century is a result of what Elizabeth Povinelli calls the carbon imaginary (Povinelli 2016) where material definitions of life and non-life play themselves out through processes of extraction and expenditure. These binary categories of life and non-life disparage more symbiotic or sustained relations, where energy and material production are not dependent on exhaustive metabolisation of resources (Wark 2019). This carbon imaginary supports petro-hegemony and the dominance of petro-chemistry (Haluza-Delay, 2012, p. 4).

As part of the material relations we make within the creative arts, I think this reconnection is important to the 'resocialisation' of non-Indigenous painting. This is a continuation of what painting has always been capable of doing, generating from conversation within social and public spaces (including more-than-human ones), beyond private or luxury commodification. As noted in the opening paragraphs of this introduction, ongoing critiques of new materialism draw attention to what is missing and what has gone uncredited within new materialist thought, adding provocations for changes of approach to scholarship and research (Todd 2016; Leong 2016; Buchanan 2019). These critiques note a lack of anti-colonial, social, and economic praxis—where theory meets the practices of structural and systemic change.

At the same time as these critiques occur, it is widely acknowledged that new materialism emerging out of Deleuze and Guattari's thought (DeLanda 1996; Dolphijn & Tuin 2012) has amplified and promoted shifts in world view within the arts, and beyond. This is part of an 'ontological turn' (Bradotti 2006, 247) that provokes non-Indigenous peoples to break down binaries of subject and object, nature and culture, and hierarchies of human and more-than-human. This turn has impacted ethics within everyday interactions—between human and more-than-human entities, and intra-actions within connected entities—leading to changes within systems (Barad 2003, 815). *Greywacke love poems: returns* (2019-2021), and work toward *Playing the Machine* (2021) draw attention to material relationships and possibilities within bio-based systems of production. While acknowledging that new materialism, post humanism, and Anthropocene studies have sought to decentre human figures by focusing on matter beyond the human, these works create space for 'tinkering' and 'hacking' (Lewis and Friedrich 2015; Wark 2004), placing playful human figures and their agency back within systems of material production.

This research has taken place during a tipping point within mainstream understanding of plastic waste and its oil industry production. People have become appropriately terrified by media reporting of microplastics within the biosphere's food chains, the hydrosphere and atmosphere's waterways, airflows and precipitation. At this moment we are grasping the extent and intimacy of our relationship with plastic. In 2018, New Zealanders learned that much of our plastic recycling is sent to Malaysia and

burned (*NZ's Role*, 2018), while the feature length documentary *The Story of Plastic* (2020) hones in on the possibilities for industry transitions, and in 2022 a Global Plastics Treaty was signed (Simon et al 2021; Bergmann et al. 2022), with subsequent negotiations of issues like waste colonialism (Liboiron 2021). There is heightened interest in bioeconomy alternatives (including biopolymer and biofuels) and caution is called for as bio-based industry also risks extractive and exploitative practices (Altman 2021; Callister & McLachlan 2022). This context is important to the material ethics and ethico-aesthetics of my research.

Listening Stones Jumping Rocks

In 2021 the exhibition component of my practice-based work changed venue and focus. Up until this point, the plan had been to make an installation where materials could be produced in the gallery space throughout the three-month exhibition period. The biopolymer materials would then be used to create polymorphic wall works and sculptural forms within the gallery, generating a range of affective formations, reconfigured and reconstituted over time.[18]

Instead of the 'reproductive surfaces' described above, I worked on a third phase of *Greywacke love poems: returns* (2019–2021), to become part of the group show *Listening Stones Jumping Rocks* (2021), at the Adam Art Gallery. In this exhibition, the work moved into the architectural space of the gallery stairwell and my focus shifted back to the geological and ecological aspects of the biopolymer materials.[19] This approach was extended through the use of 'deranged' compositional and installation strategies that embodied geologic and metamorphic movements as 'gestures'. The Adam Art Gallery stairwell and side walls involve planar angles and I thought about the different ways that gravity and other stressful forces could alter the adhesion and drying of the emulsion and pigments.

Leading up to the Adam installation, I was thinking about movement between site and gallery in the work of artists like Christine Hellyar (*Situations* 1969; *Rock, Candy Beach* 1971) and Michelle Stuart (*Ashes of Arcadia* 1988).[20] The Adam Art Gallery stairwell was designed and built in 1999 over an existing outdoor stairway that had been in use since

18 A collaborative short film 'Futurities' and public programming would have involved conversations about the economic and industrial narratives associated with biopolymers and circular bioeconomy in Aotearoa New Zealand. Text taken from the unsuccessful 2021 CNZ application for the film *Futurities: A collaboratively-realised moving image work, Futurities will offer poetic and visually experimental insight into the ways alternative futures are being shaped by New Zealand artists and scientists working with bio-based plastics (biopolymers). Taking a visually speculative and curious approach, the cinematography, editing, score and diegetic sound of Futurities will evoke for viewers the exciting interrelationships between human subjects and more-than-human entities. A nuanced theme of 'connection' will link the main narrative threads of Futurities, including the ways biomaterials present tangible alternatives to petrochemical plastics, not only changing our relationship with plasticity but also supporting circular economic frameworks that inspire whole new relationships to waste, time and being. The film spotlights the role of biopolymers within recent visualisations of the circular bioeconomy and doughnut economics. Bringing together kōrero between people invested in the bioeconomy—iwi, scientists, business, government, and artists—Futurities will explore how circular and 'doughnut' economic frameworks can 'move the world beyond oil dependency' in the context of COVID-19-responsive economic regeneration. This will involve contributions from artists, designers and scientists associated with the recent National Science Challenge on 3D printing and additive manufacturing--key components of a bioeconomy based production—alongside other artists and scientists who share an interest in the circular bioeconomy.*

19 See also, appendix text *Greywacke love poems: returns* (Martyn, O'Neill, & Knox, 2019).

20 Michelle Stuart is also an example of non-Indigenous artists with early involvement in land art movements and use of place-based pigments and materials, see: *Sayreville Strata Quartet* (1976), which I came across after working on *Greywacke love poems: returns* (2019).

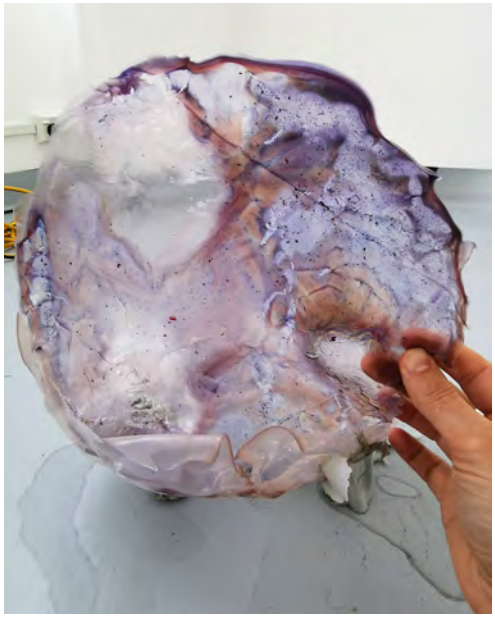


Fig. 14, 15. Raewyn Martyn, examples of work towards the 'reproductive surfaces' concept for the exhibition component (2020).

Fig. 16. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021.
Image credit: photograph courtesy of Anne Noble.

the 1960s. From looking at architectural plans and archival photographs provided by Adam Art Gallery, we can assume that the location and trajectory of the much earlier stairway reflected the general flow of people walking to and from The Terrace and the main campus buildings. Thinking about the history of the stairwell also contributes to a time-based understanding of the site and this informs the compositional and material system of the artwork.

Because of the shift in exhibition context, my research and writing about circular economy has become background information, rather than foregrounded within the exhibition itself. In the exegesis, I have continued to locate biopolymers within the context of these larger paradigm shifts and refusals of petro-hegemony, extractive capitalism, and coloniality. And in relation to a recent position statement from the Aotearoa New Zealand Ministry for the Environment: *the essential concept at the heart of the circular economy is to 'ensure we can unmake everything we make' (Compostable products*, 2022*).* 'Circularity', understood in a range of ways, remains relevant as a form and method within this PhD work.

1: Adventure: Biopolymer Aesthetics

1.1: Introduction

In Section One, I introduce the alternative material affects of instability found within creative investigations of polymers. During this PhD, I have worked with bio-based polymers in the studio, observing their instabilities to extremes (there is more to be done). Conventional lab-based samples are often small and the changes are difficult to perceive, while at the larger scale of works like *Greywacke love poems: returns* (2019-2021), in the Adam Art Gallery stairwell, these qualities of derangement (Ghosh 2016) and decomposition become visible and visceral.[21]

Industrial, creative, personal, and speculative narratives come together within each of the site-responsive artworks. I begin by describing the basic materialisation of polymers and then introduce *Greywacke love poems: returns* (2019-2021) and my work at Scion. I discuss how this work materialises connections between geological, hydrological, and biological spheres, through use of plant and bacterial biopolymers, seawater, and mineral pigments from rock fall within the Old Owhiro Bay quarry site. The bacterial polyester used in this work was made in collaboration with scientists at Scion.

I introduce the term artisan-artist (Deleuze & Guattari 1987, 346)—an artist with intimate material understanding, and I consider the role of artisans in biopolymer aesthetics and materialism, as developments of base materialism (Bataille 1985) and Deleuze and Guattari's 'explosive materialism' (1987, 346). My work as a non-scientist at Scion is necessarily a diffractive practice, and enabled me to experiment with the different methods, uses, and risks of biopolymers as well as their laboratory production processes.

The practice-based components of my PhD have been formed through adventure with unfamiliar and unstable biopolymer materials. Alongside the diffractive methodology introduced in the main introduction, I am formulating adventure as a method of risk, involving affect-generating and affect-driven

21 In the decade preceding this PhD research, the coatings and packaging industries have researched and developed the sensitivity and degradability of biobased materials, to optimise the permeability and biodegradability of packaging films, tuned for specific purposes like coating fruit with optimal respiration and shelf life. The materials developed within industry are designed to feel clean and hygienic.

developmental processes in works like *Adventure* (Charlton & Martyn, 2019). Each of the artworks discussed in this section are formed through material adventure that generates moments of fragility and precarity, and elicit material empathy and learning (Gauld, 2014).

In this section I have written about my own personal and family stories emerging within larger narratives of petrochemical polymers and bio-based polymers. At some point in the late 19th century my family became involved in building and selling bicycles, using natural and synthetic rubbers and polymers in their construction and repair. Synthetic polymer production developed over time, diverging from the bio-derived materials into the petrochemical, and the family bicycle shop adapted their use accordingly. The personal narratives I've embedded in this section occur in the interwar and post-war period, as creative use of petrochemical and bio-based plastics developed within art practices.

In the current moment, unstable and multi-stable (Jakesch et al. 2021)[22] polymer and biopolymer aesthetics can be emblematic of Amitav Ghosh's ideas of derangement, or Jack Halberstam's aesthetics of bewilderment which I connect to a playful methodology of adventure. In these aesthetics, disorientation is embraced as a form of disorder and "resistant ontology" (Ghosh 2016; Halberstam, 2020, p. 25) that takes place beyond human aesthetics and is also crucial to our understanding of both social and ecological systemic change. I connect this to material processes of entropy and empathy, with their effects and affects provoking a range of working methods that are also learning methods, including a playful and responsive misuse and hacking of materials, tools, and machines. Interrogating the effective and 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?', 'In a world?'

Fig. 17. Raewyn Martyn and Jess Charlton, still shot from *Adventure* (2019), filmed at the old Owhiro Bay Quarry.

22 Multi-stable images can have multiple pictorial interpretations. An image might appear as a rock to one person and a toad to another, for example.

1.2 Adventure: Biopolymer Aesthetics

Artisans and artists

Plastics come together to be perceived as material through the process of polymerisation, where small molecules called monomers assemble into three-dimensional chains known as polymers. The roots of this word are in the capacity of many parts *to share in something* (Wagner-Lawlor, 2017). 'Poly' (many) and 'mer' (to remember and to share). These entangled monomers share their atoms, creating reconfigurable mass and changing their arrangement or expanding and contracting, when triggered by factors like heat or humidity. Biopolymers do this too, but are less fixed in their arrangement than petrochemical plastics which are prone to more permanent and insensitive fusions, via heat setting.

The artworks in *Greywacke love poems: returns* (2019) are made from water-soluble and/or thermo-plastic materials and are formed through processes of extrusion, hydration, layering and heat forming—reconfiguring and re-materialising at molecular and formal levels over time (Martyn, O'Neill, and Knox 2019, 3).

Bio-based plastics readily move between two-dimensional and three-dimensional forms, allowing the painting and sculpture to become four-dimensional, I discuss this further in Sections Four and Five. I begin Section One by writing about the background to this work, and then discuss how the term 'artisan' has helped me understand the material production in this PhD (Deleuze & Guattari 1987, 345).

In 2018, a plan for collaborative lab work at Scion was funded through Massey University's Strategic Research Fund, supported by my main PhD supervisor Heather Galbraith. Since 2019, I have worked in the Scion laboratories with technician and scientist Beatrix Theobald, to extrude plant and bacterial polymers. The extruder machines feature in social media for *Greywacke love poems: returns* (2019) and in *Playing the Machine 1 & 2* (2021-2022), made onsite at Scion with filmmaker Jess Charlton. We have used them to mix commercially available bio-based polymer pellets with pigments, including DIY pigments ground from greywacke rock fall at the disused Owhiro Bay Quarry, on Te Whanganui-a-Tara's South Coast.[23] Greywacke pigments produce a range of greys and oxidised oranges, while a complementary colour palette is generated with use of additional mineral, plant, and synthetic pigments that have ecological and art historical resonances, like the biogenic[24] calcite used in gesso, which eventually sediments, sequestering carbon (Siddall 2018, 1-11).

In the studio-based research associated with *Greywacke love poems: returns* (2019), I experimented with fugitive water-based mediums that are highly sensitive hydrophilic and hydromorphic cellulose, and a range of different plant/algae-based blends. The water-soluble cellulosic mediums can rehydrate

23 Sampling of this rock fall occurred in conversation with mana whenua; Wellington City Council; and geologists. The film extruder machine at Scion is used to melt and blend pellets of bacterial and plant-based polymers. Pigments are added at intervals, creating a spectrum of colour as the mix moves through the machine and heated rollers press and stretch molten polymers into a thin film.

24 biologically generated by coccolithophore phytoplankton.

Fig. 18,19. DIY pigments ground from greywacke quarry rock fall and extruded into rolls of bacterial polyester at Scion. The film extruder machine at Scion is used to melt and blend pellets of bacterial and plant-based polymers. Pigments are added at intervals, creating a spectrum of colour as the mix moves through the machine and heated rollers press and stretch molten polymers into a thin film.

and release images that had been accumulated, layered, and embedded within the material, through distribution of pigments within its paint-film. This kind of paint film can also be made into a thicker and more sculptural material which is slower to rehydrate and takes on more rigid forms. I think about hydrophilic images as made up of particulate, where pigments are released from particular configuration and composition into something more indexical of atmospheric conditions and forces at work within a given physical situation (hydrophilia is discussed in Section Three).

The thermoplastics and bacterial polyester used in the *Greywacke love poems* projects also have a shape-shifting morphology—the capacity to hold and reveal three-dimensional shape memories. These shape memories are plastic images and forms imprinted within the polyester's molecular arrangements, registered and revealed, through heat, with forms carried between sites.

My experiments with both the rehydration and shape memory imprinting processes of biopolymers allows artworks to be made reconfigurable—releasing their matter and energy back into unfixed flows. These unstable mediums resist ideal (hylomorphic) forms and ongoing studio observation develops intimate understanding of their behaviours. This instability and associated intimacy is present in histories of how paint and its colour are made: *by people, often in dusty, dirty, non-sterile environments. Their composition is therefore not fixed.* (Siddall 2018, 4).[25] Thinking through paint and pigments as material expands our understanding beyond human bounds of visual language and representation.

Within creative research, learning through intimate material relationships has been described as an ethico-aesthetics (Guattari 2000; Grosz 2017). When I submitted parts of Section One as a journal

25 Petrologists and mineralogists know that colours can also *be deceptive. A bright-red paint may be analysed as calcium carbonate, a material assumed to be white. The actual pigment is probably an organic dye such as carmine (cochineal) on a chalk substrate* (Siddall 2018, 3).

Fig. 20. Raewyn Martyn, an example of hydrophilia—cellulose during rehydration and dehydration, reconstituted from the lightbox work and used again at the coastline for *Greywacke love poems: returns* (2019).

Fig. 21, 22. Raewyn Martyn, an example of shape memories relocated from the Owhiro Bay site to the Adam Art Gallery, with bacterial polyester molded over two different boulders brought together in one part of the stairwell work.

paper, the editors suggested the term 'artisan' as a way to describe my work at Scion.[26] A hands-on artisan makes their own materials, developing a more intimate and 'cosmic' relationship—connected to the materials through *forces of consistency and consolidation* as well as with forces of *deterritorrialisation and explosion* (Deleuze & Guattari 1987, 346). I wouldn't use these phrases myself, but I like the idea that an artist can know their materials inside and out, beyond commodity form, at the level of matter and basic chemistry. I have developed understanding of bio-based polymers at molecular and social-ecological (molar) levels (Deleuze & Guattari 1987; Bell & Colebrook 2009, 229), including how production and creative use of bio-based polymers generates and circulates affect (Wagner-Lawler 2017; Heyes 2021).

'Artisans' are open to material explosions that refuse, or are not yet in service of, form, language, and representation. Whereas for 'artists', the representative languages of signs, symbols, images, sounds, etc., flow as data and information that is not necessarily recognised as explosive info-material (arguably they are, as discussed below). Deleuze and Guattari also include birds as non-human artists (if not artisans)[27] and describe territorial marks as readymades (Deleuze & Guattari 1987, 316-317). They don't explicitly mention dada, but I think that dada, surrealist, and constructivist artists were also artisans who saw ready-mades and material in both ways—with processes of explosion and consolidation—and that this is part of the reason biomorphic and polymorphic forms developed further in their work. Their morphologies needed both explosion and consolidation to enable matter to take form. More recent writings about 'tinkering' and 'hacking' that build of Deleuze and Guattari's work (Wark 2004; Lewis and Friedrich 2015) are linked to surrealism and pataphysics, which I discuss in Section Six.

Over the past three decades, these vitalist and materialist explosions have been reoriented toward feminist and embodied knowledge, alongside the materiality of information and media (Grosz 1994, 2008; Barad 2007; Bennett 2010; Parrika 2016). Stephen Zepke describes how the explosive 'abstract machines' involved in art work are both vitalist and material, resisting technophilia and the ideal models of 'hylomorphism' (Zepke 2014, 2-4).

> *Hylomorphism is an operation that moulds matter into forms according to an ideal model, an operation by which the world appears as obedient and predictable representations* (Zepke 2014, 2-4).

The processes of code switching and recontextualisation within postmodern and contemporary practices can involve careful gestures by artists, as they appropriate and recompose material from a range of media sources—info-material flows. Explosion and decomposition may not always be a priority within this careful

26 A 2020 special issue of *Matter: Journal of New Materialist Research*, with texts that approached 'wild pedagogies' through the writing of Deleuze and Guattari, edited by Evelien Geerts and Delphi Carstens. (Geerts & Carstens 2021).

27 Deleuze and Guattari cite composer and ornithologist Olivier Messiaen (Messiaen, Olivier, and Claude Samuel, 1994). Messiaen's thoughts on birds can also be found in (Gurewitsch 1997).

selection and composition (Zepke, 2017), and one of the limitations of the explosive approach to materialism and affect is that it can be difficult to regroup intersubjective understanding from it, limiting its role within social and political movements (McCullough 2018).[28]

Contemporary artists like Nancy Spero (*Merde, Fuck You*, 1960), and Laurie Anderson (who borrowed the dada cut-up technique via William S. Burroughs), are both artist and artisan, embracing immediate material and conceptual explosion at the same time as careful mediation (Reed 2021, 76). I talk more about Spero in Section Seven, but here I'll mention *O Superman* (Anderson 1981), which came about in response to a helicopter explosion during the Iran hostage crisis 1979-1980. The lyrics describe the material disassemblage of that event while using a polyphonic vocoder machine to explode her own voice (Symonds & Taylor 2014, 167).

> So hold me, Mom, in your long arms
> In your automatic arms.
> Your electronic arms.
> In your arms.
> So hold me, Mom, in your long arms
> Your petrochemical arms
> Your military arms
> In your electronic arms
> (Anderson 1981).

Stephen Zepke further describes the artisan-artist dynamic in relation to machines: *Building an abstract machine is more DIY than techno-science, and requires a bit of the mad professor* (Zepke 2014, 2-4). He goes on to cite Deleuze and Guattari's 'desiring machines' (Deleuze & Guattari 1983, 2)*: Machines eat and sleep, they remind us, they shit and fuck. (AO, 117) …Our task to be done with techno-paranoia-is to turn these machines creative, to liberate their parts in an explosion that remakes the world" (ATP, 345/426)* (Zepke 2014, 2-4).

21st century imaging technologies enable different points of view within our visible and invisible realities and, like modernist technologies a century ago, have led to exploded and expanded forms of representation and recognition—whether that be Google Earth or various forms of biomedical imaging. Cinematographer Jessica Charlton has noted in our recent artist talks, these imaging technologies emerged from military industrial innovations.[29] Beyond photographic and digital imaging media, this also influences artisans and artists working with mediums of painting and sculpture, where art histories have often been written in ways that create separations between material, form, image and concept. An expanded and exploded understanding of materiality can be concept-shaking, but the material of that explosion doesn't need to sit in separation or binary opposition from concept, or its images and forms. The affect

28 It's important to note that the role of joy, often generated through explosions of matter, remains important to the development of collective movements, and this is often noted in relation to Weil, who maintained its importance within collective organising (McCullagh & Ford 2018).

29 I discuss my work with Jessica in Sections Two and Four.

and aesthetic materialisation of (political) ideas will be discussed further, in relation to Walter Benjamin's (1935) thinking in Section Five.[30]

Personal Narratives

My family arrived in Aotearoa from Scotland, Ireland, and England in the 1860s. And by the 1920s, my great grandparents were establishing themselves as property owners via the economic mobility of colonisation and war. One of my great grandfathers was able to open a bicycle shop in 1913. And later, having lost an arm during WW1, my other great grandfather used a returned services grant (available to Pākehā soldiers), to move from being a door-to-door salesperson to opening a news agency that later became a book shop. The bike shop and bookshop were next door to each other in Oāmaru, and that's how my grandparents, Ken and Evelyn, got to know each other.[31] These businesses were both dependent on colonial industrialisation of bio-based materials—rubber and pulp/paper, and what Sylvia Winter and Katherine McKittrick have described as plantation fictions and futures (Wynter 1971, 1; McKittrick 2013, 6; Leong 2016; Davis et al. 2019, 7-9; Jegathesan 2021, 80).[32]

The rubber used to make bicycle tyres had been used by people in Central America for around a thousand years before Europeans observed its use in the 15th century. By the 18th century Europeans knew of it as caoutchouc, which translates as "weeping wood". It became known as rubber when someone noticed that it rubbed pencil from paper, also erasing its previous names. In the 19th century, Europeans wanted to control caoutchouc production and stole sharinga seeds from Brasil, taking them to colonies in Southeast Asia—an act described as bio-piracy, that led to the collapse of Brasil's rubber industry. Meanwhile, Belgium took control of the rubber vines in the Free State of Congo, where their atrocities led to the first photographic human rights campaign.

Most of the rubber used within factories and production during the 20th century came from Southeast Asia, or was synthetic rubber made from petrochemical by-products.[33] I've looked through archival films of rubber production from the early 1920s through to the 1970s, the period my great grandfather and grandfather worked in the shop. The violent colonial control of Indigenous and migrant workers is deeply disturbing, as is the evidence of deforestation to make way for the new sharinga plantations. Toxic chemicals were used in the vulcanisation process, necessary for the rubber to perform in the harsher climates of North America, the United Kingdom, and Europe. As

30 See also, appendix text *Plastic Feelings* (Martyn 2022).

31 Thinking about my family's economic mobility includes their leisure time and ability to participate in art making. In Section Four I focus on Evelyn Adams, my grandmother, who grew up in the book shop that also stocked art supplies like some of the earliest tubed acrylic paints (petrochemical), along with mediums and papers.

32 Haraway (2015), uses the term Plantationocene but here I am following Davis et al. (2019), citing earlier links between plantations, colonial capitalism, and ecological impacts in the work of Wynter and McKittrick.

33 Currently 60% of rubber is petrochemical, and 40% is from descendents of the sharinga trees.

early as 1863, people were becoming aware of the dangers of carbon disulfide, particularly for workers in balloon and condom factories (Hamblin, 2016).

Creative and Material Histories

Both petrochemical (acrylic, enamel) and plant-based paints (oils, tempera, gouache, watercolour) have shaped non-Indigenous painting as an activity and history, generating rich iconographies, iconoclash, and iconoclasm. A whole spectrum of industrial, post-industrial, and future materials are used by contemporary artists.[34] And includes integration of biomimicry, biogenesis, biomineralisation, and symbiotic production—like the bacterially metabolised polyesters used in *Greywacke love poems: returns* (2019).

The water-soluble cellulose used in all phases of the project, is related to the cellulose-derived materials developed in the late 19th and early 20th centuries. Industrially produced cellulose acetate was used as a sculptural construction material in the work of Antoine Pevsner (*Head,* c1923-4) and Naum Gabo (*Construction in Space: Two Cones*, 1936) who gained early access to this material through one of the production company's owners. An improved version of cellulose acetate was used by Italian artist Carla Accardi (*Tenda* 1965-66, p12-14; *Segni Oro* 1967-76), who experimented with alternative figure and ground relationships made possible through use of transparent materials. She was working within the context of the post-fascist Arte Povera and Forma 1 movements, where relationships between art, everyday life, and environments were reconsidered (Gutiérrez 2012). Artists like David Smith, predominantly a sculptor but also associated with abstract expressionism, experimented with early synthetic paints, including spray paint made from cellulose-nitrate emulsions, and alkyds added to traditional oil paints (*DS 1958*, 1958).

The history of rubber latex that I have introduced through my own family history, has a much longer creative history within Indigenous material cultures, for example Mesoamerican games utilised rubber balls from around 1600BC.[35] In twentieth century art produced within the United States and Europe, Louise Bourgeois, Eva Hesse, and Lynda Benglis were some of the earliest to explore bio-based and petrochemical polymers, including rubber latex. During the mid-late 20th century, with an ontological turn toward embodied and situated knowledges, their polymer aesthetics contributed radical fluidity and corporeal skin-like qualities to invocations of the body beyond figuration, and with gender diverse subjectivity (Rahtz 2021, 131; Hutabarat-Nelson 2017, 490). And

34 Within Aotearoa, mātauranga Māori material culture sustains a continuum of work with biomaterials: harakeke, bone, bird feathers, kuri fur, native timbers, pounamu, shells. Pre European colonisation, this arguably centred on materials sourced through relationships with the surrounding world, acknowledging and honouring sophisticated understandings and values of interconnectedness and prestige. With colonial settlement, Māori adapted new materials and technologies not previously available. Binary classifications of 'natural' and 'man-made' become redundant when considering the ways that materials have been used, adapted, manipulated and re-constituted across Indigenous and settler-colonial contexts.

35 For more information see: *Wonderful Things: Peruvian Rubber Ball.* (n.d.). Science Museum Blog. Retrieved November 30, 2022, from https://blog.sciencemuseum.org.uk/wonderful-things-peruvian-rubber-ball/

an interest in systemic thinking about ecology, society, and economy.

Within twentieth century art practices, artists have developed a range of polymer and biopolymer aesthetics. In this exegesis I focus on the visual and material languages of biomorphism (living and life forms); hydromorphism (rehydrated and water forms); and geomorphism (geological forms). These approaches to form are found within early and mid-century industrial plastic and polymer sculpture; feminist post-minimal and process-based work, and in more recent investigations.

Anastasia Kahn (Kahn 2019), identifies Louise Bourgeois's 1963 'Portrait' as one of the earliest non-Indigenous uses of latex. With a postwar surplus of synthetic latex, it *became a ubiquitous ingredient in domestic consumer products, from childrens toys, to condoms, to house paint.* (Kahn 2019, 1). The current conflation of the terms 'latex rubber' and 'latex paint' (water-based petrochemical house paint is often referred to as 'latex' in the USA), results from the earlier history of interconnected 'natural' commodities and cheaper petrochemical synthetics developed for the consumer market. Lee Bontecou, used the waste streams of military industrial production to source found materials for her wall reliefs, and used petrochemical plastics in dystopian biomorphic works, vacuum-formed flowers and fish, like *Untitled*, 1967, made in response to ecological grief.

Polymer and biopolymer aesthetics are evident in work by Eva Hesse (*Aught*, 1968), Lynda Benglis (*Fallen Painting*, 1968), Senga Nengudi (*Water Composition II* 1969-1970) Christine Hellyar (*Flotsam and Jetsum*, 1970, p34), Ree Morten (*Of Previous Dissipations* 1974), Rosemary Mayer (*Spell* 1977), Heidi Bucher (*Borg*, 1976), Liz Larner (*Cultures* 1988, & *Every Artist Gave a Breath* 1988), Linda Besemer (*Fold #7: Optical Objectile*, 1998), Margie Livingston (*Folded Painting, small,* 2009), and Helen Calder (*Orange Skin (125 fl.oz.)*, 2009), and Anicka Yi (*You Can Call Me F*, 2015). Some of these artists will be discussed in more detail in later sections.

Adventure and affect

Like diffraction, adventure is a physical and temporal process, and its application as a method means that ideas and thought are embodied, within process. The artworks *Adventure* (2019) and *Greywacke love poems: returns* (2019), occur in a site that is spatially and temporally unfixed—coastlines are always shifting. The work also moves between sites and changes physical form, remaining open to risk. As with diffraction, encounters between materials and ideas may happen multiply over time, not as one singular event of diffraction or adventure. In *Greywacke love poems: returns* (2019), adventure redistributes affects through various locations, morphologies, and images within multiple site-based interventions.

Adventure may involve loss—breakage, injury, ephemerality, disorientation, and reorientation. These are the risks that play out over time. Adventures and

misadventures reveal what is important to us—we imagine what might be lost and gain clarity about what is at stake. The potential release or loss of something we value, focuses us on protective and resistant measures. There's a cognitive dissonance between the desire for both risk and the prevention of loss, this dissonance can heighten our awareness of what is possible as we imagine alternative paths and navigate risk.

Adventure conjures images of colonial explorations, contemporary canyoning trips, suggesting a navigation through unfamiliar and cavernous sedimentary rock forms, carved and made porous through geotrauma (the underground bifurcations and flows they enable, and are subject to). According to Benjamin Noys (1998, 504), such underground sites invoke Georges Bataille's "bowels of the earth" and Deleuze and Guattari's processes of sedimentation.

The quarry cliff-face and coastline, remediated by Wellington City Council over the past two decades, present dramatic geomorphic strata and fault lines. In both the lightboxes (*Greywacke love poems* 2019) and the coastal installation (*Greywacke love poems: returns* 2019-2021) 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 lightboxes and the later on-site work, both reorient 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.

In the lightboxes, the biodegradable paintings appear and disappear into the coastal landscape, performing a kind of return. Their presence in the central business district activates curiosity and desire for memory, and I think these are impulses to understand colonial loss and return. Out at the old quarry, the returns—independent of transaction—take place as redistribution, somewhere between gift, use, and loss.

Within affect studies, Maria Hynes and Scott Sharpe (2015) have described the risks of engineered affect—like the emotive qualities generated by intentional decay—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.[36]

I like to think of affects coming together as intersecting references, within the larger unfamiliar aesthetic. As an artist, affect studies helps me understand how artworks carry affect, breaking

36 Hynes and Sharpe 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* (Hynes and Sharpe 2015, 116).

Fig. 23. Raewyn Martyn, detail from *Greywacke Love Poems* (2019), Courtenay Place Lightboxes, Te Whanganui-a-Tara. Sixteen images on eight free-standing lightboxes.

artworks down into moments of affect rather than a more singular or holistic *gestalt* approach to artworks and aesthetics (Arnheim 1981).[37] 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. So, like energy and matter, affects might become disordered, or cease flow and become sedimented.

In the social world, habits and systematised actions can crystalise—solidify—through contraction and tightening of behaviour. Elizabeth 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 (2013, p. 231) uses 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 memories of adventure within the creative intersection of mnemonic organic processes and disorderly physical processes.

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). I worked with cinematographer and artist Jess Charlton to make a music video for *Adventure* (2019), that explores this dynamic. It was filmed in infrared by Charlton, who intuitively observed children encountering hydrophilic biopolymers for the first time, moving through

Fig. 24. Raewyn Martyn and Jess Charlton, still shots from *Adventure* (2019), filmed at the old Owhiro Bay Quarry.

37 McKenzie Wark (2020) has written 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 – Sian Ngai's list of affects associated with the plasticity of late capitalist consumerism (Ngai 2010, 294).

processes of familiarisation, territorialisation, and creative destruction. During conversations with the childrens' caregivers, I've realised that processes of play and adventure are becoming key to raising children who are encountering the extremes of ecological and social change—reclaiming change through play. Play has perhaps always fulfilled this need in different ways, but in the context of the climate crisis, our awareness of this is acute.

Alter-globalisation

Artists manipulate affects and narratives to influence our imaginaries every day, contributing to alter-globalisation —where the possibility of 'other worlds' is given collective attention and voice (see Lenco, 2012).[38] Art makers are often thinking about how they can sustain the active and open forms of affect and risk, to break with habits and habitus—their own creative habits, and audiences' perceptive and interpretive ones (Bourdieu 1977, 18-19). Alter-globalisation movements have worked to challenge "petro-hegemony" (Haluza-Delay 2012, 4), via activism like the global climate justice protests.

The visualisation and materialisation of change, precarity, and systems failure are a feature within contemporary culture. *To oppose a system, one must first conceive its nature as precarious…seeing the operative system as a fragile installation* (Bourriaud 2016, 36). We are within a moment where artists are returning to an aesthetics of flux, destabilisation and/or overt radical change (Brady 2021, 3), including low-key modes of provisional aesthetics.

I've come to understand biopolymer aesthetics and materialism as responsive to conditions of and for bewilderment or derangement, and a larger reorientation of our assumed material conditions (Ghosh 2016; Halberstam, 2020, p. 25). This reorientation allows alter-globalisation to become visible, generating consciousness that another world is possible, within and beyond petro-hegemonic plasticity (Haluza-Delay, 2012, p. 4; Lenco, 2012).

Biopolymer artworks involve characteristics of plasticity instability that are prefigurative of systemic change—whether that be within the compositional systems of painting, or larger ecological and social ones. Throughout the PhD I've been asking myself if biopolymer aesthetics destabilise the narratives and aesthetic forms of a petro-hegemonic worldview, and whether a didactic form of destabilisation is even a desirable outcome. The unpredictability of adventure and play become ways to avoid instrumentalisation of affect, or the neutralising tendencies of aesthetic risk management where the desire for something to look or feel like artwork is prioritised.[39] I've come to think that these approaches are not mutually exclusive, there can be elements of conceptual and didactic intention at the same time as poetic and open-ended play.

Shifts in visualisation are part of the presumed

38 In the notes of *Companion Species Manifesto* (2008), Donna Haraway acknowledges an unpublished manuscript by Paul B. Preciado that introduced her to the concept of alter-globalisation.See also, Rosi Braidotti's nomadic ethics (2011)

39 At the same time, I understand that industries like adventure tourism and the arts both monetise affect, while managing levels of risk to ensure sustainable and archivable, and profitable forms of bewilderment.

'common task' (Wark, 2020) of working out what a practice of knowledge for the Anthropocene might be, Wark suggests: *the world might be known provisionally, speculatively, tentatively, without any one way of knowing having to be sovereign over the others* (Wark 2020, 11).[40] This lends itself to processes of worlding, where the ethics and aesthetic actions of everyday life and 'being' in the world collapse the space between subjects and their environments—ecological and sociopolitical (Palmer & Hunter, 2018), where human and beyond-human encounters involve processes of expression and legibility that manifest physically and socially, including art work and artworks.

Visual interventions in systemic understanding are seen in recent visualisations of doughnut and circular economy, which I discuss in Section Two (Raworth, 2017; Royal Society Te Apārangi, 2019). With this in mind, *Greywacke love poems: returns* (2019), playfully enacts its own circular economy, with materials used in the works displayed at the old quarry site and at the Adam Art Gallery reconstituted from previous biopolymer artworks, enabling the repurposed material to escape existing measures of value, while also extending the cycles of productivity. 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.[41]

The responsive morphology of biopolymers resonates with their plant-based and biowaste origins: within an ecosystem, plant morphology and bacterial fermentation processes are responsive to site-specific conditions and nutrient cycles.

The provisional nature of the work I've been making is foregrounded, thinking through McKenzie Wark's common task, but such speculative ways of knowing and working characterise the neoliberal mantra of continuous adaptability and flexibility and risk 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 other words, concerns about the normalisation of precarity are an important consideration here, adventuresome repurposing risks sustaining capitalism and its precarious systems rather than liberating and repurposing that precarity (Berry & Dunphy, 2018).

In such a scenario, discrete artworks become a kind of 'zombie painting' (Robinson, 2014), where reprocessing of materials and methods risks a constant restaging that might convert a sense of adventure into entropy. Catherine Malabou also warns that seemingly plastic ideals of flexibility and constant change easily inflict or legitimise violence, where people's lives, communities, homes,

40 In painting, I see this as an important development to add to Raphael Rubinstein's provisional painting texts (Rubenstein 2009; 2012).

41 Bioeconomy futures require better resourcing of community-based and indigenous-led initiatives, alongside regulation and change within existing industry (Liboiron & Ngata 2020; Smith, Graichen and Martyn 2020). To support this, Pākeha and tauiwi need to ask themselves how they can work to rethink their own relationships with plastics.

landscapes and ecosystems are transformed in service of capital flows and profits (Malabou 2000; 2011; 2012). Malabou's rethinking of plasticity as resistant and regenerative, lends bio-based plastics a capacity for a kind of biological and living alter-globalisation (Malabou 2008, p. 80; 2011, p. 73).

This is where an artisan's approach to organic figurations, involving *sympoiesis* and symbiosis, *enlarges and displaces autopoiesis and all other self-forming and self-sustaining system fantasies* (Haraway, 2016 p. 125). This approach moves assemblages beyond individualist or purely *autopoietic* precarious survival modes. Keeping these dynamics in mind, I've been attempting to embrace both *autopoiesis* and *sympoiesis* in my work.

Donna Haraway's "tentacular worlding" (2016, p. 42) acknowledges the synthesis of interspecies learning that occurs within symbiotic and *sympoietic* processes (Haraway, 2016, p. 125). *Greywacke Love Poems: Returns* (2019) includes bacterial polyester, produced through symbiotic bacterial metabolisation of waste streams. At the quarry, the tentacles of colonial and material histories reach beyond the Owhiro Bay site into the deep time of floods, underwater microorganisms, their sediments, and the future of such deposits. These tentacles also reach into the city where quarry aggregate was used to create foundations, gutters, and roading. The tentacular is also an apt metaphor for thinking about Indigenous histories and forces at play along the southern coastline of Te Whanganui-a-Tara, the site of Kupe's encounter with Te Wheke the octopus.[42]

Plasticity is life

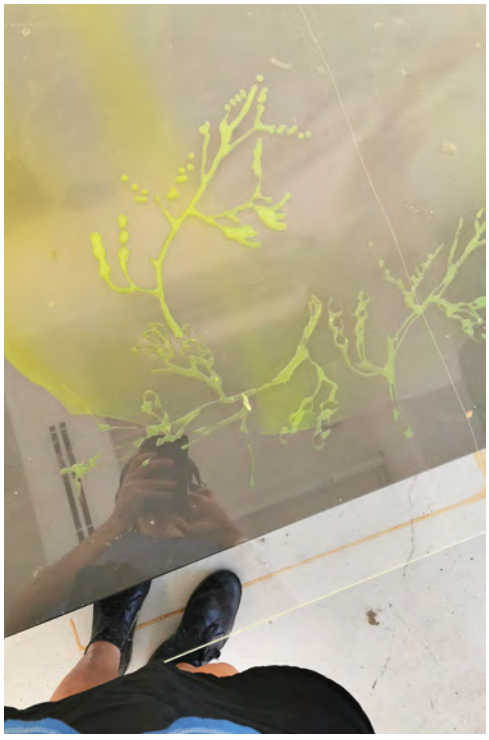
Contemporary popularisation of plasticity is described by Wagner-Lawlor as a form of "utopian anticipation" (2017, p. 67) whereby utopian artworks and fictions generate political motivations, or a type of prefigurative politics (Leach, 2013).

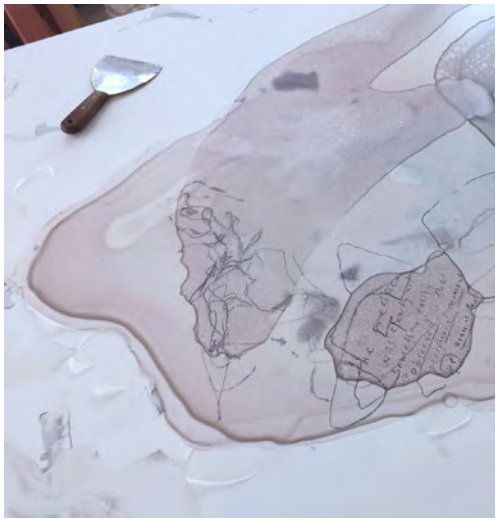
Malabou's biological alter-globalisation (described above) has become a reference point in my studio work. The most obvious example is work made for *Not standing still* (2018), where I attempted to culture marine algae within cellulose substrates. I talk about my various drying racks and cast substrates as reproductive surfaces, for initial casting and reconstitution of the water-soluble cellulose. While the poems within *Greywacke love poems: returns* (2019–2021), and works like *Paint over, use again* (2021) and *Climate change heartbreak poems* (2006–13 and 2019),[43] have developed methods for image and text transfer, and for reproduction within the layers of cellulose produced from each studio production surface. In section Seven, I further consider the prospect of biological alter-globalisation within a bioactive subjectile.

42 Haraway notes that Indigenous creation stories already recognise more-than-human processes of worlding. https://www.wcl.govt.nz/maori/wellington/wheke.html

43 *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.

Fig. 25. Raewyn Martyn, *Untitled* (2018), as part of *Not standing still*, at Blue Oyster Art Project Space, 2018.





Figs. 26–32. Examples of gel-cast cellulose 'reproductive surfaces' and images imprinted and/or transferred. Techniques include hand-painted images and text, and pigments transferred by etching images and text into the casting surface. This includes the fluorescein tracing of Evelyn Adams' kowhai drawing for *Paint over, use again* (2021).

Both Barthes and Malabou think about the plasticity of childhood and the ways that children experience trauma and interact with the world beyond trauma (Wagner-Lawlor, 2017, p. 77). Barthes' (1972) derided the shift from wooden toys to plastic toys, suggesting that he thought of plastic as anaesthetic (Wagner-Lawlor 2017, 74). 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, 80; 2011, 73). Such a biological alter-globalisation might involve the kind of more-than-human and intergenerational solidarity, already present within Indigenous thinking where plastics derived from fossil ancestors are considered kin (Liboiron, 2019).

While making *Paint over, use again* (2021), reproducing images made by my teenage grandmother almost a century earlier, I was thinking about intergenerational art making, and how 'infectious thought' and its aesthetics are often passed along through story and memory.[44] This form of cultural inheritance is analogous to epigenetics, which carries intergenerational gene behaviours in response to conditions and experiences. The adaptive plasticity of gene expression is also akin to shape memory in bacterial biopolymers. The bacterial thermoplastic biopolymers, and polysaccharide blends used in *Greywacke Love Poems: Returns* (2019b), reconfigured through heat that can also 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.

Anthropocene scholarship and the new materialisms have attempted to break down dualistic categorisations of nature and culture, and highlighted the role of colonial capitalism, however they have been slow to acknowledge Indigenous cosmology (Haraway, 2016; Todd, 2016). And this criticism 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. Once we have recognised the dissonance and resonances between these habits and affects of materiality, we can then develop a more robust alter-global imagination that follows alongside the kin-making material relations of Indigenous thought. (Liboiron, 2019).

Within non-Indigenous art theory here in Aotearoa, Roland Barthes' (1972) meditations on petrochemical plastics, and Bataille's base materialism (1985, p. 45), are both relevant for considering the past, present and future of plastics. For Bataille and Barthes, base and superstructure

44 As introduced earlier in Section One, I am reconnecting material relationships by understanding biopolymer and polymer histories, and bringing them into my current work. The personal narratives include my paternal grandmother, E. E. Adams (later E. E. Martyn), whose unpaid reproductive labour (Fraser 30) ensured the economic mobility of her family and children, within settler-colonial New Zealand. My own understanding of what is possible within creative life, colonisation, and contemporary circular bioeconomy is influenced by this family history and my position within it. In Sections 3&4, I discuss this, and the resulting installation *Paint over use again* (2021), made with cinematographer Jessica Charlton.

exist in material entanglement, as base matter is active and does not stay put within a binary of high and low.[45] This base entanglement risks overburdening the affective potential of matter with a revolutionary intent, but can still provide *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.* (Noys 1998, p. 503).[46] In Section Three, I discuss the life-giving nature of death in the work of Hilda Hilst, where negentropy and plasticity are found in hydromorphic and geomorphic imagery.

1.3: Conclusion

Methodologies of adventure reorient, disorientate, and bewilder us via "groping experimentation" (Deleuze & Guattari, 1994, p. 44). These methods prioritise processes of overcoming, becoming, remembering and understanding that are linked to histories of materialism. This manifests within biopolymer aesthetics, where making and becoming happen at the interface of regeneration and decomposition, as is evident in the music video for *Adventure* (2019) and in *Greywacke Love Poems: Returns* (2019). The deformations within artworks like *Adventure* (2019) and *Greywacke Love Poems* (2019) contribute to a prefigurative politics of reorientation, regeneration, and redistribution. The so-called *returns* within *Greywacke Love Poems: Returns* (2019), 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 Section One I have been using various feminist, Marxist, and Deleuzoguattarian new materialisms, alongside my own hands-on explorations of the malleability of biopolymers, to trouble neoliberal capitalism and coloniality's conceptual habits and material practices. This has involved diffractive and nomadic thought, considering multiple possibilities for material self-organisation, creative disorder, and the materialisms of worlding (Braidotti, 2011; Haraway, 2016). In Section Two, I apply this approach to the narratives of industry and extraction—new and old materialisms.

This way of approaching research has opened up the personal and poetic within the scientific—the human and more-than-human subjectivities already embedded within biopolymer materials. If a story starts by describing grass as extruded cellulose, or sand as powdered glass, or that some plant oils dry to a thin film; it's possible to reframe industrial materialisation beyond the human, into a flatter creationism, with multiple sites of production and shifting archival values. This is an immanent position where the inside and outside of creation, and of nature and culture, are brought together.

While writing this section, I have conceptualised

45 The way that Bataille developed a structural imaginary of high and low has anarchic qualities which foreshadow artist Gordon Matta Clark's 1970s notion of anarchitecture (see Halberstam, 2020).

46 Barthes and Bataille were both applying Marxist ideas to cultural practices. Here in Aotearoa, Marxism needs to be considered as colonial and in tension with Indigenous context (see Barber 2019, for one example of this).

biopolymer materialism and its processes of entropy (and empathy) as a kind of feminist materialist entropy that segues with Halberstam's aesthetics of bewilderment (2020). 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.

2: New and Old Materialisms

2.1: Introduction

Polymers are entangled chains that create mass; polymeric substances are many molecules held together in this way, including raw materials like rubber latex, algae, bacterial SCOBY, leather, and wood.[47] Bio-based plastics and biopolymers are often framed as 'new' materials, but they are old materials. Indigenous peoples' use of biopolymer materials—seaweed, natural rubber, and plant or bark-based cellulosic materials—predates petrochemical plastics. Polymers also include processed materials like plastics, vulcanised rubber, and glass. In these long histories of creative use, we see working methods of plasticity that are sensitive to the more-than-human nature of biological, geological, and industrial polymers, while also resisting exploitative and extractive practices.

In Section Two I continue to develop an understanding of these materials and their production. 'Bio-based' plastics are produced with human processing and additives, while 'biopolymers' are formed from plant and bacterial growth without human intervention. We're now in a moment where industrial plastics could transition between petro-chemical and bio-based plastics, but the oil industry has invested in prolonging the dominance of petrochemicals (Bergmann et al. 2022; Lerner 2022), and there are also important criticisms of large-scale bio-based industry (Altman 2021).

As we make choices about what comes next, we need to understand the ecological and social dynamics of biopolymers' past, present, and future. A sixteenth century use of the word futurity spoke of affections being extended beyond someone's personal existence, beyond their immediate space and time (De Montaigne & Hazlitt 1879). This affection sounds hopeful, thinking toward a future beyond your own lifespan, and it is also part of an expansionist colonial and imperial imaginary. Here in Moananui-a-Kiwa, Lana Lopesi's work foregrounds Moana imaginaries (Lopesi 2021).[48] My reading around futurity has found that close consideration of the formations of

47 SCOBY is an acronym for Symbiotic Culture of Bacteria and Yeast

48 Lana Lopesi has reviewed a range of imaginaries, including colonial imaginaries, going on to propose alternative Aotearoa and Moana imaginary, I revisit this is Section Four. https://openrepository.aut.ac.nz/handle/10292/14298.

imaginaries and futurities (both settler-colonial and Indigenous ones), can help us navigate systemic and personal biases (Tuck & Gaztambide-Fernández 2013). This has informed my own thinking about the future or bio-based plastics and bioeconomy in Aotearoa.

Futurities and their narratives are processes of 'worlding', territorialisation and deterritorialisation that inter/intra-act through time (Haraway 2015, 159-160; Neimanis 2017, 29). The future forms within our agencies in everyday life and within the institutions and infrastructures that we work within, helping to sustain and create (Liboiron 2022). And the less 'everyday', liberatory dystopia and utopian narratives of worlding and unworlding, present longer histories, particularly of Indigenous futures that resist recuperation (Tuck & Gaztambide-Fernández 2013; Aikau, H. K. 2015; Goodyear-Ka'ōpua 2017). From an anti-capitalist perspective, Mark Fisher's work also explores our capacity to imagine and create the future while acknowledging that it is *easier to imagine an end to the world than an end to capitalism* (Fisher 2009, 2).[49]

My own work is clearly not Indigenous, it exists within the shifting dynamics of settler-colonial futurity and university-funded material research undertaken by tangata Tiriti (people of the treaty of Waitangi). I've used my work to think with a non-linear diffraction of the past/present/future of biopolymers. This work has occurred on site, in places like the old Owhiro Bay quarry or Adam Art Gallery, in the studio (at home and the university), and at Scion's laboratories. All of these situations contribute to my personal and systemic understanding of biomaterials.[50] And this includes the personal family stories that emerged within larger narratives of petrochemical polymers and bio-based polymers.

Section Two begins attending to alternative and speculative understanding of plastics and plasticity, and the systemic conditions of production. I look again toward creative and theoretical practices that can destabilise our extractive colonial biases and relationships to plasticity. Alternatives exist in the industrial and applied science realms, and in the very real-world Indigenous science and anti-colonial work of Tina Ngata and Max Liboiron (Ngata and Liboiron 2020), and are reflected in the work of artist-led research collectives like Kauae Raro. Tangata Tiriti artists, scientists, teachers, institutions and consumers who actively engage with this work can make a range of changes to their world view and everyday actions (Muru-Lanning 2022).[51]

Currently, within dominant Western modes of thinking, the perceived boundaries between nature and culture; inside and outside; human and more-than-human—are shifting (Nikolić 2020). In new materialism, flat ontologies collapse binaries and hierarchies of life and non-life, human and non-human, into an interconnected more-than-human

49 Fisher attributes this to Fredric Jameson and Slavoj Žižek.

50 *Greywacke love poems: returns* (2019), has been the focus of this studio work and was reconfigured for the final exhibition component of this PhD. All three iterations of this work have developed a four-dimensional approach to painting which will be discussed further in Section Four. For more discussion of diffractive practices see Bozalek & Zembylas 2017, and Hill 2018.

51 The depth of change within policy, regulation, and funding is yet to be seen, remaining aspirational. (Muru-Lanning 2022).

Fig. 33, 34. Documentation of lab work with Beatrix Theobald at Scion, a crown research institute in Rotorua. The extruder machines at Scion are used to melt and blend pellets of bacterial and plant-based polymers.

life and planetary aesthetics (Sanzo 2018; Apter 2013)—this is not new to Indigenous thinking (Todd 2016; Stewart 2021). Section Two traces the material histories of biopolymers alongside these shifting frameworks, from Marxist historical materialism, with its surface/depth dualisms of base and superstructure, through post-structuralist dematerialisation and upsurgence of conceptual positions, into new materialism (Ireland and Lyndon 2016 3; Grindon 2010, 305; Chaput 2020).

2.2: New and Old Materialisms

Past, present, future plasticities

Bioplastics are marketed as 'new' materials, and as a 'new industrial revolution for plastics' (Nakajima, Hajime, Peter Dijkstra, and Katja Loos 2017). Public awareness of petrochemical polymer waste generated renewed interest in biodegradable polymers in the 1980s (Nakajima, Hajime, Peter Dijkstra, and Katja Loos 2017). Their 'newness' is a deliberate framing, and this can erase earlier histories of Indigenous bio-based material culture and science.[52] Indigenous uses of biopolymers (in a range of geographical locations) are well-known but often excluded from current discussions of bio-based plastics (Latterman 2015, 2). This bias toward 'newness' can also obscure the impacts of earlier colonial industrialisation of bio-based materials, impeding our ability to do things differently this time around.

When reading about current collaborations between life sciences and industry, you're likely to encounter terms like 'industrial ecosystem' and the 'third revolution', bringing together biology and engineering (National Research Council 2015). In a US-based context, Neri Oxman from the MIT Media Lab has observed: *"The biological world is displacing the machine as a general model of design"* (Lewis 2021). By contrast, in Aotearoa, the language of newness is less dominant and necessarily involves Tiriti o Waitangi perspectives, and acknowledgement of long material cultures and histories within Te Ao Māori. Although under-resourced, a focus on collaboration rather than extractive consultation is important to the future of bioeconomy.

The language of newness is also important to critiques of 'new materialism' and 'post humanism', where the use of the word new can erase the fact that earlier theoretical discussions and historical narratives of humanisms and materialisms excluded Indigenous knowledges and Black scholarship (Todd 2016; Leong 2016, 7). Many of the intellectual approaches that are included in 'new' materialism, already existed but weren't recognised within the colonial academic canons of Non-Indigenous science and philosophy (Todd 2016). In white supremacist science and academia, erasure of Indigenous knowledges and sciences sustains a belief that colonial cultural and educational institutions are necessary features of a universalised sense of 'progress' and 'improvement' for 'humanity'—used to justify the

52 This critique of newness in material science is strongly related to critiques of the newness of 'new' materialism (See: Todd 2016; Leong 2016, 7).

violence that colonising 'progress' relied upon.

In academia and contemporary art, it can be difficult to resist the historical amnesia of 'firsting' (Liboiron 2021), particularly in material practices. This is especially challenging for those working within competitive funding and exhibition structures, where claims and recognitions of authorship make a real difference in the opportunities and incomes received by artists and academics. A desire to have subjective knowledge and contribution recognised in their specificity sits in tension with understanding that individualising authorial systems need to be actively challenged within both academic publication and creative exhibition practices, through ethical citation of collaboration (Liboiron 2021).[53]

One of my initial interests in bio-based plastics is their ability to move between liquid and solid and this quality is a feature of some of the earliest biopolymer materials, made in Egypt around 8,000 years ago.[54] In 19th century biomedical sciences, liquid bone broth was used as a growing medium for microbes, and the messiness of this form led to a desire for a 'solid media'. This was enabled first by the production of gelatine, and then agar (*History of the Agar Plate*, 2021). Like some of the plant-based thermoplastics I've been using, agar is a polysaccharide, derived from seaweed.

Earlier in the 19th century, experimentations with the constituent substances of paper and cotton involved flammable combinations that became

Fig. 35. Raewyn Martyn, an example of cellulose in use for *Greywacke love poems: returns* (2019–2021), at the old Owhiro Bay Quarry.

53 This is also at work within industrial and technological applications where competition and protection of intellectual property impedes collaboration and systemic change (Martyn, Graichen & Smith, 2020). Importantly, there is also tension with the need to respect Indigenous knowledge and collective approaches to knowledge.

54 We know that bio-based economies have long been part of both Indigenous and migrant societies with historical accounts beginning around 8,000 years ago, when people in Egypt worked out how to create a jelly from boiled bones and skins. This bone jelly was valued as a glue for making clothing, tools, and furniture. In English, it became named gelatin via the Latin word gelare – to freeze. (Avenas 2012).

alternatives to gunpowder—nitrocellulose. This led to solid and less flammable forms or cellulose, like celluloid film. Growth in colonisation, with expansion of the lumber industry and pulp and paper production, meant that those waste streams were channelled into production of by-products like celluloid and cellulose acetate. Ecological impacts include deforestation and intensification of the camphor extraction (Altman 2021).

Celluloid plastics were initially celebrated as an aesthetically appropriate substitute for scarce animal ivory, and they could also move between liquid and solid or soft and hard—enabling moulded forms to produce a vast array of items (Lattermann 2015, Gabrys, et al 2013). The military industry embraced cellulose-derived materials for their lightweight strength and water-proofing qualities, with cellulose butyrate coatings used to strengthen silk and canvas aeroplane wings during WW1 (Treece and Griffin 1992).

In Europe during the interwar period of 1918-1939, Antonin Artaud and Georges Bataille thought through the material spoils of colonisation in different ways. Including their own experiences of war and the psychological excesses of trauma, and the industrialised rifts between urban and pastoral life, with the excesses of time and creative energies that modernisation afforded. George Bataille's concept of base materialism came about in the wake of Marxist historical materialism. Bataille extended the metaphors of Karl Marx's 19th century metabolic rift to claim that human waste had become disconnected from the metabolism of local pastoral spaces (Foster 1999; Melillo 2014). Benjamin Noys (1998) writes that Bataille understood base matter and its affective qualities as excessive yet often hidden or invisible.

By the 1920s, advances in biological sciences and chemistry generated further understanding of bacterial life and in 1926, French biopolymer researcher Maurice Lemoigne began to regenerate waste streams into bacterial polyester thermo-plastics, like those used within *Greywacke Love Poems: Returns* (2019). This biopolymer is produced by a bacterium that metabolises human waste into plastic, a little like our own production of fat, it turns its excess energy into polyester (Matias & de Andrade Rodrigues). Both bacterial and cellulosic bioplastics can be generated through symbiotic processing of waste streams, or through extractive feed-sources and forest use. It's important to note that these are different forms of bio-based economy that led to different social and ecological impacts. Renewing attention to Lemoigne's work in relation to Bataille's base materialism opens a non-linear understanding of this materialist and economic context in relation to feminist new materialist thought, which considers the symbiotic qualities of more-than-human and bio-based material.

My own earlier education around industrialisation and its infrastructures of production link such 'advances' to the project of colonisation and its extractive capitalism. The violence of white supremacist colonisation was shared as a side note,

Fig. 36, 37. Bacterial polyester molded around a rock as part of *Greywacke love poems: returns* (2019).

or left implicit, without examination or discussion of alternatives. The ways we tie industrialisation to colonial and modernist frameworks limits our understanding of human relationships with material production and the systems that are possible.

During the pandemic, there is heightened interest in economic futures, and within colonial contexts there's renewed interest in Frantz Fanon's provocation for 'stretching Marxism', whereby Marxist ideas are rethought within specific colonial contexts, recognising the *pervasive and constitutive role of colonisation and racialisation* (Salem 2019). This interest in Fanon's ideas, reflects a convergence of calls for greater industrial sovereignty, left-wing populist nationalisation, and anti-colonial action—with all the risks of nationalism that come with that (Salem 2019). Here in Aotearoa, it is important to stop and think about Marx and historical materialism as colonial frameworks that also arose at the time of Te Tiriti o Waitangi (Barber 2019). Momentarily decoupling industry and colonisation, allows us to imagine alternative frameworks and systems, without a denial or erasure of colonisation. Whose materialism and materiality? How do those materialisms and histories need to be stretched? Where is human intimacy and agency located within these systems? These are questions in the back of my mind when I work with biopolymers at Scion.

Extractions

Settler-colonial capitalist systems (including the arts and higher education) extract time, labour, knowledge and cultural capital from individuals and networks (Bourdieu 1977, 183). In conversations about sustainability in the arts and more broadly, it becomes apparent that so-called sustainable practices can still 'sustain' extractive tendencies—appropriation of indigenous knowledge, and recycling exported via waste colonialism, for example (Todd 2016, 16). In 2018, New Zealanders learned that much of our plastic recycling is sent to Malaysia and burned (*NZ's Role*, 2018). Export of plastic waste is a form of waste colonialism (Liboiron 2021)[55] that intersects with capitalism with lingering drives to extract further value from waste, while also sustaining the status-quo production of plastics.

Terms like the Capitalocene and Elizabeth Povinelli's 'carbon imaginary' (Moore 2017; Povinelli 2016, 16), provoke and invite us to imagine alternative conditions for material production. The plastic imaginary and qualities of plasticity have been used to describe flexibility and adaptability in human neurobiology, social and economic systems, and in workplace and interpersonal relationships. Catherine Malabou warns that plastic ideals like flexibility can be used to inflict or legitimise violence; where people's lives, communities, homes, landscapes, and ecosystems, are transformed in service of capital

55 Max Liboiron (Métis) and Tina Ngata (Ngāti Porou) have discussed the whakapapa of plastics pollution activism within the specific colonial dynamics of Aotearoa (Ngata and Liboiron 2020; Ngata 2014).much of which is also documented in Ngata's earlier blogging as "The Non-plastic Māori"

flows and profits (Malabou 2000; 2011; 2012).

Anti-colonial and revisionist histories address devaluation of particular materials, where material biases can also be associated with gender. As Monika Wagner describes: *material, valued as raw, unsightly, natural or even female - in any case low in rank* (Latterman 2015, 2).[56] Glass became an early "luxury material", while plastics and biopolymers were further devalued over time (Latterman 2015, 4). Revisions within Western art historical and material research are seen in descriptions of fossil polystyrene which was already formed by nature as a biopolymeric material in the Eocene, 55-35 million years ago. 'In an exhibition catalogue of the State Museum Stuttgart from 1909 with the title (translated) "Taste aberrations in Applied Arts", Celluloid and Galalith (milk casein-derived plastic) are labelled as materials, which "irritate" the spectator. They are included in the special catalogue category "Materials error", subchapter "Material surrogates"(Latterman 9).

Petrochemical plastics have been widely used within creative practises since the 20th century and despite the archival problems with petrochemical plastics, these materials have been more readily accommodated within the market and its collections than what we see with more experimental bio-based materials (Marcal 2019). The 20th century creative histories of industrialised plastics that are found in international collections—including but not limited to: MOMA, Tate, and the Metropolitan Museum of Art—are drawn from colonisation and demonstrate how petrochemical aesthetics and biopolymer aesthetics move between the geological and the biological origins. This generates a geo and bio-aesthetics where 'being' and 'feeling' are forms and forces of worlding beyond the 'natural', and dislocated from the place-based knowledge and relationships that created them.

The aesthetics and conditions of production, and our interpretation of them, are influenced by institutional culture and 'atmospheres' within museums, galleries, universities, research institutes, and industry organisations. Psychologist Deanne Bell has described differences between colonial and decolonial atmospheres (Bell 2018), with the subjective positions of workers, researchers, and students altering those atmospheres.

Within transitions to a bio-based economy (bioeconomy), biopolymers are adapted to existing petrochemical atmospheres and infrastructure, a kind of petromimicry, sustained with the carbon imaginary (Povinelli 2016). Meanwhile, the increased public awareness of plastic pollution generates a market for alternatives, and motivates manufacturers to differentiate new materials through green colour coding and natural textures. This flips the biomimicry of early petrochemical plastics that were developed to mimic tortoiseshell, circumventing the scarcity of the shells (Meikle, 1995). Biopolymer aesthetics continue to be responsive to markets and atmospheres—code

56 Wagner's text is in German and Lattermann has translated it for citation.

switching between petromimicry and biomimicry, during production and marketing (Wagner-Lawlor, 2017).

Re-evaluating and reclaiming

Dale Harding, who is of Bidjara, Gungalu and Garingbal, Indigenous Australian descent, is an artist whose material and formal investigations expand his family's canon and knowledge production processes. Harding's exhibition *There is no before*, at Govett-Brewster Art Gallery, Taranaki, continues his larger project of adding to the continuum of minimalist forms within his family's ongoing cultural practices. Dale Harding's *Extractive Painting I* (2020) reclaims the terms of extraction for an exchange of pigment and artwork between two Indigenous artists—during the exhibition, Taranaki-based artist and arts advocate Wharehoka Smith (Taranaki Tūturu, Te Ātiawa, Ngā Ruahinerangi, Ngāti Pākehā o Taranaki) is invited to extract pigment from Harding's *Extractive Painting I,* and then create new work to sit alongside it on the wall of the Gallery. This project can be understood as an example of what Eray Çaylı describes as the aesthetics of extraction, and the possible counter-extractivist imaginaries that develop from localised and place-based practices that prioritise Indigenous perspectives and subjectivity (Çaylı 2021). The title of Harding's exhibition, *There is no before,* acknowledges non-linear cultural continuum, and refuses the positions of alienation or acceleration that late-capitalist settler-colonial conditions of knowledge production often enforce.

Harding is intervening in the universalising art historical canon, through personal and specific understanding with 'authorship' shared between generations. The personal ethics and aesthetics of our work and everyday life are theorised as ethico-aesthetics (Guattari 2000) and onto-ethics (Grosz 2017). These onto-ethics can impact extractive industrial systems (including the art industry), where workers' everyday ethics of being, form-taking, feeling, and acting within the world can generate systemic change. Elizabeth Grosz's work stems from Deleuze and Guattari's geophilosophy and ecosophy (1987; 1994; 2000), with their focus on earth systems and matter, non-hierarchical "self-organising material systems" (Protevi, 2001, 2). These are models for resistance to the forces of colonial capitalism (Coleman 2013). Grosz extends this by examining corporeal and incorporeal (material and immaterial) processes of being and feeling—the affective stuff that often motivates our ethical choices and becomes material.

In science, collaboration and shared authorship can counter or undermine the hegemony of competitive and capitalist systems, making it possible to imagine differently.[57] This was highlighted in my work at Scion, and as part of my methodology to undertake informal conversations with a range

57 Collaboration has the power to shift both distribution of resources and recognition of achievements (enabled by including collaboration within evaluation criteria). And when artists and scientists work together, across cultures and fields of research, there are also more opportunities to recognise differences between knowledge systems and community concerns, making biases and assumptions more recognisable and open for transformation. Revaluation of success and measurements – like the boundaries of Doughnut Economics, and the New Zealand Treasury's Living Standards Framework – encourage different ways of working.

of scientists and nonscientists. As Florian Graichen from Scion states: S*imply bending a linear system into a semi-circular one, is not enough. It's a total mind shift in thinking how the sectors see working with each other. … Competition creates behaviour, the way you measure it creates behaviour* (Smith & Graichen, personal communication 2020). Ngāi Tūhoe scientist Teina Boasa-Dean offers another way of thinking about interdependencies: *…in the takarangi there was huge fluidity, there was collaborative sharing and abundance as opposed to competitive scarcity and there was a much more equitable and fairer, humane form of existence.* (Boasa-Dean, personal communication 2020). In both of these conversations with scientific leaders, I heard shared desires for collaboration over competition.

Scientists at Scion are working toward strengthening their understanding of Te Ao Māori perspectives, including these indigenous perspectives in their work, enabling them to partner effectively with Māori:

> *a Pākehā scientist thinks they are following kaitiakitanga, but it's a bit different from Māori. Like, the Whanganui River, is now legally a person, so if you think about all nature like that, that for some body of water to have maintained its lifeforce it should have a whole body speaking for it, that is a totally different way of thinking about things. … And also, in that learning, is seeing that imperialism and even modern-day economic imperialism happens to all of us, but we don't necessarily realise it. And that imperialism doesn't really fit with circular or doughnut economies. If we don't see it, we can't even oppose it.*
>
> (Smith & Graichen, personal communication 2020).

With Pākehā and tauiwi scientists shifting their world view and working collaboratively in partnership with mana whenua and tangata whenua, industrialisation of biopolymers could be localised and place-based. Indigenous-led models can rethink extractive practices, and the redistribution of resources and profits, reconnecting whakapapa at multiple levels (Boasa-Dean). As Florian Grachen states: *currently NZ is one of the only countries in the world where you could actually build something Indigenous-led, or develop a circular economy for the country that builds off Indigenous principals, it's not just trying to fit it in later* (Smith and Graichen).

Playing the Machine

After working on *Greywacke love poems returns* (2019), I worked again at Scion with polymer scientist and technician Beatrix Theobald, using a forced-air extruder designed to 'blow' plastic bags like those found in fruit and vegetable sections of a supermarket. We 'misused' the machine, creating long chains of bubbles by trapping the blown air into the sausage-like skins, and manipulating them, like balloon animals. The pigments used in these extrusions included plant-based sources like indigo, and alkanet—a ph-sensitive dye that ranges from red through to purple and blue.

Fig. 38. Raewyn Martyn and Jessica Charlton, work in progress toward *Playing the Machine I & II* (2021).

In 2021, Jess Charlton filmed our work sessions, with the premise that Beatrix and myself would be 'playing the machine' and that Jess would focus on this aspect of our behaviour, alongside the material behaviour of the bio-based thermoplastics. This idea of 'playing the machine' came out of conversations with Beatrix, who had trained and worked as a chef in Hungary before she came to Aotearoa where she then studied chemistry at University of Auckland. While working together, we talked about her previous life in the kitchen, using the tools, machines, and methods of food chemistry, and how this prepared her for working with bioplastics. At Scion, the extrusion machines were designed to process petrochemical plastics and technicians are still learning how different bio-based polymer blends behave during extrusion. Biobased and petrochemical plastics have a range of different glass transition temperatures and variables, so Beatrix often needs to experiment with machine settings and use them in unconventional ways. Working with me, Beatrix could exercise these intuitive and experimental approaches to another extreme, and we joked around about 'Playing the machine' or misusing the machines. The name stuck and has become the working title for a series of short film works by Jess Charlton.[58]

This premise for the work intervenes in the context of research commercialisation, where there is pressure to work efficiently and to monetise, often working directly from industry-driven briefs. For

58 These were to be shown at The Dowse Art Museum in October 2022 but the show was cancelled by the gallery.

me, working within a university and in collaboration with a crown research institute, 'playing' becomes a form of intervention where attention is drawn to our capacity to play, and the importance of making space for this within knowledge-generating work. Play and its associated processes of 'tinkering' and 'hacking' (Wark 2004; Lewis and Friedrich 2015) are fun, joyful, and generate intimate material relationships and understanding that are important to knowledge generation (I discuss this further in Section Six). These modes of play also operate as forms of suspension, that make a thing and its situation both familiar and unfamiliar, Lewis and Friedrich write:

> *tinkering transforms a useful object identified within the order of things as a particular object with particular uses that separate it from other things and uses. Being both an engine and not an engine simultaneously means that it is a toy. For Agamben (1993a), the toy is a peculiar kind of thing that 'can be said to be withdrawn from all rules of use' (p. 57).*
>
> (Lewis and Friedrich 2015)

In *Playing the machine 1&2* (2021), this doesn't undermine the real economic potential of iwi and community-led bio-based economy, but provokes and expands our sense of what is possible, beyond what we assume plastics to be and draws attention to human agency within systems of production.[59]

Work in progress toward *Playing the machine 1&2* (2021) was screened in the Len Lye Centre Cinema at Govett-Brewster Art Gallery during the closing weekend of *Paint over, use again* (Charlton and Martyn

Fig. 39. Jessica Charlton at the screening of *Paint over, use again* (2021), at the Len Lye Centre Cinema, Govett-Brewster Art Gallery.

59 The plastic extruded in *Playing the Machine 1 & 2* (2021) is a polysaccharide thermoplastic that has 'shape memory' — as mentioned in earlier sections, it can be molded into one shape at a particular temperature and then re-heated and deformed before returning to its set shape through the trigger temperature. Once it's heated to that initial temperature again it will remember that molded shape. Heat becomes a trigger. So there's some resonance there between human plasticity and this more-than-human plasticity of the plant and bacterial polymers. Some geo-based ceramics and metal alloys also have shape memory, so it's not exclusive to the bio-based world, but the movements or shapeshifting within plant and bacterial materials is perhaps more radical or immediately visible. In July 2022, we'll do another film shoot that explores the shape memory of these materials and this will become part of the exhibition that also features the 'playing the machine' work.

2021). The screening programme also included a new edit of the film featured in the *Paint over, use again* installation, developed especially for the large cinema screen; our earlier work *Adventure* (Charlton and Martyn 2019); and *Mother of Colour* (Adams 1972), made by Evelyn Adam's nephew Jim Adams who is also an artist and now lives in New Plymouth.[60] The screening was followed by a conversation between myself, Jess Charlton, and writer and archivist Stefanie Lash who had written the text *The Golden Spike* (Lash 2021), to accompany the Open Window project. We discussed how the film changed the painting, and vice versa—I think Jess's filming helps me understand painting as a four-dimensional medium. This could be reduced down to something like a performance of painting, but I think the way that Jess films, using the camera to paint and using light to paint, resists that idea, so that Beatrix and myself become part of the painting at the same time as being painters. *Paint over, use again* is discussed again in Section Three, and at length in Section Four.

This is a systemic understanding of painting, with connections to ecological theory of picture space that developed in the 1970s (which I discuss in Section Five of the exegesis). These theories developed to acknowledge that the viewer or receiver is present within a specific environment, drawing information from within a larger ecology of context and conditions (Gibson 1978; 1966; Rogers 1995). In *Playing the machine 1&2* (2021), the specific human figures of Beatrix, myself, (and sometimes Jess), become agents within the system of production, in direct and intimate contact with materials. This is important because there has been a (necessary) decentering of the human within new materialist, post-humanist, and Anthropocene studies, but this comes with risks of delocalisation, dehumanisation and denial of human agency (Plummer 2021; Nichols & Compano 2017).

Emily Apter's planetary aesthetics develop thinking about more localised and place-based systems at a planetary and more cosmological scale (Apter 2013). In the expanded field of painting, Apter gives the example of Gustav Metzger's immersive *Liquid Crystal Environment* (2005), first made in 1965, involving slide projectors and liquid crystals.[61] Metzger's manifesto on the neg-entropic possibilities of auto destructive art, lends itself to systems interpretations while also operating beyond the boundaries of localised matter and materiality:

> *Metzger's auto-destructive happenings show that 'galaxies constantly engage in creative and destructive processes but [that] we have now internalized these processes' (7). As such, planetary aesthetics – especially Metzger's process-based actions and installations – could be seen to embrace a 'systems' concept of environment emphasizing dynamical interactivity among orders*

60 During the opening weekend of the Open Window installation of *Paint over, use again* (Charlton and Martyn 2021), we visited Jim and his partner Corrie and they shared a dvd copy of the 1972 film because they saw resonances in the work with *Paint over, use again.*

61 from the exhibition 'Gustav Metzger: de´cennies 1959–2009

of material, economic, technological and social forms (Apter 2013, 134).[62]

In my own work, this kind of systems aesthetics developed in relation to the delaminated (peeled) paintings I was making between 2012 and 2014. Each painting became a layered and unfolding material system, under the influence of forces like gravity. This expanded into a larger-scale planetary aesthetics as I began to think more carefully about the fossil-derived materials and their bio-based alternatives, I discuss this work at length in Section Four. During emails with a City Gallery Wellington curator in 2013 and 14, I described a proposal involving delaminated wall works alongside soak-stain oil-skin coats:

> *the oil–skin jacket[63] is a way of taking the painting object outside the gallery space and allowing the metaphor of skin to be extended between the wall peel and the portable object/attire of the jacket. It also invites itself to become image once again if it is documented photographically. And this cycle of surface, image, object is perhaps where the idea of an "ecology" needs further articulation. And maybe disruption. For the Hirschfeld, I would like to make a work that examines how these peels exist as emergent form, as part of their own visual and physical system and cycle.*

Ecology is obviously linked to the idea of ecosystems and 'the economy of nature', and I think that's a nice critical point of departure for thinking about more recent paintings like *Playing the machine 1 & 2* (2021), and *Paint over, use again* (2021). These are paintings that are systemic, generating as an ecosystem. For the films at Scion, the bio-based materials are placed within the industrialised system that works in response to the economic systems promoted and sustained by government policy. The current government of Aotearoa has aspirations for a circular bio-economy model ('Strategic Intentions' 2021, 27) that further entangles social, ecological, and economic thinking. At Scion, we play the machines with our own interpretation of what bio-economy models imagine and enable, inserting human play—behaviour that often decentres immediate profit-driven outcomes—back into a system of rational capitalist material production.

Jess's films are part of the ecosystem of these paintings, she notes:

> *Although I am invisible, the camera has an active presence so myself and the camera become part of the painting, another layer. In a sense, I am painting with the camera. And the film is a time-based painting itself. Cinematographers often talk about painting with light and yes that's definitely happening. But it's more than that, it's also painting with the camera, which is a machine. …And I'm also part of the machine. The camera*

62 Apter goes on to mention Timothy Morton's *notion of 'mesh' (in The Ecological Thought) aptly describes much of what falls under the rubric of 'systems' environmentalism.*

63 The soak-stain oil-skin jackets were initially proposed as part of The Obstinate Object (2012), but that exhibition occurred in summer so the folding camp stools, *For Loan,* made more sense as something that could be borrowed from the gallery. I'm still fascinated by the image of Wellington politicians and public servants walking through a Lambton Quay rainstorm in their oil-skins. In the USA this becomes the image of the wrangler, or the hipster, in their tin-cloth gear. Or George W Bush at the 2007 APEC meeting posing in Australian made oil-skins alongside Vladmir Putin and Helen Clark – the oil-skin used for the socializing of power.

> *is rigged to me so we are one... and Raewyn and I together with her materials are a machine. I feel like in our practice we're developing our own system of filmmaking / film painting?*
> (Jess Charlton 2021).

In her recent lecture *Against the environmentalism of the rich*, Nancy Fraser emphasises how capitalist societies separate realms of life, like a picture plane, foregrounding the human and economic, set against background realms like nature—used as a scenic device, a resource for extraction, and a sink for waste (*Nancy Fraser - Against* 29:11, 2021). In the landscape described by Fraser, production presupposes reproduction—care work, sustenance, learning, memory—and this social reproduction is linked with natural ecological reproduction, jeopardisation of one impacts both. (*Nancy Fraser - Against* 33:00, 2021). Transitions to a biobased circular economy that recognise symbiotic relationships as a productive quality pose important challenges to the way we understand the relationships between production and reproduction. The cycles of production, reproduction and reconstitution within the practice-based parts of this PhD, provoke further questions for me—how are knowledge and memory reproduced and carried within circular materials?

2.3 Conclusion

The parallel industrial histories of bio-based and petrochemical plastics that I've outlined in Section Two are tales of dominance, where potential alternate plasticities were excluded and obscured by oil industry interests and made unsustainable through their exploitative and toxic production (Latterman, 2015). Early plastic histories—petrochemical and bio-based—move between spheres of industrial and cultural contexts: as 'resources' extracted through colonisation, as commodity by-products, consumer items; through their use within media and the arts (celluloid and design materials); and in military-industrial applications. Currently, widespread reporting on plastic waste and the proliferation of alternative solutions like bioplastic packaging and increased visibility of bio-based art, design and manufacturing materials (*Materials—Future Materials Bank*, n.d.), has destabilised and enlarged mainstream understanding of plasticity and its future.

In the context of the COVID-19 crisis, the language of economic 'recovery' is being reconsidered because the word recovery 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 in language help dismantle and sow different seeds, triggering different compositions, and the conditions for tinkering, hacking, within our current economic and ecologic trajectories (Lewis & Friedrich 2015).

While working with Scion I have learned about

government and industry planning toward circular bioeconomy in Aotearoa. I have also read about the tensions between growth and degrowth within these models and systems of economy, and the anti-colonial and ecological advocacy that is happening to avoid the damaging practices within past forms of bio-based economy. Materials used in *Greywacke love poems: returns* (2019-2021), and work toward *Playing the Machine* (2021), carry the risks and possibilities of circular bioeconomy, drawing attention to material possibility. While acknowledging that new materialism, post humanism, and Anthropocene studies have sought to draw attention to human interconnection within ecological systems by decentring human figures by often focusing on matter beyond the human, we have placed playful human and more-than-human figures back within these systems of material production.

3: Hydrophilia

3.1 Introduction

In Section Three, I discuss qualities of fluidity and hydrofeminism, developed through 20th and 21st century responses to social and ecological change (Neimanis 2017; Ahmed 2019) and in much longer continuums of Indigenous and anti-colonial work. Hydromorphism circulates within movements of surrealism, post-war painting, and process-based practices of the 1960s and 70s, along with biomorphism and geomorphism. These morphologies also influence what I see currently, in transitive, transitional, and reparative practices (Flood, 2007; Rubenstein 2009; 2012; Joselit 2009; Graw & Lajer-Burcharth 2016).[64]

Hydrophilic—water-loving—cellulose, mixed with a drying oil creates an emulsion that dries into a paint-like film that can be applied to surfaces and later moistened for recomposition and rehydration into a fluid medium. The material swells and expands as it rehydrates, disrupting the existing composition and pigment distribution. 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 density of colour and tone. The images or text may warp, distort or as material moves between two-dimensional and three-dimensional forms.

These cellulose emulsions and their paint films are intimately connected to the history of celluloid film and the liquid image making of photography, which I discuss in this section. The 19th century celluloid industry enabled the later popularisation of photography and scientific image making that influenced early 20th century avant garde movements like constructivism and surrealism (Kallai 1947). Surreal and constructivist imaginaries generated further exploration of subjectivities, including deeper and more expansive understanding of interrelationship within the 'natural' world—and a questioning of what is assumed to be natural or naturalised (Botar 1998).

64 The unmonumental, provisional, and transitive were not the only ways that artists have responded to grief – there are many forms of transcendence and confrontation at work – but in this exegesis I have focused on these forms, and in Section Five I discuss these in relation to Amitash Ghosh's idea of 'derangement' within climate crisis (Ghosh 2016).

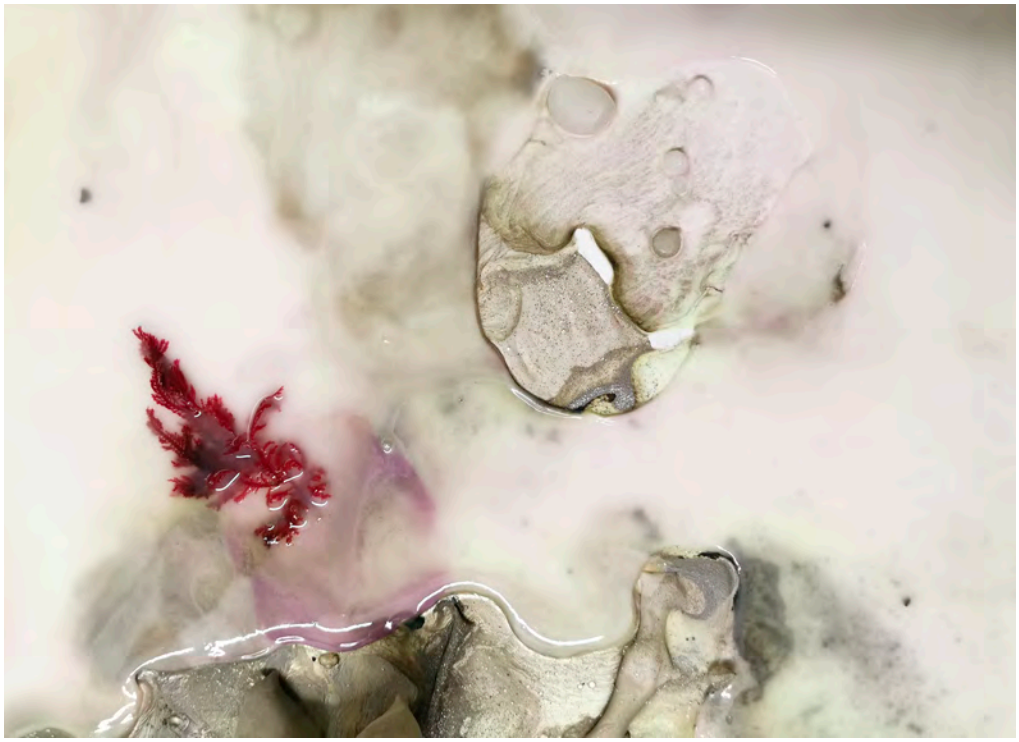


Fig. 40, 41. Raewyn Martyn, *Greywacke Love Poems: Returns* (Martyn, 2019). Examples of hydrophilia—cellulose during rehydration and dehydration, reconstituted from earlier work before installation at the coastline.

Artists who emerged from this period and continued to practise into the latter 20th century include sculptor Barbara Hepworth; painter Georgia O'Keefe; photographer Imogen Cunningham; and ceramic and plastics designer Eva Zielsel, all of whom explored the biomorphism of fluid, yonic and less phallocentric forms, while evading narrow gender essentialism (Botar 1998). In Section Three Paul Klee is a touchstone for how this played out in painting.

Material and ecological forms of feminism (ecofeminism), like hydrofeminism, hydrochoreography and geochoreography (Neimanis 2017; Hamilton Faris 2021),[65] are found in Aotearoa artists' work with both petrochemical plastics and bio-based materials (biopolymers, paper, etc). I have focused on artists who can be linked to existing theories of hydrofeminism, geochoreography, hydrochoreography, and propose hydrophilia as an additional term that also features in work produced as part of this PhD.

Evelyn Adams, my grandmother, who grew up in an Ōamaru bookshop during the 1930s, was a decade or two younger than the surrealist artists I've mentioned above, but I link her to this moment in art history through her lifelong interest in biomorphism—her abstractions often used fluid media and/or gesture, working from floral and plant forms. Some of Evelyn's half-finished artworks are annotated with notes to herself, like "Paint over, use again" and these became source material for the installation and film *Paint over, use again* (Martyn and Charlton 2021), made for the Open Window space at Govett-Brewster Art Gallery in New Plymouth.

In Section One, I mentioned experiments with the growth of seaweed algae cultures within wet cellulose, *Not standing still* (2018). Although this was an ephemeral success, the potential is exciting and resonates with a kind of biogenic or organic plasticity – plasticity within living things (Deleuze and Guattari 1994). In organic plasticity, a plant can contract *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* (Deleuze and Guattari 1994, 212). These material affects of liveness are present within hydrophilic artworks, provoking surprise, curiosity, and a desire to decode the visceral skin-like stuff.

3.2 Hydrophilia

Biomorphism and hydromorphism

In early 20th century artistic manifestations of what we can now refer to as posthumanism (Ferrando 2016), there are examples of biomorphism, geomorphism, and hydromorphism that I've been thinking about through hydrofeminism. Within colonial art histories, these include practices from within

65 I have focused on hydrofeminism and geochoreography, and propose hydrochoreography and hydrophilia as additional frames. Ecofeminism as theorised within the United States and elsewhere sits outside the scope of this PhD but is relevant to understanding the terms hydrofeminism, hydrochoreography, and geochoreography.

surrealism, dada, and later contemporary art practices.[66]

Biomorphism and plasticity are features of the visual languages that emerged in the late nineteenth and early twentieth century, as photographic imaging technology pushed artists to think beyond their immediate experience and capacity for representation. Artists had access to photographic information, drawn from both science (and 'pseudoscience'),[67] that developed understanding of matter and energy as fluid, moving between many different human and more-than-human forms. In the late 19th century, spiritual mediums, whose work became associated with surrealism, began to use photography to capture images of 'ectoplasm', developing an aesthetics of excessive psychic experience that was popular with both artists and scientists (Delgado 2011).[68]

Theories of bio-romanticism and naturo-morphic analogies were influenced by Hungarian constructivism, and the advent of microscopic and x-ray photography (Kallai 1947). In the publication *The Hidden Face of Nature* (1947), Kallai reflects on the emergence of surrealism and the parallel developments in scientific thinking: *Science is also at the point of seeing through the dense fabric of this godly veil. .... Let us think of the rays, invisible, but, due to modern science, precisely measured and defined, which interpenetrate terrestrial and astronomical space. ...This realization again points to those supersensual, those transcendental levels [hat-ter] which the last century's Materialism wanted, at all cost, to ignore* (Kallai 1947). Kallai is talking about light, but the understanding of more-than-human scales of experience, time, and space is important to the physics of liquids too. And the photosynthesis of trees fuels the growth of wood used to produce the celluloid films that photographic mediums would come to rely on during that period. These photoactive substrates allowed for images and time to be understood as fluid and live.

Paint over, use again (Martyn and Charlton 2021), is part of a larger series of hydrophilic paintings, made over the past six years,[69] with images that develop and are embedded through various hydromorphic (and geomorphic) techniques. In *Paint over, use again* (2021), Jess Charlton filmed the creation of paintings that were then hung in the Govett-Brewster Window space, with the moving images then projected back into the cellulose film as it hung. Processes within these works include: pouring, diffraction and bifurcation of flows, trace, imprint, sedimentation, cut-up and tear techniques, melding of material segments, burn-like dissolution of the substrate, oxidation, crystallisation and salt precipitation from seawater, refraction and other forms of light sensitivity. Their ongoing potential for rehydration

66 Francesca Ferrando outlines the feminist genealogies of posthumanism including colonial and non-Indigenous individuals and collectives as well as Indigenous, diasporic and anti-colonial ones – this collective aspect is relevant to Neimani's framing of the hydrocommons. (Ferrando 2016)

67 This could include Alfred Jarry's pataphysics and also practises like those of spiritual mediums. Pataphysics will be discussed further in Section Five.

68 I discuss ectoplasm further in Section Five, but it's important to note here that a feminist reading of spiritual mediums and their 'ectoplasm aesthetics' shares some of the excessive qualities of hydrofeminism.

69 These are in addition to, and discrete from, the *Greywacke love poems: returns* (2019-2021) works.

means there is a liveness to these mineral and sedimentary deposits, with the hydrated state holding onto the possibility that something may yet move or grow within the medium, expressing unfamiliar animacies within a personal archive (Chen 2012).

The possibility of animacy alters the hierarchies of agency within the artwork. As Mel Chen writes, these hierarchies are: *shaped by the spread of Christian cosmologies, capitalism and the colonial orders of things. Animacy's 'grammar' thus extends beyond linguistic coercion to broader strokes of biopolitical governance* (Chen 2012, 30; Braidotti & Hlavajova 2018, 33). Artworks that activate our senses of beyond-human animacy also expand our boundaries of empathetic processes, and our sense of interconnection and responsibility—as Chen notes, this is not news to Indigenous peoples. I will discuss empathy further in Section Five, here I am concerned with how biomorphism, hydrophilia, and hydrofeminism generate affective animacies within graphic and photographic images.

Grounds become large bodies of water

Descriptions of Paul Klee's lessons on pictorial space, make me think of Klee's own fluid grids, where translucent horizontal and vertical planes create a mesh-like field with fluctuations surfacing in wave-like contours—the grounds become large bodies of water on which figurations surf and surface:

We quickly arrive at a mobile space with three

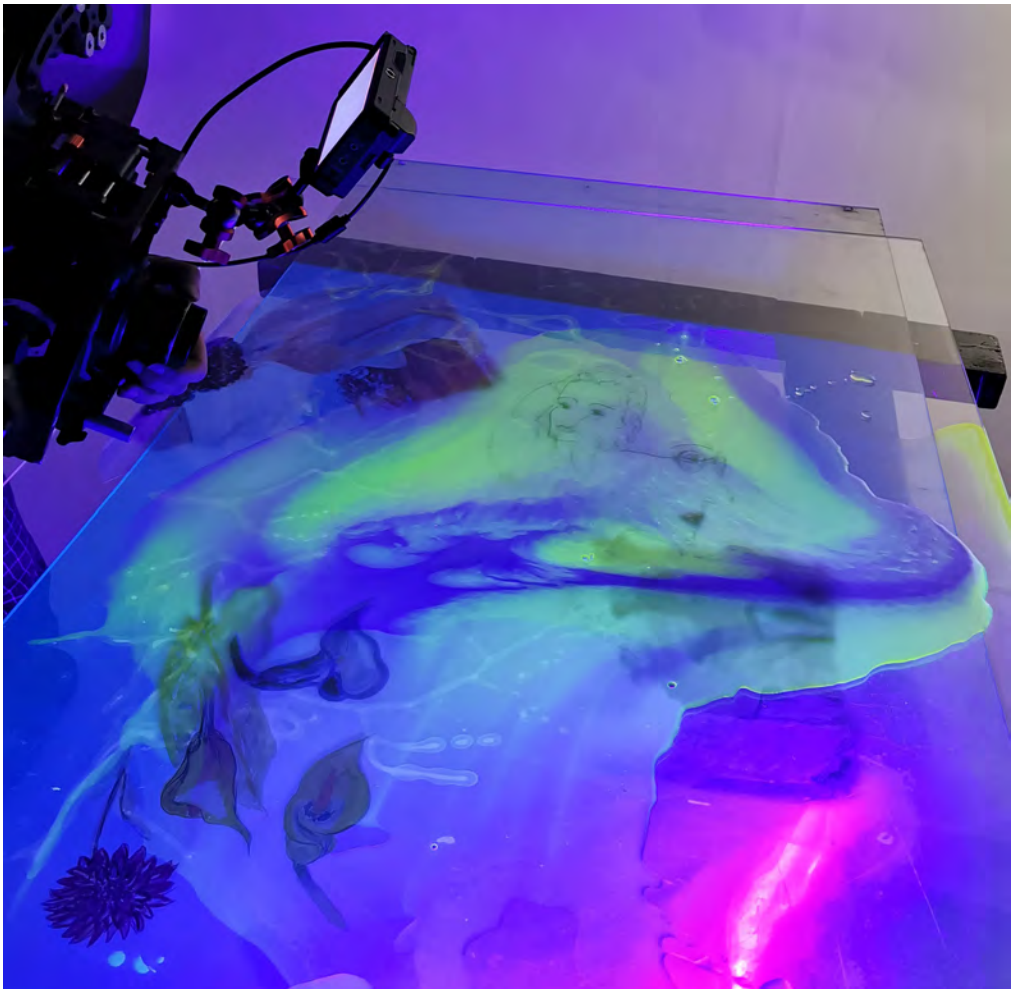


Fig. 42. Raewyn Martyn and Jessica Charlton, *Paint over, use again* (2021).

Fig. 43, 44. Raewyn Martyn and Jessica Charlton, *Paint over, use again* (2021).

> *dimensions. He shows his pupils how to construct a space whose centre moves, and the effects that this displacement may have on colour intensity. He emphasises the importance of the eye level, the consequences for changing the relation between height and horizon. Klee has constructed several pictures based on these principles, using multiplied perspectives, spaces succeeding one another, interpenetrating each other. (Boulez 1989, pp. 55–64, own translation)*
> (Caliandro 2019, 31)

Stefania Caliandro also discusses these perspectival features of 'morphodynanism' and polymorphism in Klee's 'polyphonic painting' (Caliandro 2019, 26-31). His approach to pictorial space was informed not only by photographic technology, but by Klee's travels and understanding of pictorial systems from within cultures beyond Europe. There needs to be stronger acknowledgement that Indigenous and anti-colonial practices of picture making and material culture were already doing the radical things that Klee 'discovered' or innovated in his teachings about perspective, and also in the ways that we talk about polymorphism and biomorphism. This doesn't make Klee or the surrealists work less important within their own cultural contexts, but their work can't be framed as universally 'revolutionary'.

Shifts in spatial and pictorial understanding were also informed by changes in the way people navigated and performed their everyday movements through cities, in response to increased development of intentional public spaces, and also the advent of street photography and moving image documentation. City design and photographic technologies changed the way people experienced contingent encounters within public spaces, altering both perception and construction of reality (Caws 2001). The boundaries of personal and public were altered—becoming more fluid—with personal life exceeding itself into new forms of public life and the early instances of 'social' media that photography and film enabled.

Plastic image-making allows for impressions, mimesis, phantoms, and copies, and when Catherine Malabou describes these features of plasticity as an alternative to writing, it is within the planetary aesthetics (Apter 2013) of the biosphere—as a language-akin to those of flowering plants, constantly changing, polymorphic and refusing to submit to fixed forms or models (Malabou 2010). Thinking of both localised and planetary plasticities as mediums of image reproduction, like photography and printmaking, the focus shifts to matter and material itself as images, or to images as embedded within the material itself—not reliant on a surface coating or light sensitivity. The imprint or impression is internalised, within molecules and particles. 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.

Polymorphic hydrophilia is part of an earth-scale imaginary where loss is observed and understood through cycles of everyday hydrospheric erosion and less visible slow-grinding, hot-pressing, geospheric transformations of matter not necessarily perceived in the day-to-day. This scale of imaginary helps us understand symbiotic processes within the hydrosphere beyond the intimacy of something like a rock pool biofilm. Symbiotic plasticity is also present in what I have described as biopolymer aesthetics—with its Western/European roots in Bataille's (1985, 45) metabolic "base materialism," yet clearly predated in Indigenous bio-material relationships (Liboiron, 2019)—and within the cosmological timespan of what Emily Apter (2013, 132) has called a "planetary aesthetics."

The material affects of hydrophilic artworks provoke surprise, curiosity, and a desire to understand what the material is. For example, during the coastal 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.

These kinds of multi-layered and unstable aesthetics are often reserved to spaces like an art gallery. And 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 composure and 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, 226). Biopolymer aesthetics reconfigures and re-materialises polymers at molecular and formal levels (Martyn & O'Neill, 2019).

Over the past fifty years, many artists in Aotearoa have developed work that can be connected to these ideas of planetary and biopolymer aesthetics, including hydrophilic materials, so I'm not pitching these as exclusive to my own work.[70] In Section Three and Four I discuss a few select artists including Tessa Williams (Ngāti Rakaipaaka, Ngāti Kahungunu, Ngāti Kōtirani), who I met at Massey University in 2019, chatting while in line to use the laser cutting facilities. Tessa was already working with whenua and biobased materials, and we talked about getting her connected with Scion to develop materials specifically for her work. In the meantime, I shared

70 Including, but not limited to: Christine Hellyar, Maureen Lander, Motoko Kikkawa, Bek Coogan, Kezia Whakamoe, Tessa Williams, and Holly Walker. Real discussion of that range and the differences between approaches is beyond the scope of this PhD.

Fig. 45, 46. Raewyn Martyn, *Greywacke Love Poems* (2019), Courtenay Place Lightboxes, Te Whanganui-a-Tara. Sixteen images on eight free-standing lightboxes.

information about DIY cellulose-based emulsions and some of the gel-casting film-forming methods I had been using. Tessa has developed her own methods for working with cellulose-emulsions and materials specific to her whakapapa and the places in which she now lives and works.

Tessa writes: *exploration of biopolymers derives from her wanting to create better versions of the materials she is often questioning within her works. Inspired by the innovative and mindful ways Māori have always created, using natural resources that can be returned to te taiao, Tessa creates her own recipe for what she calls kirihou Māori.*

Tessa has come to think of her cellulose medium as a kind of "plant plasma" and uses water from specific awa, along with plant and whale oils. Her current research includes development of cellulose from harakeke.

My conversations (and recent collaborations) with Tessa have deepened my understanding of differences in material relationships, illuminating the parts of my own practice that are influenced by my own position as tangata tiriti and fifth-generation Pākehā. This includes lifelong learning (and unlearning), encountering tangata whenua ways of being in relationship with material and te taiao through time, and learning how this can alter non-Indigenous practices without falling into cultural appropriation. This is a finding that centres non-Indigenous experience and learning, but it's an important to acknowledge how informal community-based learning contributes to broader cultural shifts that are occuring in Aotearoa.

Soak stain and surrealism

She is invisible because she changes

(Caws 2001, 28).

Polymorphic contingency extends beyond surrealism via the materiality of fluid mediums used by Helen Frankenthaler, who stated the influence of surrealism (Siegel et al. 2015).[71] Antonin Artaud's idea of the 'body without organs'(Artaud 1977)[72] can be used as a tool for interpreting paintings and artists' engagement with painting as a fluid medium. For example, the 'pour' and 'soak stain' processes within Helen Frankenthaler and Lynda Benglis' practices, resist the organisation of individuated 'gesture' or stroke, or the usual compositional structures of a rectangular picture plane, some of these works are largely unmodulated and decompartmentalised compositions, where paint fluids move freely, a little like body fluids without organs.

This kind of material contingency also informed Lynda Benglis's later pours: "*I realized that the idea of directing matter logically was absurd", she has said. "Matter can and will take its own form."*(Lynda Benglis. *Blatt,* 2021*)*. I develop these ideas in discussion of DIY practices later in this section.

When I was ten or eleven years old and visiting

71 Katy Siegel describes the surrealist influences of Frankenthaler's teacher Rufino Tamayo.

72 'Body without organs' was taken up by Gilles Deleuze and Félix Guattari as a concept of disorder and boundary transgression within and between bodies, whether they be biological bodies or bodies of knowledge.

with my grandma in Ōamaru, we travelled to Dunedin to see a touring exhibition of modern art. Standing in front of a large Morris Louis soak-stain painting, she made a joke about it looking like a caravan awning. Her joke is a conflation (or diffraction) of very different materials, contexts, and recreations—she was a lifelong painter, and appreciated abstraction, but she had a healthy ambivalence for the value of one thing over another.[73] Later, as an undergraduate student, I remember reading that Morris Louis had learned this technique via Frankenthaler, but this history often goes unacknowledged. In my own work, I've thought about surrealism in both a material and figurative sense. And how the alternative realities encoded in colour palettes are activated.[74]

In 2020, I had a Zoom conversation with physicist Andrzj Herczynski who has written about physics and forces in the paintings of Jackson Pollock and Lynda Benglis, made in the 1950s and 60s (Herczynski et al. 2011, 31-36). Later, that conversation reverberated when I read a quotation from artist Liliane Lijn, also working in the 1960s, and fascinated by the liquid dynamics of polymers:

> *I was constantly delighted by the intrinsic life of the polymer drop. The viscous liquid drop trembles, forces within it tend to burst its skin emptying its form, threatening its dispersion. On the outside there is air pressure and the strength of its skin which hold it together. The skin is like the line containing a drawing. The droplet with which I worked soon dried, flattened, and became invisible, leaving me with the feeling of having lost something. An inherent part of the work had disappeared. And it was - this drying - a one way process. This led me to think of those natural crystals which millions of years ago trapped droplets of water within them.*
>
> *...I wondered how to inject water within the block without leaving any trace. This was obviously impossible and the thought was laid aside. ...The condensing droplets remained alive and trembling, forming and changing in time* (Alley 1981).

A playful approach to materials and the forces at work within painting can also be linked back to surrealism, and its pataphysical influences which I discuss in Section Six.[75] The experiments of subjectivity within surrealist practices (games, automatism, and use of psychoactive substances), challenged the boundaries of perception, subjectivity and intersubjectivity. Mary Ann Caws discusses the fluidity of surrealism: *In Surrealism nothing stays where it should or used to. Things keep pouring into each*

73 This experienced informed the works *Painting Blind* (2010), *Glover Park Daybeds* (2011), and *For Loan* (2012). At a similar age, I remember encountering the fluid languages of watercolours by Frances Hodgkins, Jane Evans, Toss Woolaston.

74 This was particularly important in the first delaminations I made in 2012, during MFA study. The grey and white layers seen in that work are generated by layering of deep camouflage green and a neutral white. Various degrees of delamination began to occur as I was selectively painting out the initial camouflage green door works. As the layers peeled and unfolded they generated labial folds. The MFA cohort had a lot of fun discussing the yonic qualities of these doorways that were also becoming curtains. At the time I was surprised that many classmates hadn't encountered the term yonic before, but this has changed since then, particularly with the resurgence of market attention to women artists from the 1970s who deliberately made a yonic aesthetic visible, while also raising questions about the essentialism of such forms.

75 Pataphysics is a speculative kind of science, developed by Alfred Jarry (Shanken 2013).

other (Caws 2001, 2). She goes on to link this to Jean Rousset's hydromorphic analysis of the baroque, where material and formal conversion is associated with psychological conversion:

> *...such images as soap bubbles for their formal change and their fragility, water as it reflects and alters in form, and water's imagined hard form, the mirror. Associated with change or material conversion is psychological conversion* (Caws 2001, 5-6).

The surrealist self is a shape-shifting self (Caws 2001), and the polymorphic material of natural and synthetic rubber latex, that moves between liquid and solid, became of intense interest to artists following in the footsteps of surrealism.[76] Even now, Eva Hesse's work held in collections, continue in flux, as Anastasia Khan describes the fluidity of their decomposition: occurring in *unpredictable cycles of liquefying and hardening over time* (Kahn 2019, 17).

Both natural and synthetic rubber latex share particular material characteristics and the capacity: *to physically respond to and negotiate with its environment as it expands and clots into spontaneous "amoeba-like" patterns* (Kahn 2019, 113). In Lynda Benglis's work there is: *an exaggerated analogy of skin's contact with its surroundings, responding to environments while claiming vast amounts of space as territory within the gallery*. And while Eva Hesse had begun by using the material as its own structure or support, in the 1970s her work had: *transitioned to coating other media, such as rope and canvas, with latex, which behaved like a sagging hide* (Kahn 2019, 2). In various ways, Benglis and Hesse's works subverted and *inverted the anthropomorphic as well as the anthropocentric* (Kahn 2019, 20).

These works were being made during the 1970s oil crisis and, in hindsight, they make visible the precarious entanglement of a colonial and imperialist economy with synthetic fossil-derived forms of latex, resins, and plastic products.[77] Back then, in the yet-to-be-named Anthropocene,[78] scholars like Sylvia Wynter (1971) were articulating the connections between the history of plantations (like rubber), coloniality, capitalism and the exploitation of racialised and Indigenous peoples, and ecosystems (McKittrick 2013, 6; Davis et al. 2019, 7-9; Jegathesan 2021, 80).

Gender fluidity

During the 1970s, latex became a favoured material because it alluded to the body without necessarily representing the body, this allowed artists to escape biological and gendered essentialism and specificity (Kahn 2019, 4). For Katy Siegel, *flipping gender and fusions of high and low, nature and culture*

76 What came to be called Eccentric Abstraction is strongly associated with surrealism and I would argue that the use of industrial materials within that period marks it as a surrealism of the Anthropocene. (Kahn 2019).

77 Davis et al. remind us that the 'human' and 'humanity' of the Anthropocene generalises and erases the racial and colonial dynamics of how this geologic era came to be (Davis et al 2019, 4).

78 An Anthropocene that was already also a Capitalocene, and part of the Plantation Futures described by Katherine Mckittrick in *Plantation Futures* (2013) via Sylvia Wynter's *Novel and History, Plot and Plantation* (1971), and later still, the Plantationocene described by Donna Haraway (2015) (Jegathesan 2021, 80).

(Siegel 2015, 13), were all part of what Susan Sontag had described as "camp" (Sontag 2009).[79] These subversions of normative bodies now diffract with Jules Gill-Peterson's (2017) observation that terms like plasticity can also risk corrective or normative approaches to sex and gender (Gill-Peterson 2017). This has helped me understand the complexity and fluidity of gender within biopolymer aesthetics.[80]

The relationships between fluidity and feminism within the mid-late 20th century have been discussed in Mira Schor's book *Wet* (Schor 1997), and in Astrida Neimanis's book, *Bodies of Water* (Neimanis 2017). Neimanis situates hydrofeminism as a posthuman phenomenology, challenging Merleau Ponty's anthropocentric writings on phenomenology, and specifically the phenomenology of painting (Merleau-Ponty, Maurice, and Michael B. Smith 1993, 8, Neimanis 2017).

Merleau-Ponty's ideas of 'proximal distance' can be applied to the spatial encounters between a viewer and a painting, and between the inner and outer horizon. Neimanis extends this to consider the proximity of time and the extension of temporal experience beyond individual human moments of physical presence, and beyond individual lifespans. This acknowledges the need for intergenerational

Fig. 47. Raewyn Martyn, *Greywacke Love Poems* (2019), Courtenay Place Lightboxes, Te Whanganui-a-Tara. Sixteen images on eight free-standing lightboxes.

79 Sontag, Susan. *Against Interpretation and Other Essays.* London: Penguin, 2009. Print.

80 Most of the artists I have referred to in this section identify or identified as White cisgender women who approach their genders with a certain amount of fluidity (and sometimes ambivalence). They were articulating their genders during a time when language tended to hold sex and gender within in a binary, and their experience of gender fluidity would have been very different from artists within gender minorities. As someone who experienced 'non-normative' sex and gender during puberty and early adulthood, I am sensitive to the different stigmas and freedoms involved. Siegel writes that Frankenthaler and Benglis's generations of artists *have often been cast as feminine or feminised in relation to the first generation of Abstract Expressionist artists, with a range of connotations, both positive and negatives, attaching to that term: lyrical, emotionally expressive, and also of lesser historical impact* (Siegel 2015). In a Zoom conversation with art historian Susan Richmond, we discussed whether diffraction was a useful way to approach gender and sexuality in Benglis's work, in the sense that diffraction attends to binaries and allows for non-binary approaches to knowledge and perhaps embodies knowledges along with material and immaterial processes. Richmond mentioned that queer and non-binary are applicable terms in relation to Benglis's work but were not used in the book because of historical specificity – these terms were not in use at the time of Benglis's own articulation of gender and sexuality in her work.

perspectives within non-Indigenous or Western feminism, and resists linear constructions of time and space, while ideas of a hydrocommons also risk the sovereignty of specific local communities, often Indigenous (Bakker 2003; Neimanis 2013; Diprose, Dombroski, Healy, & Waitoa 2017, 173-174). In this way, hydrofeminism provokes us to rethink not only the boundaries of our own organisms and empathies, but also the temporality of liveness, in the more-than-human sense of posthumanism (Ferrando 2016). This reorientation of the personal allows for a dissolution of boundaries between subjective and intersubjective experience.[81]

> *what it means to be a body of water - to be always only precariously contained in a skin sac, and instead profoundly distributed, inherited, gestational, differentiated.*
>
> *Concepts like transcorporeality, naturecultures, amphimixis, and co-worlding provide a lexicon for this uncanny mode of living both ... as part of an always emergent planetary hydrocommons* (Neimanis 2017, 29).

Here in Aotearoa, xenofeminist writings enable further diffraction and synthesis, of interconnected creative, technological, and social perspectives, helping artists like myself to generate a systems view of feminist materialism. I see this understanding at play within my work at Scion, with myself and Beatrix using embodied knowledge to work with materials and machines. As noted in earlier sections, this material understanding accumulates over time and is shared in conversation as we work, enabling a greater range of form. An understanding of bodily experiences then informs the way I embed artworks within sites and architecture, and how I understand the polymorphic more-than-human figurations and grounds that emerge.

Xenofeminism and hydrofeminism have helped me to recalibrate essentialised understanding of the corporeal and incorporeal found within Elizabeth Grosz's work (Grosz 1994), resisting transphobia (Upadhyay 2021). And the already mediated and more-than-human experiences of Donna Haraway's 'situated bodies' and cyborgs (Haraway 2006). Neimanis notes the 'trans-corporality' described by Stacey Alaimo has continued to break down binaries between scientific and humanistic understanding of bodies (Neimanis 2017, 56; Alaimo 2008; 2010; 2016).

In the *Greywacke love poems* lightboxes (2019), and the *Greywacke love poems: returns* (2019-2021) coastal installation and Adam Art Gallery wall work, geomorphic and hydromorphic languages inhabit the same imaginary and pictorial spaces as yonic flourishes that attempt to avoid some of that essentialism. Beyond these flourishes, this work isn't pornographic in a representational sense, but in its material transgressions. I have been thinking about the art historical genealogy of this through Hilda Hilst's work: surrealism, base materialism, and practices within the 1960s and 70s. This includes shared languages of pareidolia, anthropomorphism,

81 Neimanis goes on to parse out these paradigm shifts of boundaries, and of how experiences are located (Neimanis 2017, 60-61).

Fig. 48, 49. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), at the old Owhiro Bay Quarry.

and of animacy, that also feature in the embodied geochoreography and hydrochoreography described by Caycedo and Neimanis. Hilst's writing is well known for its pornographic qualities and it also generates moments of intimacy and eroticism beyond human scales, with understanding of planetary aesthetics (Apter 2013, 135). I see some of this at work in the three phases of *Greywacke love poems: returns* (2019–2021).

Hilst's writing of the late 1960s could be described as yonic and immersive landscapes (Hilst 2018, 19), this was around the time that Robert Smithson was writing about entropic landscapes (Graziani & Smithson 2004). Hilst's landscapes lean toward the neg-entropy of eroticism, and both of these artists were influenced by Bataille's ideas of erotic base materialism. Hilst's yonic landscapes are a foil for Smithson's entropic ones, drawing attention to the yonic and encircling forms within Smithson's entropy.

Through their work, the binary of yonic vs phallic concepts and forms can be reconsidered as fluid—what is often described as a dominant phallocentric imaginary, also has fluidity. Hilst's landscapes contain yonic and phallic figures as well as non-binary ones, drawing attention to earlier instances of this within the surrealism that influenced both Hilst and Smithson. Recent revisions of surrealist art histories attend to gender fluidity, for example Maylynn Sternstein writes of Czech surrealists in the 1930s:

> *fervid in their desire to presence the void and put pressure on the viewer to look into …the anxiety of rhizomatic growth, and the yonic gapings or phallic intrusions of the ordinarily benign. … Vincenc Makovský, whose Surrealist legacy today is all but eclipsed by his traditional monumental sculpture, created rounded outcrops with hints, too, of the phallic and yonic* (Strom 2022, 220).

Hilst wrote of her interest in the extremes of human experience and her work has been described as holding itself in culmination, in extended climax, where the end or the exhaustion of that energy is visible/preeminent (Barbosa 2017, 30). This is a seizure of a system at its peak performance, where readers find themselves immersed, encircled, within a narrative system where discomfort is *a factor central to these works: what is at stake is certainly not appeasement of minds, intelligibility, a strengthening understanding, a disciplinary order* (Barbosa 2017, 30). Hilst's systems of affect, in the form of novela, poetry, drawings and waterolours, resist entropy because the bodies that feature in her prose are not closed systems, they are bodies without organs (Artaud 1977) and bodies without mortal or corporeal limits. Whether used in the literal or the figurative, they are shape shifting organisms and geological formations that share energy and exist beyond human scales of time. Hilst recognises herself as part of the ecological system: *Landscape, you feed me of green, of sun, of love. (HILST, 1980, 254)* (Leitão & Ferraz 2014, 105). Andréa Jamilly Rodrigues Leitão and Antônio Máximo Ferraz

Fig. 50, 51. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021. Image credit: photographs courtesy of Adam Art Gallery and Ted Black.
.

describe: *the beloved corresponds, in another dimension, to that of water for the maintenance of the earth, leaving its wet trail, opening furrows and fertilizing it in the "fraternal" movement... "May your body of water be more fraternal/ Extend over mine.* (Leitão & Ferraz 2014, 104).

Patricia Clough has written about the shift from governance of representation into the control of affect and attention, citing Brian Massumi: *affect becomes 'as infrastructural as a factory' (Massumi, 1998: 45).* (Clough 2003). Clough notes that this shift from control of representation to control of affect alters our understanding of materialism in the economic sense and also our material understanding of images:

> *The image is thought to be culturally dynamic, but is not itself a dynamic matter and it is only as culture that the image is able to compensate for what is lacking in matter. Not only is the image itself refused the ontological status of dynamic matter. But perhaps more importantly, focusing on the shape of the body, as queering bodily matter does, the dynamism of the organism is ignored such that the organism remains static matter, the stuff of the body that culture engenders with meaning. And yet, it is precisely in rethinking the image as matter (a matter of information), and matter as dynamic or 'informational' (Taylor, 2001) that allows for blurring the distinction between organic and non-organic life*
>
> (Clough 2003).

Hilst's treatment of images within her prose also blurs the distinction between organic and non-organic, in the lack of boundaries described by Leitão & Ferraz (2014) above, and also how this changes our sense of how matter and energy circulate within systems (living and economic), including controlled and uncontrolled flows of affect. Clough describes how this impacts our experience as human beings: *the ontology of the human body shifts: the organism-centricism of the human body is deconstructed and the body, no longer human only, becomes instead a composition of intermeshed body parts both human and non-human, an assemblage of organic and non-organic life that goes beyond the organism as an entropic, closed system conceived under a thermodynamic understanding of the production and reproduction of energy (*Clough 2003).

For Hilst, working from her lived experience and interpreting Bataille, both sex and death allowed the individual to exist beyond itself in life and after life—with the body consumed by ongoing ecological processes (Bataille 1986 138-140; Fumaneri 2011, 505). The transgression of erotic norms allowed for the human individual to reach beyond its own mortality, to generate pornographic images of its body as bodies, beyond an individual body. *What dissolves, in the physical erotic union, is the normal constitution of social life – "the discontinuous order of the defined individualities that we are" (BATAILLE, 2004, p. 31)* (Fumaneri 2011, 505). In thinking through Hilst's yonic landscapes and 'land art' of the erotic imaginary where bodies dissolve in sex and death, I see that she achieves something more: the more-than-human social life of bodies resisting entropy

within both biologic and geologic systems.

Rehydrations

A cellulose painting can be fully rehydrated and bottled until ready for redistribution, at which point what was a singular painting might become more than one. The painting can multiply through solution, being poured or applied again to more than one object or surface area. Its scale and dimension are variable—its parts or reproductions may be distributed in thicker blobs yet they are smaller in area, or thinner and more expansive. As it dries the next time, its pigment particles might shrink closer together, intensifying colour and tone. Intriguingly, there are almost always recognisable figures or colour fields within the reconstituted composition. Is it the same painting?

When I undertake these processes of rehydration and reuse, I've been talking about the paintings as reproductive surfaces, but am I reproducing images/paintings or material and is one necessarily consumed or exhausted by the other—is there ever more than there was to begin with, in the sense of biological reproduction? And is image redistribution or reconstitution a more accurate way of describing this form of image reproduction? These are still open questions for me and will inform my future work with hydrophilic painting.

The changes that result from redistribution are alternative conditions of archival measure, where physical changes in the material are desirable. This is the case whether the rehydration happens through coincidental atmospheric conditions, or if the rehydration happens through planned reconstitution. Because of this, these art objects can be said to veer away from permanency.

Ongoing re-materialisation is part of the conceptual and formal life cycle of the work. The artwork becomes more like a service; an activity

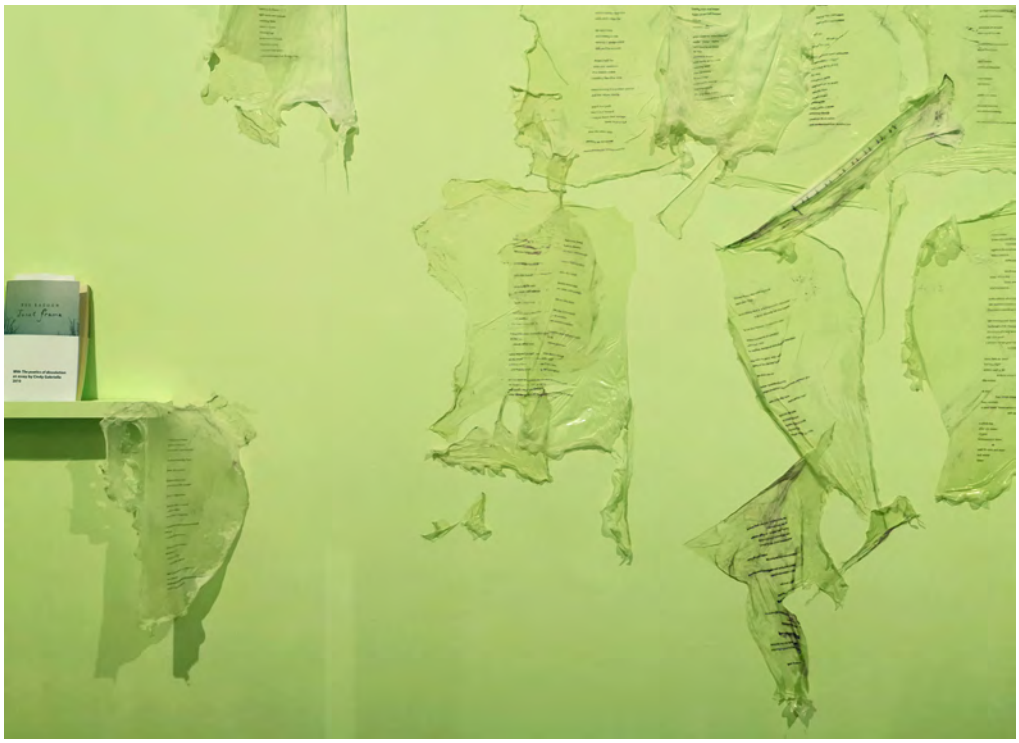


Fig. 52. Raewyn Martyn, *Climate change heartbreak poems* (2007–2013).

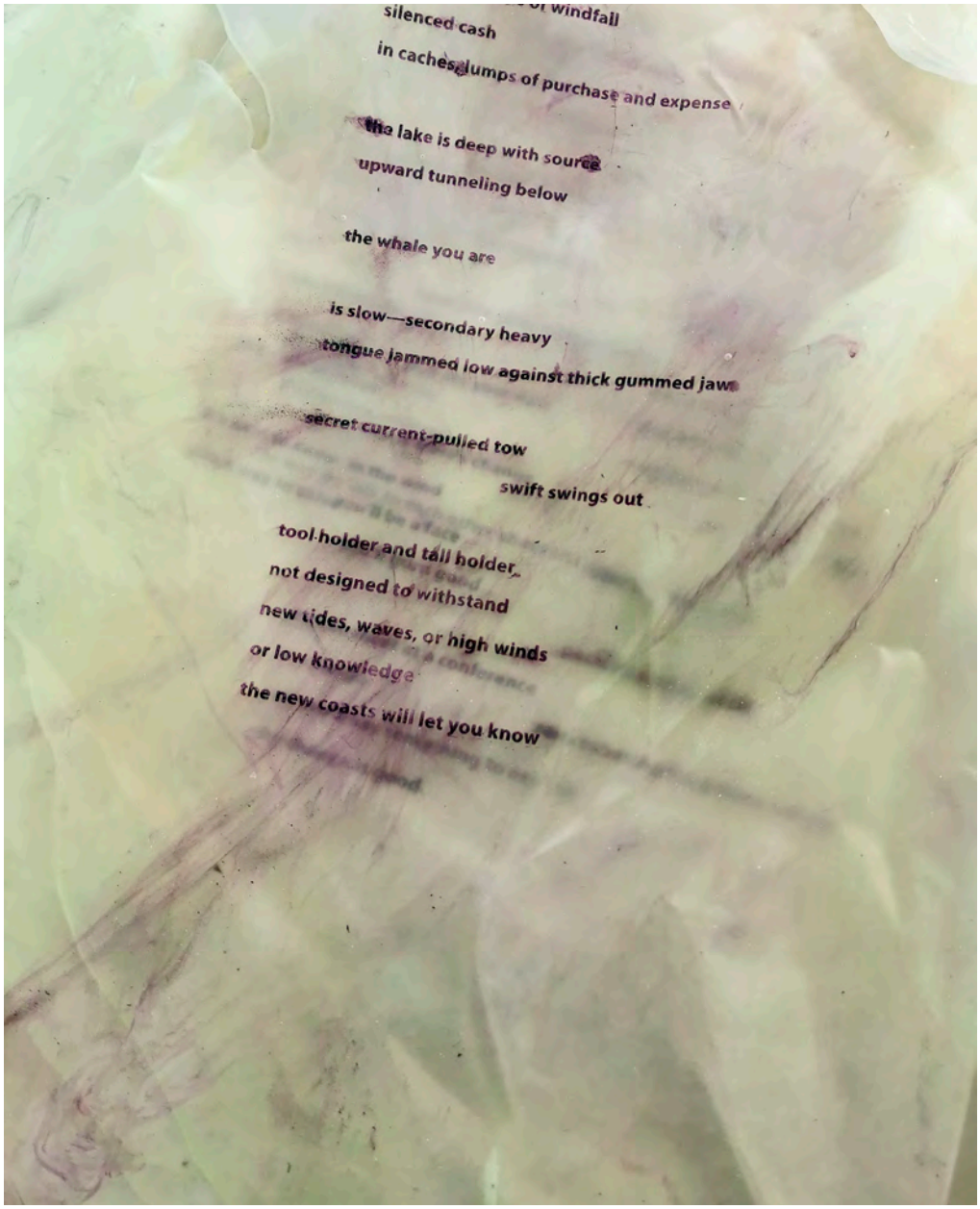


Fig. 53, 54. Raewyn Martyn, *Climate change heartbreak poems* (2007–2013).

sustained over time, a verb: a servicing—a painting. I haven't sold any of these works as discrete objects, and the prospect of doing so raises questions about how they might be valued—market value / cultural value / environmental impact. Beyond hydrophilia, further discussion of circular aesthetics can help us to understand how material values like degradability, flexibility, solubility might become marketable formal and conceptual values, that also make the artworks last longer, or transverse time and space in unconventional ways. Some of the standard measures become irrelevant. These systems of arriving at and maintaining 'value' within an art market also relate to broader societal patterns of extraction, production and consumption and change alongside those practices.

Within more linear archival frameworks, painting objects are evaluated through their ease of conservation; their response to levels of acidity, or moisture, or oil, organic matter, size, delicacy, weight, or other physical vulnerabilities. With hydrophilic works, the value of fluidity is located in the polymer molecules that remain reconfigurable, allowing for changes over time. Works like this generate a need for 'circular archives', where ephemerality and the capacity to shape-shift might be valued.

As part of more circular archives, social media feeds allow for a greater range of transformations and temporal registers (time signatures) within an artwork's existence. This also recognises social circulation and status—a resocialisation of the activity of a painting, through social media. In Section Two, I gave examples of WhatsApp conversations and have noted that many artists are using Instagram as a site for distribution or circulation of both studio and exhibition work (including sales) (Patricio, n.d.).[82]

Instagram allows studio processes to be experienced as discrete 'ideas' within the Instagram feed—extending the four-dimensional qualities of the work. *Greywacke love poems: returns* (2019-2021), has used Facebook and Instagram to share discrete moments and forms within the polymorphic materials, as they play out over time, renewing and circulating curiosity. This use of social media came about during the project *Camping Paintings* (2015 and ongoing), where the paintings accumulated over time on custom-made tent flys, and at multiple sites. Instagram was an ideal platform for the four-dimensional and transitional qualities of this work.

DIY and Alchemy

Art histories are also material histories that involve ongoing inventions and DIY customisation of materials and mediums, outlined within texts by art historians and conservators (Learner et al. 2007; Jablonski et al 2004; Homer 2019; de Duve 1986). The history of pigments can also be traced around DIY, Indigenous, colonial, industrial, and scientific

82 OFluxo Platform came about on Instagram during the period of this PhD research and it caught my attention because it features work from an online and offline network of artists who share interests in what I would describe as a contemporary base materialism, with strong biomorphic and animistic aesthetics. It existed before the pandemic, but its online presence has been important during the pandemic.

Figs. 55–60. Raewyn Martyn, a selection of Instagram images posted while making Camping Paintings (2015 and ongoing). These particular images are from 2016, and featured on the old @fallingwalker account that disappeared from Instagram in March 2020.

histories (Ball 2001; Meier 2013; Wolfson 2016).[83] In my thinking about hydrophilic mediums, and in my exegesis more broadly, I've reviewed a select history of DIY paint and mediums, and considered their status between artistic alchemy and industry.

In a 1993 Auckland Art Gallery catalogue conversation between Priscilla Pitts and Lynda Benglis, they discuss alchemy and Lynda's interest in the physical behaviour of materials:

> *I wanted to make some sort of recipe that seemed to be rooted in alchemy--the beginnings of painting. ...I was exploring how we perceive nature; how we perceive gravity; how we view... I experimented with light and phosphorescence; and that worked particularly well in the polyurethane foam works* (Pitts 1993).

Artists like Helen Frankenthaler transitioned to acrylic and water-based paints for archival reasons, and then customised their hydromorphic qualities of fluidity and increased plasticity (Jablonski et al 2004). Very early tubed artists' watercolour paints (and oils), are also a starting point for thinking about aspects of four-dimensional painting, and how tubes or pre-loaded palettes both enabled painting and pleinarism to happen on the move (de Duve 1986; Wolfson 2016). In Section Four, I will discuss four-dimensional painting in more depth.

While working on *Paint over, use again* (2021), I was reading about the earliest uses of the portable watercolour palettes that my grandmother later used:

> *although tin or copper tubes were already in use in England at the end of the 18th century for the preservation of watercolor, it was only around 1830-1840 that tubes of oil paints began to be available on the market. ...pleinairism was one of the first episodes in the long struggle between craftsmanship and industrialization that underlies the history of "Modernist Painting." It was also one of the first instances of an avantgarde strategy, devised by artists who were aware that they could no longer compete, technically or economically, with industry; they sought to give their craft a reprieve by "internalizing" some of the features and processes of the technology threatening it, and by "mechanizing" their own body at work.*
>
> (de Duve 1986)

In the 1930s, during my grandmother's youth, newer fluorescent pigments, like 'Day-Glo', were used by the U.S military for visibility (Bowman 1973). By the 1940s, these fluorescent pigments can be seen in use by artists like Marie Menkin, Carla Accardi, Frank Stella (Campanella, et al. 2020). Since the post-war period, artists have contributed to many developments of polymer paints and mediums.[84]

Frank Bowling, a Guyana-born British artist, is well-known for use of fluorescent acrylic paints, which he continued to use even after advice that they may fade and change over time. He also experimented

83 There were earlier forms of industry-like production throughout human history, but I have focused on the 18th and 19th century industrialisation that is closest to my own family's creative history.

84 And as discussed earlier in this section, during the 1960s and 1970s, artists customised both 'natural' and synthetic materials like latex.

Fig. 61, 62. Evelyn Adams' (grandmother) portable watercolour set and photographs of Raewyn's paint making processes.

with metallic pigments and developed material reactions between pigments and chemicals like ammonia, that transforms a gold powder to a brilliant turquoise, for example (Homer 2019). In the 1970s, Frank Bowling's customisation of acrylic polymer paints continued, he made his own painting tools, like a wooden structure that enabled him to *tip, tilt and twist the canvas while the paint was poured directly onto it from heights of up to two metres.* (Homer 2019)[85]

Richard Bowman wrote one of the few essays specifically about the early fluorescent paints he used, similar to those mentioned above. His interest includes the five-dimensional possibilities of the light and radiation they emit: *fluorescent enamel paint emitted "an actual, measurable energy from the canvas." (Radiant Abstractions,* 2019)[86]

These DIY attitudes are contextualised in exhibitions and books like *High Times, Hard Times* (Siegel & Bey 2006), featuring Lynda Benglis. And in Aotearoa, this context is also provided in writings about Benglis's contemporary Christine Hellyar, who used latex as a paint-like coating (Ensor & Hellyar, 2021). And in recent decades, more artists are working with DIY bio-based and biological materials (living materials), I discuss this in Section Five (Mitchell 2015).

DIY design materials (*Materials—Future Materials Bank* 2020; Ribul 2014; Özdamar 2021) are also relevant to artists,[87] and one approach to understanding their aesthetics is the 'five kingdom' taxonomy (Rognoli et al, 2018, Ayala-Garcia et al. 2017).[88] Here in Aotearoa, such a taxonomy feels neo-colonial, as it may interfere with whakapapa interrelationships within Te Ao Māori. And it becomes a provocation for both tangata whenua and tangata tiriti artists working here to share alternative frameworks and language for understanding their own material relationships. I think this understanding can be seen in the work of artists like Christine Hellyar and Maureen Lander, collectives like Mata Aho and Kauae Raro, and the individual practices of Tiffany Singh, Jordan Davey-Emms, Kezia Whakamoe, Hana Pera Aoake, Holly Walker, and Tessa Williams.

In my own work, I have made DIY paint materials with four qualities like shape memory,

85 Like many artists at the time, Bowling was using soaps, with their surfactants, to release surface tension in the canvas fibres, enabling both better penetration of the pigments and more fluid movement of the paint.

86 Conservator Stefanie De Winter has said that he was searching for *the possibilities of capturing nature's radiation on canvas... Bowman considered fluorescent paints as natural media. These hues carried the potential to express his concept of the great, unseen, but known forces of the universe.* ("Radiant Abstractions").

87 There is often crossover between roles of artist and designer.

88 *Comparable to Linnaean taxonomy, the DIY-Materials kingdoms principally refer to the sources or ingredients that allow the development of a particular material. The five kingdoms are named as follows: Kingdom Vegetabile when the primary source for a DIY-Material derives from plants and fungi. Kingdom Animale refers to sources derived from animals and bacteria. Kingdom Lapideum contains all DIY-Materials, which come from minerals: stones, sand, ceramics, clay, etc. Kingdom Recuperavit covers all sources society consider as waste but with the chance to transform them into a valuable resource. Kingdom Mutantis includes the DIY-Materials created from different technological mixes and hybridization of industrial, interactive or smart sources.* (Ayala-Garcia et al 2017, 377).

biodegradation, and hydrophilia.[89] In work between 2008 and 2010, preceding these investigations of biopolymers, I was researching old paint recipes for using calcite pigments from oyster shells, with an interest in biogenesis. This developed out of work using dirt from a stairwell as a pigment, while thinking about the difference between a stain and a painting—the different origins and values of a mark.[90]

Beyond specific projects like *Paint over, use again* (2021), I have continued DIY studio methods to develop things like bio-based PVA and cellulose gesso, using calcite as the white pigment. Historically, gesso already used the biopolymer rabbit skin glue as a binder and the calcite pigment created a ph neutralising ground, protecting the canvas or support from acidic degradation.

My literature review has determined that it is feasible to create bacterial cellulose through home-made scoby and small-scale processes of plant-based cellulose, or related biopolymers from seaweeds harvested in collaboration with iwi. These modes don't yet generate shifts at the scale necessary within current systems of production and consumption—the feedstocks required for industrial scoby production don't necessarily align with the waste streams that currently exist. Research into the commercial viability of bacterial cellulose and bacterial polyester,[91] and the range of possible feedstocks (carbon sources) and growth mediums (like tea), indicate that the viticulture and paper production industries are the most viable options in Aotearoa NZ (Rathinamoorthy, R., and T. Kiruba 2020).

In both Europe and the United States, my grandmother's post-war generation of artists (and older or younger), DIY use of materials developed within the war industry, and drawn from its waste streams, agitated binaries of both the organic and industrial. Although not solely paint-based, explicity hydrofeminist or hydromorphic, a biomorphic approach to materials and images were enabled by DIY approaches.

Moving between two-dimensional and three-dimensional, Lee Bontecou's drawings and sculptures hold space for fluid interpretations, between human and beyond-human. Her work brings together affects and aesthetic registers drawn from the biomorphism of interwar surrealism—that had sought to interrupt the rationalism and objectification of war. Bontecou involved the material languages of war surplus (including gunpowder pigment); mass-produced plastics; the cold-war arms race, and the dystopian ecology and landscapes of the science

89 Understanding of shape memory plastics emerged in the 1960s, first used to shrink wrap electrical wiring. Biodegradation was initially undesirable (and remains so for longer-life purposes, and recycling), it has become desirable for some single-use packaging and agricultural or horticultural applications where plastics can be made of biocompatible materials often originating from the same site or industry (kiwifruit skins or grape prunings, for example) and left to for in-situ to degrade. In paint products both desires exist – for paint wastes to be biodegradable and for paint coatings to be robust and archival. Paint has the capacity to exist in both timescales, fluid and fixed (Freinkel 2011, 200-232; Gabrys 2013; Lefteri 2008).

90 *Landing* at Enjoy Public Art Gallery (2008), included use of stairwell dirt as a pigment, and an unsuccessful proposal for Blue Oyster Art Project Space, proposed using layers of calcite paint derived from oysters (written around 2009/2010).

91 Home-grown and DIY production of bacterial thermoplastics could be undertaken with a particular slime mold that metabolises waste to produce those polymers (Parlane 2012, 23; Rehm 2018, 42).

fiction that responded to this.[92] In these works, technology and industry exist within the organisation and organisms of ecology and ecosystems—the dragonfly is a prefiguration of a helicopter or Sputnik, for example (Hadler 2004; 2007). Karen Rosenberg writes: *the works from the 1970s — with their mutant, mechanical-looking fish and flowers — evince a budding environmentalism* (Rosenberg 2014).[93] I think this environmentalism is a continuation of Bontencou's feminist spatialism and futurism— biomorphic, time-based and energetic (five-dimensional), while resisting utopian aesthetics (Burdett 2003).[94]

In the 1960s Bontecou made her own DIY vacuum forming machine, with industrial plastic fish and flowers formed over moulds carved from polystyrene (Hadler 2007; Buhmann 2007) A critic exclaimed of Bontecou's work at that time: *"Is it a pterodactyl? A Flash Gordon spaceship? An outsize artichoke or a monstrous whorl of giant flower corollas?"* (Hadler 2007).[95] The instability of signification is important to how the work generates an aesthetic response that resists further objectification of trauma, it holds it within the subjective space of ambiguity. This strategy was used within surrealism to un-wire and/or re-wire perception and open up consciousness to the possibility for alternative realities. I can imagine that the DIY vacuum former enabled a great range of studio experimentation within these multi-stable images (Jakesch et al. 2013).

In Italy, Carla Accardi was combining several newly available materials, including cellulose acetate (Sicofoil brand) and fluorescent pigments in works like *Rosso verde nero* (Accardi 1968) where two transparent sheets on a wooden frame and painted with fluorescent colours (Campanella, et al. 2020). Not immediately hydromorphic, the fluidity of Accardi's work is in the transparent Sicofoil substrate and subsequent flux of figure and ground.

Carla Accardi was part of the anti-fascist Forma 1 group, related to the more provisional arte povera, where DIY approaches were considered as forms of resistance within art-making. This is pertinent because there is often a left-leaning populist counter-hegemony at work within DIY practices,

92 These are shared interests with Judy Darragh, born into 1960s Aotearoa New Zealand, whose *Stainless* (2011) references the next generation's futurist aesthetics of the DeLorean car, produced during the Troubles in Ireland, it was a commercial failure but was made famous by the *Back to the Future* movie franchise of the 1980s. Darragh encountered the vehicle at a car museum in California, feeding into her thinking around the past/present/future failures and redundancies that materialise in popular culture, art and design, and technoscience, seen in her poster series *Back to the Future* (2010-2011), and the reflective plastic wall installation *Bloom* (2010-2011), which continue on from the earlier *Laser Bloom* (1999). (See *Plastic Feelings* 2022. in the appendix for more information).

93 Bontecou began to practice art as Cold War tensions escalated and awareness of ecological crises were brought to attention through the work of people like Rachel Carson (Rosenberg 2014).

94 She does this without the fascism of Accardi's fellow Italian, Lucio Fontana. Accardi's fellow Italian, Lucio Fontana developed the plasticity of commercially available paints and theories of space and time in painting. He was seduced by Italian futurism and fascism, and his involvement and complicity with fascism mean that discussion of his work needs to consider that violence, and his interest in the politics that drove and sustained it (Small 2019; Burdett 2003). Fontana's male privilege has sustained heightened art-historical and market acknowledgement of the singularity of his spatial theories, with exclusion of those working with related ideas during the same period (Small 2019). For these reasons, I have focused my thinking on Accardi, alongside Lee Bontecou's four and five-dimensional painting.

95 Mona Hadler writes: *Plastics were identified with high art and kitsch objects, and Bontecou's plastic fish and flowers tapped into the complex signification of its material. The weirdness of the creatures, with sinister fish eating smaller ones, suggests a critique of plastic, yet their frank representational quality weighs dangerously and wonderfully close to their kitschy siblings. She exploited the modernist, abstract aesthetic possibilities of the material, but also its possibilities for verism* (Hadler 2007).

commodified and circulated in different ways, this offers glimmers of potential for structural change as collectives like Kauae Raro prioritise information sharing while also generating income through both independent and gallerist sales. There is need for careful evaluation of these changes as the art market continues to assimilate practices of resistance and institutional critique.

Honing in on changes within material practices, and the DIY knowledge-sharing that enables it, I have looked to recent academic texts that measure the impact of non-academic and/or para-academic knowledge-sharing practices. Below, I list some key resources, while texts surveying critical and DIY practices include Bogers and Chiappini (2019); and Pruvlovic (2020).

Open-source DIY Resources:

Material Activism https://www.materialactivism.com/about
The Bioplastic Cook https://issuu.com/nat_arc/docs/bioplastic_cook_book_3
The Secrets of Bioplastic https://issuu.com/nat_arc/docs/the_secrets_of_bioplastic_
Materiom https://materiom.org/
Loesbogers https://www.loesbogers.com/

Hydrofeminism and Geochoreography

Early 21st century 'spectral' aesthetics, including those found in the surrealism and associated avant gardes that influenced Frankenthaler's soak-stain imaginary, invoke lost futures of possible yet impossible futures (Derrida 2006, 10; Fisher 2016; Diaz 2021).[96] A century later, in contemporary Aotearoa, a diffractive reading of Astrida Neimanis' theorisation of hydrofeminism (Neimanis 2017; Ahmed 2005; 2019) includes reading through the localised and outward looking futures of Lopesi's Te-Moananui-a-Kiwa. An anti-colonial Indigenous approach to possible futures is found in Lana Lopesi's discussion of larger Aotearoa and Moana imaginaries (Lopesi 2021; Lopesi 2018). Neimani's approach to hydrofeminism is necessarily localised and intersectional—acknowledging the involvement of race, class, and gender diversity (Crenshaw 1990). And as noted earlier in this section, their are risks in universalising feminisms, including erasure of earlier histories. Sara Ahmed recounts the construction of stepwells in western India between the seventh and mid-nineteenth centuries, as examples of earlier hydrofeminist actions that are complicated by ongoing inequalities of access to water, the very liquid that is used as metaphor and material analogy in these theories.

Often well-diggers and water diviners came from socio-economic groups (e.g., Muslims)

96 Mark Fisher applies ideas of spectral and hauntological aesthetics to music and artworks within late capitalism and climate crisis, but the ideas are transferable to the lost futures of the early 20th century avant garde who faced upheavals of war, imperial colonisation, and economic crisis. Derrida linked aspects of hauntology to that period, focusing on the spectral 'mediumistic' and spiritualist trends that were of interest to many avant garde artists, along with Marx and Engels (Derrida 2006).

> *that were denied access to the community water assets that they had helped build. In many cases, the wives of wealthy merchants and royalty commissioned the construction of stepwells as acts of hydro-philanthropy or religious merit, … not only are these stepwells largely neglected but also early examples of hydro-feminism (Mehta-Bhatt, 2014; Zwarteveen, Ahmed, & Gautam, 2012).* (Ahmed 2019, 1)

Hydrofeminism (Neimanis 2017; Ahmed 2019) contributes to breaking down material, spatial and temporal boundaries of understanding within White and non-Indigenous feminism. Neimanis notes that phenomenology initially failed to include some bodies within this realm of experience and its descriptions, and that differences of race, gender, disability, place, and locality remain important (Neimanis 2017, 62).

In recent art practice, fluid four-dimensional processes expand our temporal and spatial understanding of human relationships with water and the coextensive possibilities of our own human bodies of water as (already) more-than-human bodies of water. Writers and artists working and thinking within Te Moananui-a-Kiwa and the Global South continue to make links between interconnected sovereignties within the context of sea level rise and flooding events, and Indigenous-led futures (Ahmed 2019; Hamilton Faris 2021; Lopesi 2018; Barnes et al. 2018).

Carolina Caycedo uses the term "geochoreography" to describe her community-based decolonial performance and film practices made in resistance to corporate hydro dam projects in Columbia (Hamilton Faris 2021, 13). Geochoreography and hydrochoreography are both strategies involved with hydro-feminism and Hamilton Faris draws these links when describing the work of Angela Tiatia and the earlier works of the Pacific Sisters and Yuki Kihara (Hamilton Faris 2021,14).

These terms geochoreography and hydrochoreography are useful for discussing the work of Pākehā artists Holly Walker, and Bek Coogan, who both use performance art to understand their settler-colonial identities within the coastlines and river banks of Aotearoa's lower north island. Walker's MFA work, *I visit Pariwhero* (2021) and *I return to Pariwhero* (2021) both acknowledge Ngati Toa whenua along the southern coastline of Te Whanganui-a-Tara, and Bek Coogan's performance beside the Manawatū River, features in *A Party Political Broadcast* (2017), with the collaborative Fantasing.

Coogan's ongoing geochoreography with the persona 'Mud Woman' has occurred in suburban and urban spaces. Both Coogan and Walker look to the possibility of Pākehā artists making work that can support the decolonising work of Indigenous artists and activists here in Aotearoa and also contribute to the work that Pākehā and tauiwi communities need to do to understand their own identities and roles within the anti-colonial regeneration of systems in which they participate—ecological, social, and creative. I see *Greywacke love poems: returns* (2019) as part of

this contemporary movement toward systemic and personal understanding.

Pākehā artists coming of age in the late 90s and first decades of the 2000s, experienced a confluence of anti-colonial consciousness and climate crisis consciousness. Events like the Foreshore and Seabed Act and subsequent hikoi of 2004, and earlier land occupations of the 1990s, informed their consciousness and subjectivities of being tangata Tiriti in Aotearoa. While the momentum of climate reporting and visualisations of future scenarios entered mainstream media and everyday conversations, along with increasing and immediate lived experiences of human-induced extreme weather. These are intergenerational experiences, with roots in colonial capitalism, but perhaps millennial experience differs from earlier generations of Pākehā artists, who may have first experienced these issues in discrete instances or particular moments. Or perhaps in confluence with the ecological threats of nuclear weapons. This context is particularly important for artists whose work responds to site and material relationships within sites.[97]

Likewise and differently, for tauiwi arriving in Aotearoa during this period, artists like Jae Hoon Lee (*Stranger in a Strange Land*, 2015), Motoko Kikkawa (*Engine in Nature*, 2021); and more recently Birgit Bachler (*Papawai Transmissions*, 2016–2020), have contended with their own journeys and experiences of ecological or planetary aesthetics and anti-colonial movements within Aotearoa New Zealand.

I think of the similarities and differences between Aotearoa-based Christine Hellyar and her North American counterpart Lynda Benglis, who have met several times.[98] Hellyar's interest in ecology is long-standing, from the 1960s and 1970s, as is her interest in Pākehā relationships to land in Aotearoa, and the materiality of colonisation (within both the landscape and the social world). Christine uses the word geography[99] to talk about her early understanding of systems thinking and landscape, I asked if she thinks of this as ecological thinking.[100] She explained that it was through activities like tramping and the everyday experience of growing up within the geology and geography of Taranaki.

I asked Hellyar how her awareness of land rights and ecological material relations developed over time, and at what point a specific consciousness of human-

97 A range of different class and socio-economic positions have been further complicated by economic and housing crises. At the same time there are increasingly more immediate lived experiences of human-induced climate change, and consciousness of this as a system problem has come together within the systemic understanding of ongoing social justice movements of the previous centuries.

98 The two artists' work developed in parallel, and they met in Korea as visiting artists during the 1988 Olympics, and then again during Lynda's time as a visiting artist in Auckland and an exhibition at Auckland Art Gallery curated by Andrew Bogle. I interviewed Christine in 2021 and was in email contact with Lynda Benglis's studio around the same time.

99 She wasn't allowed to study geography at school – the academic track she was on didn't encourage applied subjects like geography and art. But at university she was able to do some Bachelor of Arts papers beyond her art school studies, and then teaching at Epsom Girls Grammar secondary school in Auckland. (conversation between Martyn and Hellyar, 2021).

100 An ecological thinking informed by personal politics of lived experience beyond the city, including an awareness of ecological issues that were more immediate in regional areas like Taranaki where her father owned a copy of Rachel Carson's Silent Spring, and the impacts of colonial agricultural and industrial practices were evident in the changed landscapes. She learned about the intersection of geology, ecology, and politics from colleagues who were teaching geography and also politically active within the 1970s and early 1980s.

induced climate change began to inflect her work.[101] It informed her material choices and subject matter while at art school during the late 1960s, and again as she began experimenting with latex. Hellyar sourced latex from the Skellerup gumboot factory in Christchurch. Skellerup was a pragmatic choice rather than a conceptual one, but it adds context of agricultural and colonial capitalism within our ecological and material culture. And I can't imagine discussion of hydrofeminism here in Aotearoa without the ubiquitous waterproof and water-proud 'gummies'.

For Hellyar, fluidity extends to circular use of materials between projects, where parts are recycled into new projects.[102] She sees that artwork like hers has come to exist in a space where media now raises awareness and public discussion of how life is dying, and it is important that there is also art that celebrates life—creating space for people to imagine alternative futures. This is the kind of biophilia encouraged by systems thinkers like Gregory Bateson, whose work emerged in parallel to Hellyar's.[103]

Provisional Grief

Hydrofeminism is anthropocentric and hydrocentric, decentering and adding specificity to posthuman framing; it holds space for specific forms of grief within accelerating climate change. Contemporary art is creates transitional space for ecological grief, in continuation of response to social and technological changes of the 1960s and 1970s. Here in Aotearoa Indigenous and anti-colonial practices have different and much longer histories of technological and ecological responsiveness (Tonga 2021; *Te Ia Tangata* 2021; Reweti and Rakena 2019).

Painting and image-making have long, culturally specific, and ethically engaged histories. Within these histories, rigid iconography reconfigures or undergoes iconoclasm, and figure/ground relationships shift, perhaps involving more-than-human perspective (Siegel & Bey 2006).[104] Julie Mehretu describes the fluid medium as mutant (Graw 2016, 275), and it has become networked through transitivity, provisionality, reassembly, contamination and

101 When Hellyar was at art school everyone was thinking about Vietnam, students knowing people who were over there, the injustices and feelings of complicity became much more intensely focused. This was at a time when political art was often perceived or expected to be overt and didactic – there wasn't space made for artworks that came to complex political questions with open-ended positions; definitive claims were expected. This is understandable given the urgent human rights issues that were lived experiences for many Māori and tauiwi artists and coming to a broader Pākehā consciousness at that time, it was a time for positions to be visible and amplified. However, there's also a need to reconsider some of the process-based and materially poetic practices of this time through a political lens, observing the range of politics at work during that period. Hellyar's own politics didn't really include an awareness of Māori politics until the late 1970s, with Rhodesia and then the 1981 Springbok tour. Greenpeace also became a visible presence around this time, and made a lot of noise and a few artists like Claudia Pond Eyely made space for that activism in art making. Their work was especially important because nothing was in the newspapers or magazines, which were all right-wing. The university was also right-wing. For Hellyar, the current arts ecology has a much healthier approach to the range of political strategies and approaches that art can enable and it's great that politics is important and visible and written about, beyond a binary positioning of political and apolitical. Essays within public and artist-run gallery publications, and web platforms like Pantograph Punch, Circuit, and Art Now come to mind (Personal communication with Hellyar, 2021).

102 This is partly due to the financial restrictions of an artist working largely outside of the private collection market.

103 Hellyar's new body of work, *Fields of Colour* (2015-2020), integrates biomaterials, pigments, and dyes sourced from plants endemic to Europe, Aotearoa and the larger Te Moananui-a-Kiwa. The colour palette is a necessarily complex spectrum, with colour shifting between the fifteen parts of the work which are exhibited together – the colour palette is an ecosystem. This work has been developed with support from friends who are weavers and artists working with their own Indigenous knowledge systems and communities of practice here in Aotearoa and in Hawaii (interview with the artist 2021).

104 During the 21st century, systems of visualisation and rematerialisation have continued to be developed through the ongoing process-oriented and site-responsive expanded field of painting that came to attention in the 1970s (Siegel & Bey 2006, 29-87).

entanglement (Joselit 2009, 125-134; Rubenstein 2009; Graw, Birnbaum, Geimer 2014; Graw, Lajer-Burcharth 2016, 7-9).

In the 2000s, some painters were making work described as unmonumental, provisional and transitive—aesthetics that privileged more contingent and immediately accessible modes of production (Flood, 2007; Rubenstein 2009; 2012; Joselit 2009; Graw & Lajer-Burcharth 2016).[105] Provisional painting, can be seen to borrow from painting practices of the 20th century (Arte Povera, synthetic cubism, process-based painting within the expanded field, support/surface), but it was also being made by a new generation of artists working within very particular late-capitalist socio-economic and technological conditions (Rubenstein 2009; 2012).

I've spoken with many artists of my age who identify post-911 grief in some of the provisionality of practices during the 2000s. This also began to converge with the grief of irreversible climate change—something that informed my work *Climate change heartbreak poems* (2007-2013). And for non-Indigenous and White artists, there was also increased consciousness of the violence and grief generated by ongoing white supremacy, with greater awareness of how this is experienced differently, in ongoing ways by Indigenous and Black peers.

Multiple forms of grief are found within the urgency (and sense of inaction) of transitions away from a carbon-based culture (Brady 2021, 3). Increasingly, artists of my generation and younger are using processes, materials and aesthetics, which are bio-based, adaptive, reconfigurable, self-supporting, prefiguring collective and responsive knowledge, and in some cases self-generating.[106]

McKenzie Wark writes about provisionality in the context of the Anthropocene and a 'common task' (Wark 2020, 11) of working within these conditions.[107] She isn't talking about provisional painting, but it is striking to add this perspective to how we perceive the aesthetics, materials, and phenomena of provisionality. Like the spectral aesthetics of an impossible future (Fisher 2016), perhaps the 'unfinished' or indeterminate is also spacious—it leaves space for the future. For me, these are reorientations rather than forward movements.[108]

3.3 Conclusion

In Section Three I outlined some of the ways that hydrofeminism and plasticity take form within artworks, particularly within historical and contemporary examples of biomorphic, geomorphic, and hydromorphic forms and aesthetics. I have focused on how the visual and material languages of these aesthetics have developed from surrealism through to more recent new materialist and site-

105 The unmonumental, provisional, and transitive were not the only ways that artists have responded to grief – there are many forms of transcendence and confrontation at work – but in this exegesis I have focused on these forms, and in Section Five I discuss these in relation to Amitash Ghosh's idea of 'derangement' within climate crisis (Ghosh 2016).

106 For a longer discussion of reparative aesthetics, please see my recent essay *Plastic Feelings* (2022), provided within the appendix.

107 This kind of prefiguration has also been described by Benjamin Noys as the 'aesthetics of communization' (Noys 2013, 4).

108 And again, many Indigenous peoples continuously orient this way.

specific practices, contributing to an expanded morphology of embodied and subjective experience.

Twentieth century movements connected to painting, like Arte Povera, process-based work and happenings, had begun to destabilise material expectations. This occurred with appropriation and misuse of industrial materials, DIY approaches, and through the affects of visible and material precarity. Artists working in these ways generate a prefigurative aesthetics of systems and norms that are fluid and vulnerable to change, within a larger continuum, resisting the inevitability of ongoing colonisation and late-capitalism. In Section Four, I go on to discuss four-dimensional, transitional, and reparative practices that I see as an extension of the fluidity and destabilisation discussed here.[109]

109 For a longer discussion of reparative aesthetics, please see my recent essay *Plastic Feelings* (2022), provided within the appendix. I discuss theories and critiques of a reparative turn in the humanities and arts. And I consider reparative tendencies in the work of artists like Judy Darragh, Lee Bontecou, Joanna Langford, and Eve Armstrong.

4: Four-dimensional Painting

4.1 Introduction

Painting is four-dimensional (and I suggest probably always has been), and thinking about painting as four-dimensional allows us to recognise that images remain fluid even once paint has dried. We can understand the temporality of painting through both materiality and semiotics—neither of these are static, both material and interpretation change and circulate through time. In non-Indigenous science the fourth dimension is time, and observations of time within paintings tend to be linear. Further discussion of four-dimensional painting can develop polychronic and anachronic understanding of artworks (Karlholm 2016) that align with less linear perceptions of time within Indigenous artmaking (Mitter 2018).

The Gwion Gwion rock paintings were painted 12,000 years ago by people of Ngarinyin speaking Wilinggin country in the Kimberley area of Western Australia and their surface hosts cyanobacteria and fungi that produce continuous restoration of the images (Tacon 2021; Doring 2014, 476).[110] This is just one example of early paintings that involve four-dimensional, more-than-human processes, and how Indigenous understanding of temporality enables these paintings to be located within ongoing cultural life and land occupation.

Within non-Indigenous and settler-colonial art, four-dimensional qualities have been explicitly recognised in movements like impressionism, cubism, futurism, spatializmo and avant garde theatre and ballet costumes—many of which reference biomorphic and geomorphic forms that are inherently time-based, with shapes and patterns that infer movement, growth, and transitions between physical and psychic states. In the middle of the twentieth century, critic Harold Rosenberg defined the canvas of the American Abstract Expressionists as "an arena in which to act" and said that "what was to go on the canvas was not a picture but an event."(Rosenberg 1952). In the present, new materialist and post-human paradigm shifts are used

110 In the version of Surface Active Agents published in Antennae Journal (2018), I focused on the role of the microorganisms and their conservation of the artworks, I did not acknowledge the painters of these works and this resulted in an unintentional erasure of their authorship. Here in the PhD I have attempted to amend this.

to reinterpret or revisit earlier art histories like these, and are influencing many levels of contemporary cultural production (Braidotti 2019, 1186). Writing about 'transversal' posthumanities, Rosi Braidotti has described the current situation as the 'posthuman predicament', the 'convergence of post-humanism on the one hand and post-anthropocentrism on the other' (Braidotti 2019, 1181).

In Section Four I talk about painting as incidents, actions and events that can be understood within a larger framework of painting in the expanded field, at the intersection of process-based and site-responsive practises that prioritises human and more-than-human relationships, social situations, and community contexts (Schechner & Kaprow 1968; Peterson 2010, 124).[111] I develop connections between contemporary non-Indigenous, tauiwi, international and Indigenous practitioners, who have worked four-dimensionally and sometimes five-dimensionally, to re-materialise their artwork in continuation of earlier ecological, localised, place-based making, and within the current crises. Four-dimensional painting often involves the socialisation or 'resocialisation' of painting—which I suggest is not new, but a continuation of what painting has always been capable of doing: being generated from conversation and composition within social and public spaces within and through time.

'Transitional practices' and 'circular aesthetics' include artists who are responding to current social and ecological crises with a return to localised and time-based materiality. The social, ecological, and political implications of site and time play out in different ways for different artists. And they continue to draw from earlier process-based and social practices, where malleable forms of relational aesthetics were investigated in attempts to dematerialise and detach cultural production from commodity forms and commercial art markets, or with an interest in differentiating productive or creative agency, subjectivity, and labour (Bourriaud et al. 2002, 42-44). The current return to materiality acknowledges the transitive four and five-dimensional energies of physical matter that further traverse the non-Indigenous duality of nature and culture, and the relational aesthetics that exist between.

Some of the transitive, transitional, and reparative qualities associated with fluidity and hydrofeminism that I introduced in Section Three are also four-dimensional qualities (Joselit 2009; Graw & Lajer-Burcharth, 2016; Derrida 1994, 169) that enable painting to move between sites, situations, families, communities and contexts.[112] Earlier sections of this exegesis have begun to discuss how the site-responsive biodegradable paintings featured in *Greywacke love poems: returns* (2019-2021) and associated works, move between states and sites, here I will expand discussion of these durational, intra-

111 Happenings are one example of how Rosenberg's observations influenced developments within socially-oriented painting.

112 Derrida also describes the "subjectile", ground of an artwork, in terms of "transitivity", simultaneously being thrown and throwing (Derrida 1994, 169).

Fig. 63. Raewyn Martyn, *Biobitumen—a greywacke love poem.* 2019, Circuit Aotearoa New Zealand, AURA Festival, Newtown. Still shots of road and curb-side action, presented with edited video with photography by Rachel O'Neill and video editing by Johanna Sanders. The work is made using bacterial polyester, extruded with mineral pigments sourced from the old Owhiro Bay Quarry on the southern coastline of Te Whanganui-a-Tara Wellington, a predominate aggregate source 19th C-late 20th C, materials from which are now found redistributed, within the roading and building materials of Pōneke Wellington city.

active, adaptive, and transitive qualities.

Lynda Benglis's material processes invite a four-dimensional perception of painting where flow and cantilevers of interaction or intra-action of force are described by physicists (Barad 2007; Herczynski et al. 2011, 31-36; *Whitney Focus* 2009).[113] Her work seen in gallery and museum collections are often specific to the gallery and institutions as site, challenging particular parameters and conventions of medium and display within the expanded field (Krauss 1979, 30-32)of painting. Whereas, the work she did during a residency at Auckland Art Gallery here in Aotearoa responded to her experiences within the geological and geothermal systems in the north island during her time here.

Four-dimensional approaches create time and space for subjectivity and intersubjectivity within sites, art histories, relationships, and inheritances. Time-based thinking holds ground for things to play out, incidents to occur, and for processes of 'tinkering' and 'hacking' (Lewis and Friedrich 2015; Wark 2004)—processes involved in the plagiarism of my own grandmother's paintings, that I undertake as part of *Paint over, use again* (2021). This is also the time and space of the 'subjectile' a more-than-human social interface, which I discuss further in Section Six.

4.2 Four-dimensional painting

Painting as event

with Frankenthaler, the artist's action is at a minimum, it is the paint that is active. The artist is the medium of the medium. (Rosenberg 1983, 64; Siegel et al. 2015, 117)

113 Lynda Benglis talks about this during "Whitney Focus".

Lynda Benglis has identified Frankenthaler's relationship to the medium as an entry point for her own paint pours (Seigel 2015, 17). Katy Siegel describes how Benglis *sketched an empathetic identification between self and materiality* with Benglis saying: *In making these pieces I turned myself inside out. I was the paint. I was the material itself* (Seigel 2015, 18). Benglis's generation tried to move beyond the "hysterical and overheated" connotations of Abstract Expressionism, toward the "agency of materials" (Seigel 2015, 17).

Artists like Richard Serra *are more often credited with performative materiality, and they in turn often point to Pollock as inspiration or source* (Seigel 2015,17), even though it was Mark Tobey and Janet Sobel who had earlier used drip techniques that influenced Jackson Pollock's all-over and stage-like approach to pictorial space. In these artists' work, intentional inconsistencies in the paint surface create optical fluctuations during any in-person experience, as the viewer is induced into 'anamorphic' movement—moving themselves outward from the picture surface, activating the optical effects (Zalman 2015; Schreyach 2017, 195).

Alan Kaprow extended ideas of viewing as event (and painting as action) by reconsidering the role of the viewer as a participant rather than observer (Schreyach 2017; Kaprow 1966). Kaprow observed that the temporality of painting actions and events was indeterminate, as the unbounded and 'all-over' approach provoked viewers to remark that Pollock's paintings 'went on forever' (Kaprow 1991). This anachronic or polychronic unboundedness is a feature of *Greywacke love poems: returns* (2019), installed within the Adam Art Gallery stairwell, and there are obvious examples in the works of artists like Michelle Stuart (*Ashes of Arcadia,* 1988) and Katharina Grosse (*Untitled,* 2001).

Paul Klee's earlier methodologies of polyphony and cosmogenesis are inherently four-dimensional and developed a *temporisation of form* (Boehm 2013, 316-329), where the processes of formation existed in both production and reception. Clement Greenberg later described the temporality of work by Mark Tobey, Janet Sobel, and Jackson Pollock as all-over and polyphonic, and as *a kind of picture that dispenses, apparently, with beginning, middle, end* (Greenberg 1948). I haven't found reference to these artworks as polychronic or anachronic (see Karlholm & Moxley 2018), but I propose that paintings like this are examples of this temporal state.

Robert Smithson's *Glue Pour* (1979), exchanged Pollock and Benglis's paint tins with a tin of glue, poured down a clay bank. Smithson was attempting to develop an 'erosional aesthetics', recognising entropy and violence within geological time (Lauder 2015). In the 1960s and 1970s Rene Thom's theory of catastrophe described sudden changes in spatial and environmental morphology brought about by events like an earthquake or flood (Thom 1975; Banchoff

Fig. 64. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), at the old Owhiro Bay Quarry.

2014, 8).[114] Stefania Caliandro links Thom's theory of catastrophe to Gilles Deleuze's lectures on painting as 'disequilibria': *"to paint, in a way, has always meant to paint local disequilibria (Deleuze 1981, session 1, circa 8–9, ...). Indeed any change of form, whether in shape, chromaticism, texture, material or other plastic means, is a catastrophe, as it determines a boundary of that form* (Caliandro 2019, 6).

Material Interfaces

Canvases, architectural situations, device screens, biofilms, and off-site situations, are all examples of material interfaces. What happens at these interfaces can avoid a dualistic externalisation of matter; the traces of material processes generate a more molecular and granular understanding of media and matter, whether that be physical, biological, or digital. And this indexical data or information can

114 Thom's theories influenced Salvador Dali's work exploring the possibilities of four-dimensional objects in painting. Banchoff writes: *Usually shapes appear to change continuously, but occasionally there is a sudden change in form, some new phenomenon that indicates a qualitative change that takes place in surprising ways. Examples are the changes that occur in the contours in a landscape as floodwaters gradually submerge a geographical feature. More dramatic are the drastic effects of major seismic events such as earth tremors and displacement of fault lines during earthquakes. Thom identified a small set of phenomena that are characteristic of such qualitative changes and he classified them using algebraic formulas that could be viewed using computer graphics.* (Banchoff 2014).

also be understood as genetic—part of a code shared between makers, viewers, and between artworks (Mitchell 2010, 116). Media histories that are framed as archaeologies and geologies, reveal narratives carried within flows of matter—becoming sedimented or losing visibility (Parikka 2016, 14). Thinking in this physical way, can also develop our understanding of social and cultural processes as material, recognising the biological and embodied information passed along within the 'subjective epiphenomena' of values, memories, and beliefs (Fox and Aldred 2020, 36).

This understanding of trace at a molecular and biological level is part of new materialist and posthumanist thinking, and is present in feminist process-based, four-dimensional practices. Carolee Schneemann talks about painting and gestures as events and her time-based exploration of painting has been contextualised with the recent retrospective *Kinetic Painting*, at MOMA (*Exhibition Film*, 2017). She discusses her work with cats and nature as collaborators, in works like *Fuses* 1965, and more recent works on paper (Raw Materials, 2019); the studio floor and her house are key sites of response. Schneemann's more-than-human collaborations have been contextualised within posthumanism by Thyrza Goodeve (Goodeve 2015), who notes that Schneemann took up the idea of the cat as a medium in the 1970s, after the suggestion from an audience member.[115] I see this as an important development of Frankenthaler, Rosenberg and Benglis's ideas of the artist as medium of the medium (Rosenberg 1983, 64; Siegel et al. 2015, 117).

Karen Barad (2007, 35) uses the term reconfigurable and reconfigured to understand more-than-human figurations and assemblies, while Bruno Latour (2010) writes about compositionist approaches to matter and materials, aligning with aspects of feminist materialist 'composting' (Haraway 2015). Since undergraduate study in the early 2000s, I've looked to reconfigurable and self-supporting artworks as models for how painting might inhabit spaces and create interfaces for subjective and intersubjective experience. Works like Lygia Clark's *Poetic shelter* (1964), with folding and unfolding surfaces and supports; and Marisa Merz's *Untitled (Living Sculpture)* (1966), made by stapling together aluminium pieces. Although I've come to them more recently, Rosemary Mayer's *Temporary Monuments* (1977-1983), have become an important touchstone for my understanding of the ephemeral and reconfigurable qualities of my earlier *Camping Paintings* (2015-) and works like *Greywacke love poems: returns* (2019-2021).[116]

re-assembled and seen several times over the

115 Goodeve also gives the example of the Aotearoa New Zealand-authored *Why Cats Paint,* as a posthumanist text ahead of its time (Busch & Burton 1994). Busch, Heather, and Burton, Silver. *Why Cats Paint: A Theory of Feline Aesthetics*. London: Weidenfeld & Nicolson, 1994. Print.

116 In undergrad I made a participatory paper and cardboard installation with multiple folder paper and cardboard forms that could be reconfigured. I'd been looking at Lygia Clark, Robert Morris, and Richard Tuttle, as well as my lecturer Karin van Roosmalen. These ideas then fed into the way I delaminanted and unfolded latex wall paintings as part of my MFA, and also the custom fitted daybeds (*Glover Park Daybeds* 2011); the folding canvas camping stools (*For Loan* 2012), and reconfigurable tent canvases *Camping Paintings* (2015-ongoing), that I sewed.

> *years, it is the mobility of the work, the absolute impossibility of crystallising in a precise time to set the mark of what is and what shall be* (Coen 2012).[117]

Composting, sedimentation and erosion, entropy and ruin, transformation and transition, and creative destruction are also four-dimensional processes that complicate non-Indigenous perceptions of time and art experience (Filipovic 2007). These qualities are explored in artworks by artists like Jay DeFeo's durational work, *The Rose* 1958-1966), Gustav Metzger's acid paintings, like *Recreation of First Public Demonstration of Auto-Destructive Art* (1960, remade 2004, 2015), Gordon Matta Clark's agar work, *The Land of Milk and Honey*, as part of the larger in-extant series *Museum* (1969)[118], Andy Warhol's urine-induced *Oxidation Paintings* (1977), and Helen Chadwick's actively composting vitrine-like sculpture *Carcass* (1986).

In 2013 I saw a retrospective exhibition of Jay Defeo's work at The Whitney Museum of American Art. This had a big impact on my understanding of time-based painting. Defeo's paintings hybridise *abstract expressionism, landscape painting, assemblage sculpture, and the legacies of surrealism and transcendentalism…filtered through the Beat writers and poets* (Spencer 2021). Defeo's durational painting processes (*The Rose* 1958-1966), often involved accumulation of paint matter over long periods of time and a combination of additive and reductive processes, bent on dissolution of fixed forms. Perhaps less fluid and more sedimentary than biopolymers would allow, her work is an extreme example of the geopolymer aesthetics that's always been involved in painting that uses basic materials like calcite-based gesso, and oils with mineral pigments—and the deep time embedded in material and process. DeFeo's paintings: *mixed house paint, stones, string and God knows what else, making great, lava-like slags that carried Abstract Expressionist textures* (Spencer 2021). Her paintings operated at the scale and temporality of planetary aesthetics (Apter 2013), and also with the intimacy of someone making paintings to inhabit, and I think this is also a feature of biopolymer aesthetics. *Greywacke love poems: returns* (2019-2021) and *Biobitumen—a greywacke love poem* (2019), combine the two modes of geopolymer and biopolymer aesthetics with similar durational and time-based qualities.

Catherine Spencer's description of DeFeo's work lends itself to new materialist readings, noting that it held onto overt ecological connections when

117 Coen, E. (2012). 'Moon Threads', in Fondazione Merz, 21–2.

118 Filipovic writes: *When do these artworks take place? At what moment can the visitor be said to have effectively seen or experienced them? When, then, is this exhibition? Duration and exposure (in its dual sense of display and the wearing away of something) both determines and undermines the forms of all the pieces in the show. They are premised on their fleetingness, instability and, at times, their disintegration. As Matta-Clark knew well, any such artwork raises the question of the conditions under which art is bought and sold, comprehended and historicized, exhibited and collected. In so doing, they refuse the illusion of the transcendent experience of the work of art at the same time as they undermine the logic of the author as its unique activator. There is something impetuous, violent even, about artworks that operate this way, that resist being finished or fully available for visual consumption. Visitors are invited to return to see the show again and again so as to experience something of its continuous evolution, but the truth is that it will always escape them because, in between every visit, these artworks—like time—will go on while no one is looking.* (Filipovic 2007).

these were often absent from minimalist and post minimalist practices, and in the individualism of abstract expressionism (Spencer 2021)[119]

> *The Rose similarly combines the impression of ephemeral streams of light with that of a tangible, rocky surface. DeFeo heightened this impression by adding mica to the paint that she trowelled onto the canvas, bestowing it with a mineral glitter.75 …DeFeo's painterly process comes closer to the kind of 'hybrid product' described by Thoreau, and his liquid invocation of 'lichens', 'coral', 'leopard's paws or birds' feet', and 'brains or lungs or bowels' forming interlaced patterns that convey the connectivity of all things. The transformation envisaged by her hybrid abstraction is intrinsically organic, based on biological interdependence.* (Spencer 2021).

Transitive, transitional, and transdisciplinary

Diffractive methodologies lend themselves to the kinds of transdisciplinary conversations that have been a feature of my work with scientists. By 'transdisciplinary', I mean artwork that moves between creative mediums, and also locates itself in contexts beyond art galleries, moving into field work within science and industry. This way of working often involves transitional knowledge exchange, and transitive moments of art production within situ that doesn't necessarily materialise again within a gallery setting. These are important features of the *Greywacke love poems* (2019) and *Greywacke love poems: returns* (2019) projects. where I used a conversational method to understand the geological, social, and ecological history of the old Owhiro Bay quarry location.

Throughout 2018, I spoke with people who are connected with the site—an iwi representative, city council staff, geologists, tourists, and local recreational users. These conversations influenced the photographic production of these works on site and also in the studio where the cellulose materials and digital composites were made, and at Scion, where the bacterial thermoplastics were produced. This happened over time, as material languages emerged in response to the interactions with members of the public and those who I had made direct contact with through universities, iwi and local government, and Crown Research Institute Te Pū Ao, Geological and Nuclear Sciences (GNS).

It is clear that many Pākehā and non-Indigenous tauiwi need to develop understanding of non-linear four and five-dimensional qualities—temporality and energies, including intergenerational and spiritual

119 *DeFeo's painting remains invested in evocations of natural, organic and environmental process, unlike the sculpture championed by Lippard and Judd. …the sensuously phenomenological quality of her work is decidedly distinct….The paint application is fluid and heavy, at points congealing in unassimilated globules left in the wake of a pallet knife or large brush. Elsewhere, white highlights merge with greys to create atmospheric allusions redolent of water vapour and fast-moving weather. While Untitled (Everest) seems occasionally about to cohere into identifiable imagery, it remains in flux. DeFeo's placement of 'Everest' in titular brackets infers the generalised idea of a mountain, rather than topographical actuality. As DeFeo emphasised, her engagement with the natural environment did not result in 'landscapes that one goes out and parks oneself down in the field to paint … they are landscape-like. They conjure up a kind of landscape feeling'.49 Untitled (Everest) might offer a view down from a summit onto the terrain below, or even a glimpse of peaks breaking through cloud from the air, yet the composition also pitches the viewer into a granular, micro-level view of a rocky surface, frustrating a clear perspective. …DeFeo identified the resulting work as 'a sculptural painting in three dimensions, literally a relief', indicating that she conceived of it as a haptic, enveloping structure as much as a painting.74* (Spencer 2021).

aspects (*An Indigenous View*, 2020). My own material understanding has accumulated over time, through practice, and with place-based, social, ecological and economic context. During research for *Biobitumen—a greywacke love poem*. 2019, Circuit AURA Festival (2019), I came across the The Road to Nature project (*The Road to Nature*, 2019), which uses pine tar within a composite biobitumen.[120] It's a Tūhoe project, and an example of how iwi are leading the way in localised adaptations of existing industrial-scale systems. Around the same time, I also spoke with roading engineers at a Willis Street site in Te Aro, they shared their localised knowledge of the greywacke basecourse aggregate sources and histories of use (the grounding layer of the roading). They weren't aware of Tūhoe's Road to Nature, and standing on the footpath on Willis St, they listened with intrigue, among the people, cars, buses—with the exposed basecourse and new asphalt flowing in front of us. This is one example of how arts praxis and conversational approaches to research can contribute to knowledge exchange within arts, science, and industry.

My approach to transdisciplinary work is also informed by research-based and process-based site-responsive practices of the 20th century, including the collaborative and individual practices of Nancy Holt and Robert Smithson, and Helen Meyer Harrison and Newton Harrison. These artists, working within the expanded fields of conventional mediums (Krauss 1979, 30-32), generated understanding of interrelated social, geological, and ecological systems. Expanded fields emerged in the situationist and post-situationist context where psychogeography influenced artists' engagement with site, place, and time. Rosalind Krauss and Yve-Alain Bois's 1997 book about post-war art, *Formless* (Bois and Krauss 1997), borrows George Bataille's use of the term informe (formless) within the surrealist magazine *Documents* (1929-30), where Bataille's interest in systemic excess and base matter elucidated artworks beyond surrealism itself and drew attention to the social and economic rifts between nature and culture (Bois and Krauss 1997, 40), and Bataille's base materialism is clearly relevant to current new materialist and post-human thinking.

In Section Three I gave historical examples of artists like Marie Menken, Carla Accardi, and Lucio Fontana, whose investigations included the time-based and energetic possibilities of fluorescent pigments and electric lights.[121] Like Lee Bontecou's work, their images are multi-stable—Fontana's *Nature* sculptures (1959-60), were described as having a *'menacing vitality between vegetable and animal'*

120 Existing asphalt is already a somewhat circular material, but conventional petrochemical bitumen is challenging and costly to recycle. ("The Road to Nature").

121 At the time, Fontana was convinced that space travel would prove conventional artforms dysfunctional: *'I assure you that on the moon no-one will make paintings, but they will make spatial art.'5 ...Spatial art, he began to realise, could only be arrays of light broadcast via television. Not only would such a work no longer be an object, it would have no specific locality* (White 2008).

(White 2008).[122] Vibrant matter and base materialism are also invoked in descriptions of Marie Menken's paintings and films, what is assumed as 'natural' is called into question, as Menken both observes and generates human and beyond-human forces. Her paintings were made using sand and other overtly geological materials like *stone chips, stone powders, marble chips, marble dust, ground silicate, sand, cement dust, luminous paints, glass particles, glues and lacquers, occasionally string and fiber* (*Marie Menken,* 2008), carrying geological time signatures. In the 1950s Menken was showing swirling phosphorescent paintings that glowed in the dark *(Marie Menken,* 2008*)*.

Transitional approaches and the influences of both new materialist and post-human paradigm shifts within Pākehā arts practices have happened at the same time as many artists of my generation have reconsidered their position and relationship to te ao Māori. In Section Three I gave examples of Holly Walker and Bek Coogan as artists developing relationships with place, situating themselves as part of ecological systems. And I think their work also embraces the fourth and fifth dimensions, allowing for aspects of Pākehā and tauiwi understanding of kinship, interconnection, and spiritual dimensions to be involved.

Teina Boasa-Dean's thinking through circular and doughnut economies makes it even clearer that for Pākehā and tauiwi to collaborate with Māori at systemic levels, there needs to be understanding of fourth and fifth dimensions—temporality and energies, including intergenerational and spiritual aspects. Practice-based art research lends itself to this task, in transdisciplinary work with science and industry (and beyond), where these dimensions are very present within localised, place-based material production, yet there are still barriers to this work (see Sellberg 2021, 293).[123]

During the first half of the twentieth century there was an optimism toward plastics, described in German as plastikoptimismus (Miekel 231). Heather Davis places this optimism in contrast with plastic realities explored by artists in the early 21st century, like Tomas Sareceno's *Museo Aero Solar* (2007) (Davis and Turpin 2015, 62). In Aotearoa we also see this in practices that utilise industrially produced materials with an intent to reveal ecological, economic and systemic concerns. There are earlier examples, but the practices mentioned here happened at an influential time for me: Yuk King Tan's *Overflow* (2006); Johanna Langford's salvaged plastic landscapes like *The Quietening* (2007); Eve Armstrong's *Taking Stock* (2010); and Rachael Rakena's (Ngāi Tahu), *Poutereraki* (2011)—

122 Anthony White goes on to say that these five-dimensional qualities make Fontana's work an example of Bataille's base materialism, because the material and energetic instability of the paintings allows them to sustain a formless character, resonating inside and outside the body (White 2008).

123 This transdisciplinary work is seen in practices that engage art, design, and STS (Science, Technology and Society studies). Recent publications address challenges in this way of working, proposing a *'Triple-S' heuristic tool: "developed to capture the notion that the challenges and opportunities of transdisciplinary research lie at the relational nexus of Science, Society and Self* (Sellberg 2021, 293). This is particularly important in light of the COVID-19 pandemic and recent debate on wellbeing and ethics of care in academia (Levecque et al. 2017; Evans et al. 2018; Corbera et al. 2020).

repurposing plastic-coated electric cabling, spiraling in proximity to oil blobs that reference the Rena oil spill.

Within the continuum of Indigenous Māori practices, Kereama Taepa's 3D printed *Whakapī* (2017)—Rakena notes that Taepa's works conceptualise the petrochemical and biopolymer filament materials in a Māori whakapapa, its source being very old trees, etcetera, and therefore under the jurisdiction of the atua, Tāne (Rakena 2021). Four-dimensional and additive manufacturing (3D and 4D printing)[124] may default to the primary purpose and aesthetics of functionality and production, but it also exposes different aspects of time and the transparent printing units allow for a different visibility of productive time. The plastic optimism of these works is different from that earlier plastikoptimismus, and grows through ihi and a reconnection with a Māori whakapapa.

The sometimes dysfunctional and sometimes less productive time-based qualities of degeneration and regeneration are also at work within four-dimensional materials and processes. For example, the ephemerality of Anicka Yi's live culture installations is complemented by the material remnants of scoby (Symbiotic Culture of Bacteria and Yeast), (Kim 2019). Non-normative plastic behaviours are part of the biopolymer aesthetics involved in the larger concept of four-dimensional painting where arguably non-productive degeneration is also potential regeneration. Biopolymers enable more contingent, degenerative and regenerative forms of production and artists often embrace the aspects of this that might be undesirable within industrial applications.

In Canada, Kelly Jasvac's salvaged adhesive vinyl work *Slump Block* (Jasvac 2008) and the research-based series *Plastiglomerates* (Jasvac 2013), draw attention to plastic waste accumulation and anthropogenic geologic materials like plastiglomerates that Heather Davis has discussed (Hannah and Krajewski 2015, 68; Davis and Turpin 2015; Robertson 2017). And in speculative artworks with a different kind of optimism or hope, that reconstitute waste and generate circular aesthetics, like the Sea Chair Project (Groves, Murakami, Jones 2011). Artists and designers made a spectrum of material states visible within the larger design project; plastic nurdles (fragments of plastic) are salvaged from the sea and reconstituted in a range of ways over the course of the chair design and fabrication (Gabrys, Hawkins, Michael 2013, 208–224).

Mata Aho make works of architectural scale created through labour-intensive, collective processes of raranga (weaving), and tuitui (sewing). Their work centres kaupapa Māori, through working with industrial materials used widely in their communities

124 From the Scion website: *The spearhead project aims to harness New Zealand's natural resources, such as biopolymers, plants and wood fibres to create new, more environmentally friendly materials and products. Their work includes developing biopolymers for 4D printing, which adds a functionality (i.e. a new dimension) to the 3D printed object such as shape memory. Besides manufacturing the materials, the challenge will design printing processes that can cope with and preserve the natural functionalities of the renewable materials. These new properties could be used to make anything from buildings to furniture.*
Scion - Biobased Additive Manufacturing. https://www.scionresearch.com/about-us/about-scion/corporate-publications/scion-connections/past-issues-list/scion-connections-issue-34,-december-2019/biobased-additive-manufacturing. Accessed 19 May 2022.

such as faux 'mink' blankets, blue tarpaulins, marine synthetic rope, and construction netting. On Instagram they note: *The materials we use are a dedication to the people who use them every day* (@ mataahocollective). Within a frame of posthumanism, this could be seen as an Indigenous reclamation, amplifying the 'who' that is being centred and valued in the process, *and* as a means of honouring, and interrogating the materials beyond the terms of Anthropocene or posthumanism. This Indigenous reclamation of often synthetic or petrochemical industrial materials offers a counterpoint to my biopolymer explorations, but share a compulsion with the expanded narratives and loaded histories that materials carry. This could be considered a different register of a transitional practice?

Transitional practices rematerialise their own forms of extraction; appropriation, and recollection of historical models. In their 1968 essay, Lippard and Chandler outlined how thingness and making of physical objects were de-prioritised, in favour of the thinking process, surmising that "profound dematerialization of art, especially of the art object… may result in the object's becoming wholly obsolete" (Lippard and Chandler 31-36). New collections of ephemera and social media (such as Te Papa's collection of Mata Aho's Instagram) feature the transitive images that David Joselit describes (Joselit 2009) and can be understood as a form of extraction from the contemporary art market.

Texts focusing on 're-materialisation' within art production more recently tend to refer to translation from the digital sphere into a physical manifestation, where the hand-made process is coded to enable digital production of 'coded objects' and 'transitional objects', with designers now able to iterate and rework objects at a fast and economic pace, with three-dimensionally printed 'rapid prototyping' (Harrison 2013, 2-3), further complicating the idea of 'the medium is the message' (McLuhan). In 2013, Harrison wrote of studio-based practices finding their way into new technologies and social communication channels: *the idea is still paramount, but now exists within an art object with extended reach contextualising it into the larger socio/political world. Thus, the material form can now be placed on equal footing with the idea* (Harrison 2013, 2-4).

Incident, index, accumulation, and reconfiguration

In work made during this PhD, the four-dimensional qualities of accumulation, incident, index, and reconfiguration are evident in the material cycles of *Greywacke love poems: returns* (2019).[125] This

125 These interests developed between 2004 and 2005, at the Massey Whiti o Rehua studios, where I had been trying to understand figuration and figure/ground relationships. Working with marks that sat in-between a stain and a gesture, and with compositions accumulating in layers and grafted into architectural surfaces like the walls and floor. I was intuitively using the word "incident" to understand painting as emergent and event-based, I wasn't yet aware of the terms indexical and provisional (Rubenstein 2009; Graw 2014, 45-51). There's all sorts of important critiques of provisionality and indexicality, but I'm still interested in that space of the figuration beyond the human, and beyond the glyphic, and gestures that move between more than one of those. And in my fourth-year undergraduate project, there was anthropomorphism and animism involved in more overt representational ways that have also carried through into the biomorphism and polymorphism of biopolymer aesthetics, that I discussed in Section Four.

material was used previously within the Courtenay Place Lightboxes (*Greywacke love poems*, 2019), and the Circuit AURA Festival in Newtown, before being used again at Owhiro Bay. Parts of a companion work shown within *The Slipping Away* at Gus Fisher Art Gallery (2019) were also integrated into the pool of re-worked material. What took the form of overt figuration in one work, might become ground or grist in another.[126]

In playful studio work an accident or mistake becomes a tool for invention in the creative process and in language. in *The wish accident* (O'Neill 2008), Rachel O'Neill writes about the incidental and accidental puddles and stains of my work *Landing* (2008). This thinking remains key to my thinking during studio work and it also informs my teaching. One example of this is when I'm explaining figure and ground relationships within a picture space, I talk about both human and more-than-human figurations. I place this idea of figuration in context with several different ways of talking about abstraction or non-objective painting, including: indexical mark-making and figuration (otherwise known as trace); expressive gesture; and more crystalline or concrete abstraction that might result from a systemic way of thinking. Likewise, when we talk about grounds and substrates, I speak about them in relation to a canvas or support as a site, and then about site as a support. For example, a geological or geographic site can be thought of as the ground and as a ground. The creative ground or substrate is not necessarily fixed or stable. It is the interface of art work. Artaud described it as the subjectile—an in-between space of subjectivity and objectivity, subjecthood and objecthood. Subjectile is a conflation of the word subject and projectile and I discuss this in Section Six.

In 2011/2012 during my first semesters in the MFA programme at VCUArts, I had been developing figurations directly onto the studio walls. Conflating anthropomorphic and animist forms, while also pushing beyond the given figure ground relations of a wall surface. This extended ideas from within the exhibition *Transparencies* at Enjoy Public Art Gallery in February 2011. Critiques of the transparent and subtle colour palette provoked me to randomise my colour palette, making choices based on discounted mistints at the local hardware store.

By the middle of 2012, I had built up many layers of paint on the studio walls and these began to delaminate (peel), unprovoked. I began working with the delamination process, and revisited the work of Lynda Benglis after having looked at it during earlier puddle and stain works during undergrad and

126 As outlined in earlier sections, the *Greywacke love poems* lightboxes (2019) presented sixteen manipulated photographs, relocating the quarry coastline into the reclaimed foreshore of the CBD, where quarry aggregate materials were redistributed within roading and building throughout the twentieth century. Biopolymer medium – made with plant-based cellulose, seawater and pigments from the greywacke – was used to create figurations that were photographed in studio and onsite. These figures were then enlarged and digitally integrated into the rotating coastline panoramas with their exposed sedimentary and faultline seams. The biopolymer layers and flows conflate connotations of geologic and biological skin-like forms, moving between liquid and solid moments of formation. Two of the lightbox photographs include sheets of paper blowing across the foreground, featuring legible poems that were written from conversations with people familiar with the past, present, and future of the coastline. With their presence in the CBD, these photographic landscape composites generate reconnection between natural and cultural systems at multiple scales and temporal ranges, including the geological time frames of land formation and orogeny – mountain-building. (see appendix: Martyn, O'Neill, and Knox 2019, 41).

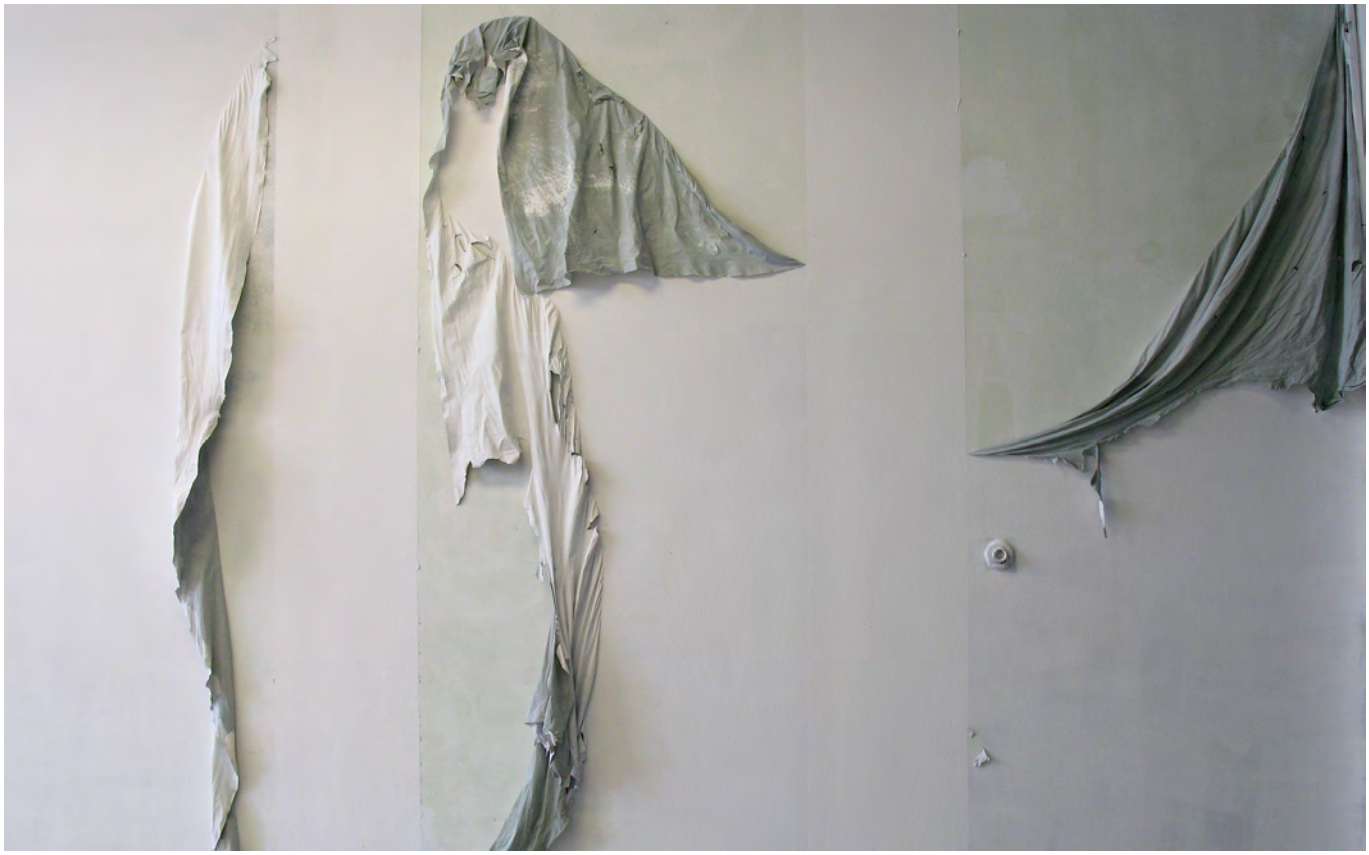


Fig. 65. Raewyn Martyn, studio work at VCUArts (2012–2013).

in the years following.[127] In the delaminated wall paintings made at VCUArts, the surface reproduces; layers of paint become unstuck and material. This transformation destabilises perceived boundaries of architectural space: surface, edge, and ground. As time-based paintings, they challenge the conventional stability and temporality of the painted surface.[128] In analogy with geologic processes, the peeling results in entropic reordering of the surface. As the peeled paint folds and unfolds back on itself, the painting is viewed inside-out. The delaminated paint can be rearranged in attempts to resist gravity, and for new composition to emerge. These paintings accumulate layers of intuitive and incidental mark making, developed in attunement with a specific site or situation. My work with biobased polymers grew out of these earlier delaminations, and the capacity for biobased materials to re-laminate, reassemble and reconfigure has altered the affective language of the installation work.

After the initial delaminations began, I was thinking about how there could be an extraction of forms from the surface. In the works that followed, I drew attention to moments when the surface becomes material, as it folds and unfolds, moving from two dimensions into three dimensions. In

127 I had purchased the book *High Times Hard Times* (Siegel & Bey 2006), before travelling to the US and it had informed my MFA programme applications, proposing to explore the poetics and politics of abstraction and site-responsive works.

128 This description of temporality in the work comes from a press release written by Holly Morrion and Nigel Rolfe for the VCUArts graduate exhibition Clothes Shoes at Whitebox Gallery, 2013.

Fig. 66, 67. Raewyn Martyn, *Dayfolder* (2013), VCUArts MFA thesis exhibition at the Anderson Gallery.

some instances, this became a little like flat pack furniture, or pop up books—for example, a blue wing/canopy form unfolded from a single surface area of about ten coats of ink-blue paint.[129] At the time I was thinking back, through some of the processual, reconfigurable and adaptive works I had looked at in undergraduate study (Lygia Clark, Karin van Roosmalen, Simon Morris, Knoebel and Palermo, Support Surface, etc).

The installation of these works often involved the informal performance of painting within public space over an extended period of time, with the painting witnessed in different states, static and active. Time-based photographs are generated within the process to expose the painting in stages, and these are often viewed out of sequence. This was a feature of the MFA thesis work *Dayfolder* (2013), and later within *Camping Painting* (2015-ongoing) which began to use social media, and postcards, as a site for the work. In the time-based dislocation of these images, painting becomes non-singular, a series of transitional images within both transitive digital space, and localised physical public space.

Intergenerational painting

Four-dimensional qualities exist materially and figuratively, within the parallel histories of industrial materialism and more personal familial materialism—this PhD diffracts the industrial history of polymers with my family's economic relationship to them—as outlined in Section One.[130] Both histories are products of colonisation and capitalism.

In *Paint over, use again* (2021), made for the Govett Brewster window space in May 2021, I use the figure of E.E. Adams,[131] Evelyn Adams (grandma), grew up during her family's transition from working class to middle class, and she was one of the first in her family to be able to sustain a creative life

Fig. 68, 69. Raewyn Martyn, *Camping Painting* (2015-ongoing) which began to use social media and postcards, as a site for the work.

129 I presented these ideas and slides of these works as part of an artist talk at City Gallery Wellington in May 2012.

130 My paternal and maternal families arrived in Aotearoa at Otakou during the 1860s and 1870s. They were variously single people; ship labourers, whalers, or bound for work as farm labourers, at the gold fields, or for marriage and domestic labour. Not yet property owners, these were working class people and their journeys toward economic freedom and choices were enabled through the wages and resources made available (illegally confiscated) within colonisation. Their transition into property ownership and leisure time, runs in parallel to developments within industrial plastics and the plastic arts.

131 In *Paint over, use again* (2021), I use the figure of E.E. Adams. This video shows text and image embedded in the cellulose sheets made to be hung in the window.

into adulthood.[132] Her grandparents had arrived in Aotearoa as labourers who jumped between jobs to find their way to stable living situations. Evelyn's parents Jim (J.T.) and Vera Adams, met in Port Chalmers after Jim returned to Dunedin from WWI—while at war, Jim had received some socks that Vera and her sister had knitted, and when he returned to Dunedin in 1918 he visited to thank them. J.T. Adams had lost an arm during the war, unable to do the kinds of physical labouring he did before, he became a door-to-door salesperson, and because of the repatriation grant Pākehā soldiers received, was able to set up a news agency in Oamaru that eventually grew into a fully-fledged bookshop. By the time my grandmother came along, Vera and J.T. were becoming homeowners. And although she left highschool early to work and didn't go to art school, she had leisure time to continue painting and drawing.

We know that the relationship between our colonial history and extractive capitalism of industries like fossil-based petrochemical oil are coextensive in a way. Colonial forestry, timber, pulp and paper, and their bio-derived celluloid was later subsumed by petrochemical plastics and the petro-hegemony of oil industry interests.[133] My working class Pākehā ancestors had the desire for access to more resources beyond whatever livelihood they already had and this is how we came to be here.

During the interwar and post-war period, excesses of particular materials meant that plastics industries accelerated.[134] At that time, in the Oamaru bookshop, Mr Adams was wearing celluloid collar stiffeners. And the biobased binders of Evelyn's 1930's childhood watercolour sets began to be accompanied by the early petrochemical polymer binders found in tubed acrylic paints that the bookshop sold. I wanted a deeper understanding of my grandmother's art practice and the materiality of it—her transition from the gum arabic watercolour tins that are inscribed with E. E. Adams to her use of tubed petrochemical acrylic paints and linseed oil paints mixed with various petrochemical solvents and mediums, with which she painted canvases signed E. E. Martyn. These petrochemical paints became available in Aotearoa in the middle of the 20th century when Evelyn was in her twenties and thirties, as she was becoming a parent of five sons.

My dad and his brothers had kept boxes of the work that she'd hoarded and kept aside for reuse, and early in 2021 I was able to Zoom with my aunt and uncle who held the pieces up to the camera one by one, as I selected which ones they would photograph.

132 I am writing this knowing that class is more complicated than these categories, and that creativity is also not limited to production of artwork.

133 When we think of the military industrial complex, with its chemical industries and the extractive motivations for war, we often think outside of Aotearoa. While I was making the work for Taranaki, Peace Action Wellington held a symposium on Climate War and the promotional material noted: It will come as a surprise to some that the very first oil well in the British Empire was here in Aotearoa in Taranaki in 1865 - war and fossil fuels have gone hand-in-hand for a very long time. Meanwhile, archivist Henry Davidson has written about the 'shady' colonial origins of forestry in Aotearoa (Davidson 2022).

134 As outlined in Section Two, during the wars, cellulose-derived materials and natural rubber latex were used to coat the wings of aeroplanes, or for other waterproofing and insulation purposes.

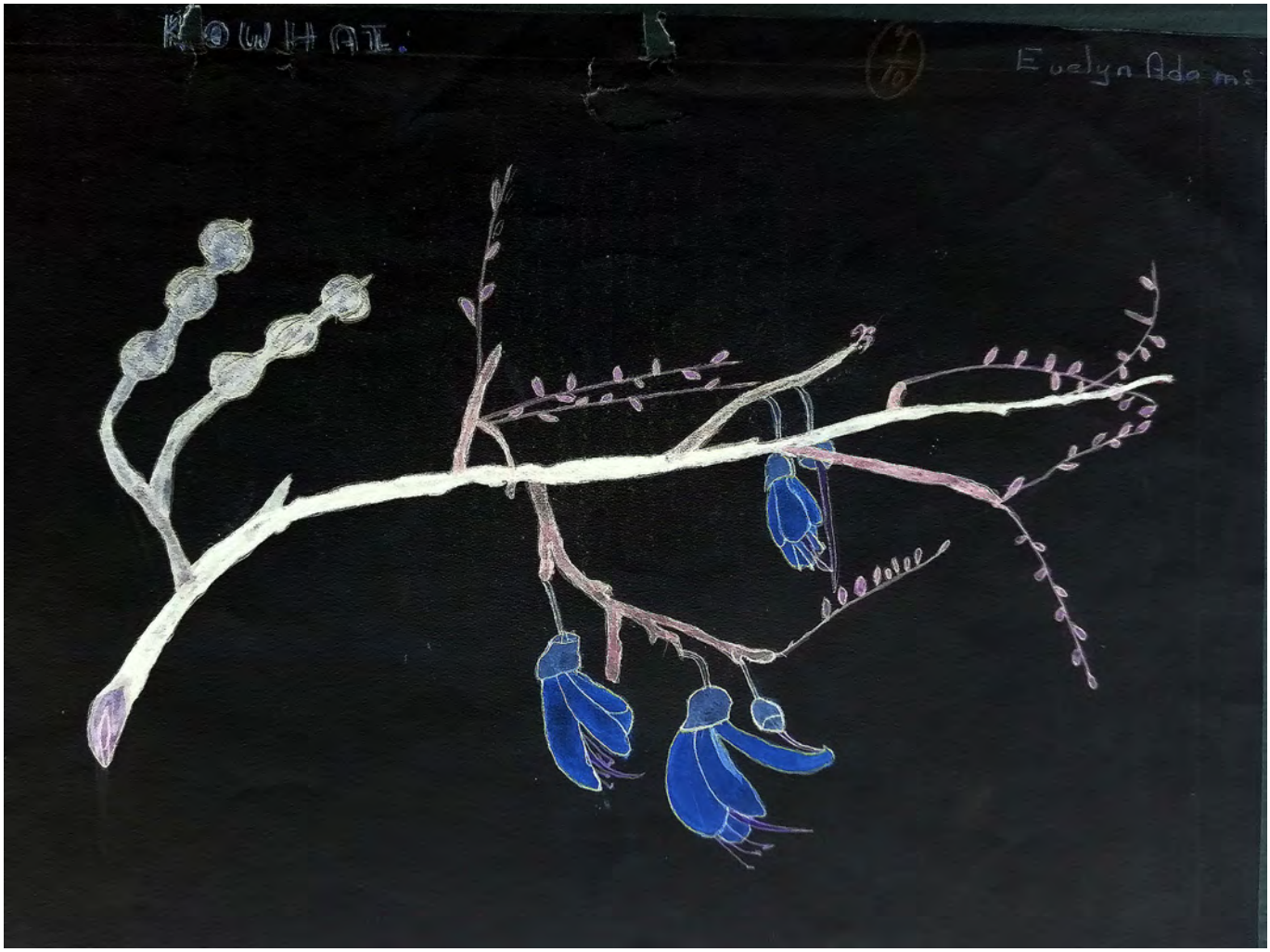


Fig. 70. Drawing of a kowhai by Evelyn Adams and cellulose detail from *Paint over, use again* (2021).

Amongst it was a half-finished portrait on canvas board that was partially crossed out with a note to say 'Paint over, use again.' Another piece we chose to work with was a watercolour of a flowering kowhai tree branch, from an intermediate school art pad, Evelyn had painted it with acute attention, and the page includes a grade: 7/10. I decided to pull these images and their material histories back into my work as source images to integrate into bio-polymer plant-based cellulose film—with its relationships to photography and celluloid filmmaking. The premise of the film shoot was for me to copy or plagiarise some of these works, as well as taking that instruction to 'Paint over, use again'. The flowering kowhai branch became a key motif in the cellulose painting and within Jess Charlton's film that was projected into the sheet of cellulose along a short animation of the branch itself.

For the film shoot, I printed some of the photographed artworks out on transparencies and we placed these underneath large perspex sheets which I could paint on top of using a fluorescent cellulose medium. We used a mixture of LED and UV lights to illuminate the translucent cellulose

liquid, so in parts of the film you can still see the photographic transparencies showing through. The fluorescent pigment is fluorescein, which is used within biomedical imaging to show cellular structures and by hydrologists and geologists to trace water flows. We liked this human and more-than-human form of tracing flows over time because as a material appropriated from non-art purposes, it nods to biological and psychological forms of plasticity, as well as the ecological and geological processes that allow us to think of plasticity at a planetary and cosmic scale. When the fluorescein isn't fluorescing it is a warm dark yellow, much like the colour of kowhai.

A ph-sensitive colour palette was also used alongside the fluorescein, with washes brushed on between pours, embedding hand-painted imagery and text. The Govett-Brewster window space meant that subtle fluctuations in colour were possible as humidity and airflow changed, but I'd like to try again in another environment where Ph levels could be induced or already fluctuate more.

At Massey University, I worked with Mike Bridgman to set up a test install and projection of the work, simulating the Govett Brewster window space. As I was describing the variables to Jess (the way it was hanging, and the subtle movement produced by the light and projector fan), I was relieved to hear her say that it felt like the cellulose was breathing. Jess's comment helped me understand how the nostalgic qualities and material time signatures reproduced from my grandma Evelyn's work, might be complicated by something more alive—the animation of fluids, the liveness of light, and the plasticity of images translated through my own hand. My appropriation might be more plastic and mutant than photographic reproduction, undermining the stability of time signifiers and nostalgic affects in the work, allowing it to be intergenerational in both form and affect. I was thinking about Evelyn's work as an inheritance that has the kinds of plasticity found in epigenetics, or an inheritance of raw materials or a somewhat immaterial colour palette, rather than any fully-formed art object.

4.3 Conclusion

Transitional and Four-dimensional painting connect to longer histories and practices of transition within art making, where forms and systems of production are unstable or become destabilised and vulnerable to change. This instability creates opportunities to breach painting's boundaries, or its formal and social isolation from the world around it.

Transitional practices persist within a local art market that remains predominantly linear and reliant on a material 'end product' and singular authorship for private or public acquisition. Artworks produced within four-dimensional frameworks have alternative archival qualities that complicate their value but are often recuperated within arts institutions and some private spaces. *Greywacke love poems: returns* (2019) and related PhD projects like *Paint over, use again* (2021), are largely funded and enabled through public

money, and draw attention to the ongoing need for this wider range of arts work to be recognised and remunerated as productive and reproductive labour within our communities.

Greywacke love poems: returns (2019) is also an example of how painting and installation practices are being re-socialised beyond gallery platforms, to persist with painting as an activity and service within both social media and a public recreational space—transitive digital space, and localised physical space. The project connects to multiple histories and timeframes, whether they be cultural and social or geological, (human, and beyond). While te ao Māori and international Indigenous-led art and research are influencing Pākehā and tauiwi perceptions of time and intergenerational material relationships beyond the colonial historical frameworks that continue to dominate—it also affirms the need for further work in this area.

As noted in preceding sections, biodegradable paintings, with their circular aesthetics and processes, offer alternatives to visions of neoliberal precarity (Berry & Dunphy, 2018). At the same time, this risks reconfiguring that precarity into something similarly troubling—instrumentalization of creativity in service and sustenance of status quo production and growth (Mould, 2018). Holding these risks in mind, transitional painting affirms the need for multiple different material languages and relationships, that prefigure more just transitions within our local and global economies.

5: Empathy: Biopolymer Materialism

5.1 Introduction

Entropy and empathy are diffractive and interrelated processes—making waves into each other. Entropy can generate ripples of empathy during individual and collective experiences of disorder, while empathy can move through disordered systems, altering effects, affects, and behaviours. In this exegesis I have placed the terms entropy and empathy in affirmative relation, shifting perceptions of their duality.[135]

I propose that processes of entropy and empathy are active within social, creative, and productive systems—including paintings and pictorial space (Worringer 1997).[136] Processes of entropy and empathy help compose and decompose our emotional and aesthetic relations by inducing, reproducing, and recalibrating affects, emotions, and actions. For example, observing experiences of disorder or disaster might provoke empathy within an individual, while their public or social expression of this empathy can trigger empathetic responses beyond themselves—the processes of empathy are reproduced (with variation) beyond the initial time and space of disorder. In this section I discuss this in relation to a history of process-based philosophy and personalism that influenced the development of non-Indigenous art and science in the 20th century (Whitehead 1978; 1979).

Concepts of empathy have long been applied to non-human species within Indigenous cultures, while the possibilities of reciprocity and non-human agential powers have been recognised within non-Indigenous science and philosophy more recently (Todd 2016; Gauld 2014).[137] Empathy beyond humans has been contextualised within a larger 'economy' and politics of emotion, including the ongoing subjective and intersubjective impacts and atmospheres of coloniality (Ahmed 2014; Gauld 2014; Bell 2018).

In a painting, empathy and insight influence handling of materials and interactions with

135 Instead of a material/immaterial and physical/psychosocial duality (two sides of one coin or two forces working in opposition), I have found that entropy and empathy are more intimately related and interconnected in their processes of perception and affect.

136 My thinking developed from reading Wilhelm Worringer's Abstraction and Empathy: A Contribution to the Psychology of Style while I was at the Jan van Eyck Academy in 2016/2017, and working on my PhD proposal.

137 Expanded forms of empathy have developed in response to anti-colonial scholarship, and within aspects of ecopsychology, new materialism and agential realism.

Fig. 71, 72. Raewyn Martyn, *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021.
Image credit: photographs courtesy of Anne Noble.

grounds and supports. This has informed my own understanding of material and compositional disorder, and influenced the deformation and decomposition that emerged in *Greywacke love poems returns* (2019), in both its coastal appearance and as part of *Listening Stones Jumping Rocks* at the Adam Art Gallery (2021).[138] In Section Five I think about these works with reference to methods of decreation (Weil 2002), compositionism (Latour 2010), and derangement (Ghosh 2016).

Critical empathy (Lobb 2017), considers how empathy is being used within contemporary politics and organisational leadership, while reactionary far-right politics and populism generate hateful and divisive rhetoric. Selective invocation and performance of empathy informs social production and reproduction, whereby existing inequities are reproduced between generations and/or new ones are produced (Tzanakis 2011; Bourdieu 1977).[139] Depending on our existing relationships, empathy can draw attention to inequities and also obscure them.[140] Critical empathy asks us to examine the biases and

138 In the intergenerational painting *Paint over, use again,* made with filmmaker Jess Charlton for the Govett-Brewster Gallery in Taranaki (2021), there are poetic leaps and propositions for extension of empathetic understanding to materials (Gauld 2014).

139 Empathy operates within habitus (our perceptions and behavioural predispositions); cultural capital (inherited and learned class-based cultural skills and wealth); and the aesthetic codes associated with each of these (Tzanakis 2011; Bourdieu 1977).

140 As part of social reproduction this creates and compounds intergenerational inequities in the distribution of resources and access to systems of both economic and cultural capital.

limits of my own empathy, and the exploitation of its inclusive and exclusive effects.

The critiques of empathetic political rhetoric that I've noted above, recognise the gap between mind and action, affective speech and effective action.[141] Within this gap, there are connections that remain possible between the two modes of affect and effect.[142] So how does this empathy work within this gap of possibility to alter our understanding of artworks and the way that art works?[143]

5.2 Empathy: Biopolymer Materialism

How we learn care

Initially, my understanding of entropy and empathy as interrelated processes was sparked by reading Wilhelm Worringer's 1907 text *Abstraction and Empathy* (Worringer 1997), alongside Edith Stein's 1916 dissertation, *On the Problem of Empathy* (Stein 1989). At the time I was a researcher at the Jan van Eyck Academy, near where Stein had 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 European fascism in the 1930s (Martyn, 2018a).[144]

It made me wonder about the epigenetics of those traumatic events, across time and space, in my own family and also my peers at the residency—many of whom were also grandchildren of that generation, caught up in those World War conflicts and their cascading impacts in different parts of the world. This diffractive reading of Stein allowed for personal understanding of historical events, activating an ethics of care (Puig de La Bellacasa, 2017), questions of knowledge politics and of intergenerational neuroplasticity.[145]

I've never been a parent, but when I was eighteen, I worked at a care home, learning how to care in collaboration: washing and being washed,

141 Currently, 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). There is increased recognition that politicians' use of empathy and its affects can become a futile performance if the experiences they invoke and provoke are not accompanied by material and structural actions that create greater economic and social equality and undermine the social and economic scapegoating from the far right (Bangstad, Bertelsen & Henkel. 2017; Lobb 2017; Kukar 2018)

142 In the philosophy of mind, an assumed dualism between mind and body has been questioned through various theories of interaction, seeking to understand the transformations of thoughts, feelings, and ideas, into actions and behaviours. These theories include epiphenomenalism, where phenomena of human experience are broken down into smaller parts. This breaks down interactions between mind and body, paying attention to the limits of co-relationship between physical events and mental states (Robinson 2020).

143 In their reframing of postmodernism and new materialism, Iris van der Tuin and Rijk Dolphijn argue that postmodern and new materialist thinkers are participating in a rewriting of modernism, working to generate knowledge without reliance on dualistic thinking. New materialism follows in the footsteps of Henri Bergson's call to 'push dualisms to an extreme' (Dolphijn & van der Tuin 2012, 118; Bergson [1896] 2004, 236). And Gilles Deleuze, who focused on activating freer movements and flows of the ideas and differences that had materialised as fixed dualisms in modernist thinking (Dolphijn & van der Tuin 2012, 117). As noted, Leong writes that this fixation with the removal of dualisms, also led to the disavowal of race (Leong 2016).

144 As mentioned in earlier sections, my great grandfather lost his arm on those fields in 1917; an event that probably saved his life and enabled him to return to Aotearoa, making a life as a door-to-door salesperson, news agent, and then bookshop owner.

145 Thorough discussion of this is beyond the scope of this exegesis but I did some reading around this and most recently found a dissertation that discusses transgenerational epigenetics and includes sections focused on survivors of the Second World War: Howard, A. E. (2022). Transgenerational effects of trauma through epigenetic mechanisms.

Fig. 73, 74. Raewyn Martyn, images of *Medium (reconfigured)*, work made at the Jan van Eyck Academy (2016–2017).

lifting and being lifted. Some of the best forms of care prioritise reciprocity within subjective experience, avoiding objectification. I was thinking about this while reading *Having and Being Had*, by Eula Biss (2020), who uses a dynamic of giving and receiving as active forms, to understand her inherited and learned relationships with capitalism. She diffracts recent theories of capitalist dysfunction with her own personal experiences of money, its extremes (lack and excess), and their tethering of the time and space for being an artist. In some ways, art helps us realise that time is material, or that time materialises in art. And that this is linked to the immaterial and material aspects of cultural capital and care (Bourdieu 2018, 244).

Empathy, and learning to care, are forms of social production and reproduction, they help produce and reproduce our relationships and the forms of care that influence systemic changes (Lobb 2017, 4; Fraser & Jaeggi, 2018; Bourdieu 1977, 183). Within processes of social production, empathy can be experienced and shared selectively, modelling systems of caring and uncaring behaviours. Empathy includes parallel and reactive modes of experience—where experiences are shared alongside, or reacted to (Davis 2018). The empathy at work within biopolymer aesthetics can move between these modes, and also the mechanistic (determined and/or determining) and the supercessional (emergent).

Questions of critical empathy (Lobb 2017), can be extended to the dynamics of entropy and empathy in the larger world of artwork—the more-than-human social and ecological context. In my artwork, I have sought to understand how empathy becomes material (materialises)—beyond leadership buzzwords, or basic responses to aesthetic triggers within fleeting experiences. Specifically, within artworks, how do empathetic affects induce different methods, and actions? And how is empathy a form of social reproduction, made visible and transmitted further within artworks? Ongoing critiques of social and political empathy inform my thinking. For example, how much is absorbed or obscured by empathetic or sensitive use and application of materials? The work may become prettier or more composed than it 'wants' to be (or I want it to be): misunderstood, misrecognized, misrepresented, often in the service of a formal status quo.

The universalisation that occurs within non-Indigenous science and philosophy risks the loss of context within specific experiences of empathy. Critically, there are differences in how empathy is triggered or activated, within the social and material relationships of ongoing colonisation, its disordering, and displacements (Bell 2018; McKitterick 2015; Maldonado-Torres 2017). Indigenous scholars critique extractive[146] new materialist understanding of non-human and more-than-human agency, including the writing of Helen Moewaka Barnes (Barnes 2018), within Indigenous-led rights of nature activism

146 These perspectives are also important for understanding how artists can participate in systemic change without extracting knowledge – working in reciprocity.

and scholarship. And Diana Leong has challenged the *disavowal or misreading of race* within the non-human turn.[147] Leong also considers the Anthropocene through discussion of "hyperempathy"—extended and heightened empathy—within Black science fiction writer Octavia Butler's dystopian *Parable* duology (Butler 1993; 1998). For Leong, hyperempathy becomes a provocation for a critical empathy that acknowledges races, class, and gender within crisis (Leong 2016, 12).[148]

Material empathy

Placing physical and scientific concepts of entropy and negentropy in an associative framework with empathy and art provokes further questions about how empathy is circulates within the physical world and its processes—within matter and the material flows of affect that I discussed in Section One and Two (Arnheim 1974; Bois & Krauss 1996; Worringer 1997). To understand the dynamics of these material flows, I have used the term "biopolymer materialism", considering how the consumption of biodegradable materials is both biological and economic, readily moving beyond the biosphere. And how the biopolymer aesthetics that carry affect, move between people and intersubjective moments of encounter.

I link the formulation of biopolymer materialism to Mark Fisher's "gothic materialism" (Fisher 1999, 2),[149] and how Fisher reframes the Gothic through materialism, as much as he reframes materialism through the Gothic. He expands the cultural associations of the Gothic by approaching it as material and also of the body, a horrific 'body without organs', and an insistence on a non-organic agency (Fisher 1999, 2; Deleuze & Guattari 1994; Artaud 1977). The Gothic is linked to the unbounded and expanded subjectivity involved in experiences of psychosis. And in the interspecies relations that feature in J. G. Ballard's fiction which embraces plant and mineral (crystal) animacies and agencies, with their gothic qualities of the in between (Ingwersen 2016; Ballard 1985; 2008).

> *Both Worringer and Deleuze-Guattari identify the Gothic with "nonorganic life", ...that cuts across the distinction between living and nonliving, animate and inanimate* (Fisher 1999, 2).

In Mark Fisher's work, the generosity and joy of the socialist 'Red Plenty' and the unbounded imagination of the 'Acidic' re-energise the Gothic with forms of collective production and reproduction, including propagation and fermentation. Psychedelics like acid are produced through fermentation, and it's possible to extend Acid Communism beyond the

147 Leong writes: *the framing of the new materialisms as inherently more ethical generates, and is generated by, a disavowal or misreading of race* (Leong 2016, 12).

148 *Hyperempathy also shares with new materialist philosophies a capacity to disturb the social and political hierarchies that regulate our encounters with difference* (Leong 2016, 17).

149 This material play with words also creates a kind of structural diffraction within language, like Artaud's 'subjectile' (subjective/projectile) that I discuss in Section Seven). I came across Fisher's gothic materialism after beginning to use 'biopolymer materialism' but it has helped me understand how it functions as a reframing of both biopolymer materials and the space between historical materialism and new materialism. Fisher references the influence of Wilhelm Worringer, via Fisher's readings of Deleuze & Guattari (Fisher 1999, 2).

pharmacological, into other forms of affective and material production. Fisher's 'Acid Communism', is largely interpreted through a psychedelic lens, another plane of consciousness that allows us to imagine a world beyond oppressive power structures (Ambrose et al, 2018; Diaz 2021).[150] Applied to biopolymer aesthetics, this includes the acidic propagation (fermentation) of polylactic acid—key to some of the most common biopolymers currently used in 3D printing.[151] Affective processes of production allow for large-scale reproduction and also more bespoke, mutational, and acidic propagations—a ferment, somewhere just beyond an artist/s or author/s' control and not necessarily reproducible in exact form.

There is another mutational propagation at work in *Paint over, use again* (2021), made with filmmaker Jess Charlton for the Govett-Brewster Gallery in Taranaki. Using liquid cellulose pigmented with fluorescein, I trace and copy from artworks made almost one hundred years ago by my teenage paternal grandmother; these processes of reproduction allow for mutation and distortion, as I inhabit her visual language. An Acidic intergenerational ferment of inheritance; memory, epigenetics, practices, and material images. The Golden Spike, a text by

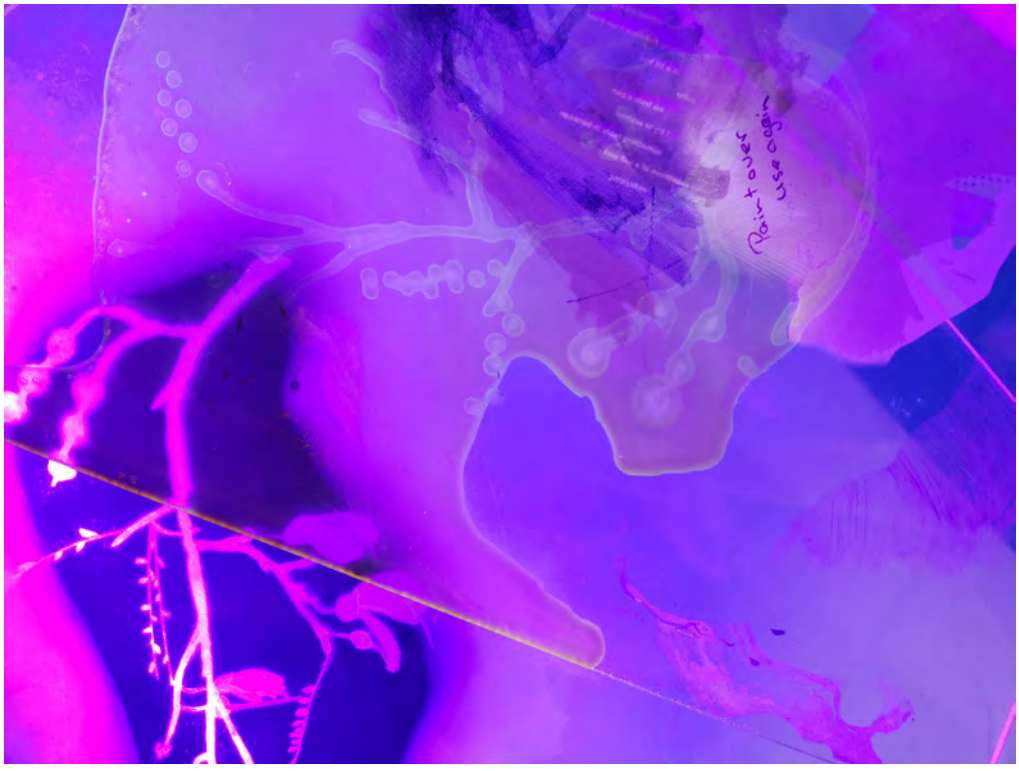


Fig. 75. Raewyn Martyn and Jessica Charlton, *Paint over, use again* (2021).

150 Fisher's posthumous publications include work toward an unfinished book that would likely have been titled Acid Communism. Fisher was influenced by Deleuze and Guattari, and by Jean Baudrillard's negativised Gothic, where perfect reproductions become impossible dreams, with attempts that result in highly visible and material deviations. published within *k-punk: The Collected and Unpublished Writings of Mark Fisher* (2004–2016) (Fisher et al, 2018), and *Postcapitalist Desire: The Final Lectures* (Fisher & Colquhoun 2020).

151 Diaz writes: *'Acid' here can be misinterpreted as well. According to Jeremy Gilbert, a friend of Fisher's, "[he] liked the idea of 'Acid' as an adjective, describing an attitude of improvisational creativity and belief in the possibility of seeing the world differently, in order to improve it, deliberately 'expanding' consciousness through resolutely materialist means." Thus, 'Acid Communism' is understood to mean the real movement towards abolishing the present state of things, moving towards a post-capitalist society, through the raising of consciousness and the use of the radical and imaginative visions of the pre-neoliberal counterculture* (Diaz 2021).

writer and archivist Stefanie Lash (2021),[152] traces connections between various forms of plasticity found within the work, and their historical connections, hollowing out intergenerational time and matter (Lash 2021).

The cellulose medium is derived from the substance that gives structure to the cell wall of plant and bacterial organisms.[153] It is an interfacial substance, a material threshold between internal and external. Sometimes it has a disembodied and gothic 'nature' to it, extracted and reconstituted as a fluid medium, it inhabits an unbound materialism, with alchemical qualities generated through more-than-human intra-activities and subjectivities (Coole 2013). In my use of cellulose, I look for possibilities of animacy, taking its processed and dehydrated form and rehydrating it into new biomorphic arrangements, derangements, and reproductions—casting, imprinting, delaminating, reconstituting, and culturing.

Entropy and empathy are useful for understanding the breakdown of narratives within colonial systems and subjectivities. For example, within my Pākehā upbringing and ongoing education, the lives and deaths we are taught to recognise and care for, inform and are influenced by changing historical and scientific narratives, that can alter perception and empathetic response.[154] Changes in perspective and intersubjective relationships of care, are reclaimed from psychic colonisation (Bell 2018b). At the same time, calls to reclaim empathy respond to far-right populism and the breakdown of social cohesion (Toros 2022), as far-right diversions of democratic discourse and media via dog whistle and scapegoating rhetoric trigger much narrower forms of identitarian empathy (Haney-López 2014). The material and affective empathy at work within the stories and artworks that we share (including my own), resists these narrower forms of empathy, expanding the forms of life we care for. Aesthetics and anaesthetics materialise within social atmospheres, and here I would add that they can also materialise in how we learn to care and the systems of care that we reproduce.

On a Sunday morning in 1997, I was slicing ham at a Fresh Choice supermarket delicatessen and listened as the radio newsreader announced that Princess Diana had been killed in a car crash. It was a death that was recognised with widespread grief, in part because of Diana's own very public demonstrations of empathy, drawing attention to particular social and political issues. My own memory of the global media coverage that followed is always in association with that job at the supermarket, where I would regularly start those long shifts in tears—slicing kilograms of onions for the mini-quiches,

152 See appendix.

153 The Gothic turn within New Zealand contemporary art in the late 20th century, saw Pākehā artists generating a gothic materialism that began to grapple with their identities and roles within systems of cultural and ecological colonisation in Aotearoa (Kavka, Misha, et al. 2006; Leonard 2008; Gallagher 2015).

154 These perceptions and recognitions are important to understanding boundaries of human and more-than-human: organic and inorganic, biologic, geologic, hydrologic, and atmospheric.

before threading raw rotisserie chickens and locking them in, line by line into the hot machine. I became adept with the muscle memory of landing their hot bodies on the stainless-steel bench and rolling them over, into their styrene caskets to be swathed in cling wrap from the giant dispenser. Each body would be treasured for the gift that it was.

The anticolonial and feminist CLEAR lab in Newfoundland places value on people understanding and sustaining complex material relationships, particularly with plastics. Plastics' ecological relationships are recognized through their origins within fossil fuels: *a lot of the dominant discourse about plastic is that plastic is inherently bad, and it's a bastard child of industrialization, and it needs to be eradicated, and illegalized, and banned, and exorcized. But also plastic is our kin, it's our relation. It's from ancestors – organic ancestors from a long time ago* (Liboiron 2019). Identifying such ancestor relationships is shown to increase engagement in processes of empathy toward and with materials and entities within living systems. Complicities and implications are revealed through care, holding space for those critical issues to remain present (de La Bellacasa 2017, 204; Dombroski 2018, 262).

This perspective is echoed by Māori artist George Nuku (*Mio* 2018), in a series of installations titled *Bottled Ocean* that propose plastics as a taonga (treasure), a beautiful and precious substance, the product of geological time frames of slow transformation of ancient marine life into crude oil, extracted from the body of Papatūānuku, Mother Earth. Refusing to classify the substance itself as 'evil', he attests it is our systemic societal failure to not value this material *enough*; to not recognise the preciousness of its base materials, or the energy required to transform it, or the ways in which we use and discard it.

Systems of Care

Attention and care can be extended beyond the individual human body toward the shared biology of community and ecology, and it also extends further into the collected sediments of geology, and the flows of hydrology and atmosphere.[155] For example, witnessing a landslide, or the strata exposed during a quake, a release and redistribution of energy and tectonic stress generates aesthetic experience and humans can have an affective experience of these geological processes.[156] This is an extension of feeling into more-than-human encounters like geo-aesthetics, where we gain affective understanding of

155 The geophilosophy and planetary aesthetics of Deleuze and Guattari, Elizabeth Grosz, and Emily Apter that I've introduced in earlier sections can also be considered in relation to entropy and empathy, and the boundaries of care. While there are also studies of sympathy and empathy between dogs and humans, for example (Young, Kathayoon, & Wharton 2018). This interspecies empathy might be extended to species that exist at the boundaries of relational, physical, and biological spheres – biofilm inhabitants, plankton, fungi, etcetera, who move between atmosphere, hydrosphere, and geosphere (Hsu 2020; Sharma 2022).

156 I formulated this example before reading Banchoff's paper about Rene Thom's four-dimensional thinking, but in Section Four I cite Banchoff's example of an earthquake as an ongoing or durational change (Banchoff 2014).

geological processes.[157]

Human capacity to feel care in response to inanimate forms has been a key question in art. As with the morphogenic impacts of catastrophe, described in Section Four, empathy is often initiated by events that articulate change or forking processes within a system or entity in creative flux, entropy, or negentropy—kinetic signifiers of growth, life, stasis, and death. Wilhelm Worringer sees inorganic forces at work within the processes and systems of organic life. And that 'inorganic life' is a *manifestation of the will toward abstraction and with it spiritual agoraphobia, entropy and death, while organic life is the will towards rationality, empathy and familiarity* (Boardman 2018, Worringer, 1908 (1953), p. 247). For Worringer, artistic forms are both physical and felt—different tools, different surfaces, different materials and media, different scales, different pressures—all involving and generating different feelings toward aesthetic experience.

More recently, theorists have extended and complicated this dualism of organic and inorganic systems (Deleuze & Guattari 1987, p. 411; DeLanda 1992, p. 129; Povinelli 2016, 32; Boardman 2018). Elizabeth Povinelli's 'Carbon Imaginary', mentioned in Section Two of this exegesis, is one example of how the commodification and flows of fossilised energy and matter complicate the binary of geos and bios, aligning with Fisher's argument for an "anorganic continuum" (Fisher, 2017, 2; Boardman 2018). I have found this useful for understanding the possibilities of not-quite-animate 'zombie' paintings and the latent shape memories that animate some biopolymers, as well as my own human memories.

Artworks become like maps and material memories, carrying affects between people, places, and generations. The emotions and affects redistributed through artworks can reorient people (Ahmed 2004; 2014),[158] and, as Liboiron (2019) notes, if people remember their longer (intergenerational) relationships with materials like plastic, it might reorient their current relationships. I've been thinking about my nana's relationship with cling film (Glad Wrap); how she washed it and hung it on the washing line, until she forgot how to do that. She didn't wash the plastic because of a particular ecological concern, but because of another conservative logic born out of living with a father who was likely addicted to alcohol, and sometimes out of work. Her will to conserve was hard to ignore—waste was nonsense, and its affects were untenable. Her agency and sense of the world was located, preserved or sustained in the conservative and its aesthetics. This might be understood as an affective economy born from childhood trauma, arguably a trauma driven by the economic and mental health

157 Affect studies beyond human experience, in non-human organisms and animals, is also relevant here but beyond the scope of this discussion.

158 Ahmed gives the textbook example of a child experiencing fear in response to the affect of a bear. Ahmed parses out the functional (biological) and relational (social) processes at work in a child's fearful apprehension of the bear (Ahmed 2014, 7-8). She does this to bring the reader back to themselves, to consider where such relational emotions might come from, and how they circulate socially. Metaphor and narrative tropes are ways that emotional impressions and expressions are circulated, through story and image, developing what might become a life-long imaginary.

impacts of coloniality, with its circulations of shame (Ahmed 2014, 33; 100–120). In Aotearoa New Zealand our collective shame includes both the colonial and ecological as manifestations of settler-colonial capitalism. The way this shame is distributed (and processed) can generate national narratives that get in the way of restorative action (Ahmed 2014).[159]

During 2019, Jacinda Ardern's internationally celebrated empathy (Fifield 2019; Toros 2022), expressed in the aftermath of white supremacist and ecofascist (Sparrow 2019) attacks on Mosques in Christchurch, was quickly followed by cross-party support for changes in gun laws. Sadly, action on our racist refugee policies and the limitations within provisions of financial compensation for victims and their families were left in stasis (Maurice 2019; *After Christchurch*, 2019).[160]

Empathy as a medium

Biopolymers are mediums in all senses of the word—growth mediums; psychic mediums; and positional mediums. They have an animacy, a liveness, that provokes mixed methods of intuitive and DIY processes, even in an industrial setting like Scion. With all of their advanced technology and science-led investment, I'd argue that there are still elements of speculative chemistry (alchemy) within the industrial chemistry at Scion.[161] Through my work there, I understand that personal, irrational, and subjective perspectives can enter into scientific thinking and practice, allowing for empathy to be part of chemical (and alchemical) processes.

In the 19th century, personalism emerged within philosophy as a reaction to the depersonalising aspects of enlightenment rationalism and a 'scientist mentality' (Burgos 2018, 8).[162] The influence of personalism helped expand the realm of scientific knowledge, allowing for a return of metaphysical and mystical perspectives. In extension of this, Roland Barthes mid-20th-century narratives of plastic objects allow for the material alchemy of everyday use, not just specimens bound to the alienated collection of matter found in 19th century museums (Barthes 1972a).[163] Barthes' writing has been traced

159 For example, collective shame projected onto dairy farmers and processed as victimisation means that cross-party climate emission legislation might be rejected by the farming community. While Crown apologies distribute shame differently – Sara Ahmed describes this kind of Crown apology as an act of nation building. The narratives of shame and apology are used to establish legitimacy for a nation state, the act of public acknowledgement stabilises moments of shared identity and history, obscuring desire for systemic change.

160 In 2002, I remember standing in my nana's kitchen talking with my New Zealand-born Australian aunt about Australia's refusal to accept people onboard the Tampa. Almost twenty years later, I'm messaging with her on Facebook about Australia's escalating climate crisis and ongoing scapegoating of asylum seekers. Shame is projected outward onto those most vulnerable within the nexus of settler-colonial climate crisis, and particularly in rural economies.

161 Within the coating industry, the emotional or affective (economy) at work is one of protection. Coatings like house paint must protect the structural integrity of objects and architectures. I proposed a project to the Govett-Brewster Art Gallery, working with paint producer Resene and scientists at the Ferrier Institute and Scion, to test wall-based biopolymer coatings within the Gallery, reflecting on the never-ending repainting of gallery walls, and temporary wall works made by artists. The project didn't go ahead but remains of interest.

162 Burgos describes the dominant 'scientist mentality', that: *at that moment, it constituted a detonator which led a group of intellectuals, including the personalists, to recognize the need to articulate a consistent response, since the predominance of scientist thought not only hampered the progress of the human sciences, but also threw into a squalid ghetto anyone who attempted to think in terms of transcendence, not merely in the religious sense, but even in the simply meta-material sense.*

163 He also discussed aspects of plasticity while writing about George Bataille's base materialism and the liquid and plastic metaphors in *The Story of the Eye* (Bataille 1972b).

through to the beginnings of 21st century new materialism (Barthes 1972a, 97; Ireland and Lyndon 2016, 3; Grindon 2010, 305).[164]

Personalism is linked to Edmund Husserl's phenomenology, which Edith Stein had contributed to as a student. I see personalism as a funnel or filter for abstract ideas, grounding them in personal experience and material systems. Personal processes of material determination and rematerialisation occur within the human and beyond it, allowing for Alfred North Whitehead's process philosophy (also referred to as organic philosophy),[165] to include more alchemical and spiritual approaches to scientific experiment and experience that contribute to 19th and 20th century materialism and recent new materialism (Whitehead et al. 1929, 45; Tuin & Dolphijn 2012; Fox & Alldred 2020). I think both personalism and process philosophy are important for understanding how empathy exists at the interface of subjective and intersubjective experience and their intra-actions (Barad 2007), particularly within art and art making. In my work at Scion and in the studio, I link my thinking about Worringer's ideas about art to these philosophies that influenced both art and science (Worringer 1997).

Playing the Machine (2021–2022), develops 'misuse' of extruders, and involves aspects of the personalism and process philosophy described above. We experience heightened sensitivity to the molten plastic, including how it moves through the extruder and behaves in response to our diversions and obstructions, prompting us to feed it through and support it in different ways. The intimacy of Jessica Charlton's camera work means that now, when I watch myself handling the hot plastic, I can feel the heat on my fingertips.

As a result of my research, I've been appreciating how these inefficient and hands-on methods attend

Fig. 76. Raewyn Martyn and Jessica Charlton, *Playing the Machine* (2021–2022).

164 Barthes describes plasticity as a migration of objects and their signifiers: *recited like the inflectional forms of the same word; revealed as the states of the same identity... extended like the successive moments of the same story* (Barthes 1972b, 240).

165 Process philosophy helps us understand flows of matter as they move through forms of abstraction and crystallisation (Whitehead et al. 1929, 45), and it is important to the later work of Deleuze and Guattari.

to concerns about the way learning and making are often siloed in the interests of speed, and funding incentives. Isabelle Stengers describes Whitehead's concerns about the acceleration of chemistry in the 19th c, where the materials, methods, and processes of chemistry became disassociated from their material applications in the world: *the many arts or crafts of chemistry, from that of the perfumers to that of the metallurgists or the pharmacists* (Stengers 2017, 66).[166] This displacement of knowledge from material application also displaces the social and political impacts of science, and the agencies involved with material applications.[167] Material reconnection, even beyond mechanistic science, develops our understanding of specific human and more-than-human agencies (Fisher 1999).[168]

Pictorial Systems

Entropic disorder within systems (including aesthetic systems, living and non-living systems, and their organisms), is experienced internally and externally. Empathy and insight emerge within this, allowing for greater understanding of what is happening within specific instances of disorder, and altering the behaviours of agents within a system—empathy can alter the course of disorder. This might include objective understanding of what energies are involved in the system and how they could be redistributed, or understanding of how a closed system that lacks energy might be opened, allowing new energy to be admitted (Shanken 2013, 6).[169]

Painting is often a system-based practice, with some form of pictorial system at work in many paintings (Bois 1993, 248),[170] and with artists as agents within those pictorial systems. In Bruno Latour's Compositionist Manifesto (2010, 474), composition shares roots with words like composure, compromise, and compost. Here, the decomposition of composting processes becomes an analogy for the discomposure of empathy, where disaffection shifts and we are open to embodied and aesthetic recognition of experiences beyond ourselves. Like

166 Stengers, Isabelle. *Another Science Is Possible : A Manifesto for Slow Science*, Polity Press, 2018. *'fast chemistry' entailed a cut, which divided not pure and applied chemistry, but rather the whole continent of chemical crafts on the one side, and, on the other, both academic research and the new network of industrial chemistry, the two entertaining a new symbiotic relation, as each needed and fed the other.* (Stengers 2017, 66)

167 Writing about the possibilities for a 'slow science', Isabelle Stengers states that Whitehead wasn't negating the importance of abstraction but was encouraging a vigilance of the abstractions that thinkers make. For Whitehead, it is this capacity to be vigilant in abstraction that generates rational thought, and this vigilance requires thinking outside of siloed disciplines (Stengers 2017, 65).

168 Mark Fisher reframes the gothic in relation to cybernetics and Donna Haraway's cyborg: *the non- or anorganic Deleuze-Guattari introduce us to is not the dead matter of conventional mechanistic science; on the con-trary, it swarms with strange agencies.* This gothic materialism is a space of more-than-human agency, including processes of entropy and empathy (Fisher 1999).

169 This James Clerk Maxwell's Demon and 'trapdoor' at work, the metaphor of a demon who opens and closes a trapdoor, allowing for energy to move in and out of a closed system, creating neg entropy.

Shanken writes: *Much has been made of Smithson's interest in geology, geological time, mineralogy, the molecular structure of crystals and glass, and, of course, the Second Law of Thermodynamics, known as entropy: the tendency of closed systems to lose energy or order. Similarly, Jarry, who considered a career in science and studied philosophy with Henri Bergson, gravitated towards the 'eccentric brilliance' and 'bizarre experiments' of Lord Kelvin, who proposed an early theory of entropy, and Clerk Maxwell, whose 'Sorting Demon' thought experiment attempted to defy the Second Law of Thermodynamics in order to achieve a net gain of energy. For Jarry, 'science was an adventure, domestic and transcendent' (Shattuck 1996: xiv–xv). The same could be said of Smithson* (Shanken 2013, 6).

170 Bois identifies this perceptual disruption of figure/ground as the 'preliminary task'(Boise 1993, 249) of modernity; in this role, paintings become a "perceptive model".

the compositional processes of painting, empathy involves perception, and is a systemic modelling process within the emotional economy. Empathy involves the decreation (decentring) of self (Weil 2002), and the generation of 'rising' intersubjective and intra-active subjectivities within particular social situations and atmospheres (Barad 2007; Bell 2018).

Posting on social media, during the installation of *Greywacke love poems: returns* (2019), at Adam Art Gallery, I found myself using the words deranged and derangement to talk about what was happening to the composition and decomposition of the painting. I realised I was using methods of derangement, decreation, and compositionism (Ghosh 2016; Weil 2002; Latour 2010).

Amitav Ghosh's book *The Great Derangement* (Ghosh, 2016) outlines the aesthetic and cognitive dissonances found within the climate crisis. And states the need for cultural and aesthetic work in response to this. A subsequent collection of texts, edited by T.J. Demos, et al (2021), sees a need to: *highlight creative and experimental practices beyond the techno-scientific, apocalyptic, positivistic and/or spectacular media and pop-cultural image systems through which climate breakdown is so often experienced and visualized.* (Demos, et al 2021,1). These texts inform my thinking about the 'derangement' of the Adam Art Gallery stairwell installation; I have questioned whether it resists apocalyptic tendencies, and embraces a more dystopian or compositionist gesture.

Materially, the difference in material composition of architectonic structures and geologic tectonic structures, and their forces, is complicated by the knowledge that the aggregates used in the building materials of the university were likely sourced from greywacke quarries like the one at Owhiro Bay. It is even possible (yet unproven) that this specific stairwell, grafted from an old external stairway structure and reintegrated into the interior of the newer building, may have used aggregate sourced from Owhiro Bay.

Fig. 77. Raewyn Martyn, Instagram post from installation of *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021.

To varying degrees, I was also delaying compositional evaluation and deferring my own role as composer, prioritising the material behaviours instead. This prioritisation of material behaviour raises questions about how much is absorbed or obscured through empathetic or sensitive use of materials, where an artist is assuming a particular and subjective understanding of the material. A painting may become prettier or more composed than it wants to be: misunderstood, misrecognised, misrepresented, and ultimately recuperated in service of a formal status quo.

Alternatively, curiosity and empathy might lead to decreation—a dissolution and expansion of subjectivity (Weil 2002, 33). Decreative empathy might lead to defamiliarisation, and discomposure of boundaries between artwork, the world around it, and the artist's subjectivity and agency. Processes of entropy and empathy allow for loss (or expansion) of self, through expansion of understanding and openness to, and of, affect (Weil 2002, 45). Our affections and disaffections shift, as does our rational understanding beyond ourselves and the immediate composition of our own subjectivity (Weil 2002). The decentering of the self allows for what we might call intersubjectivity, that Karen Barad might extend to become intra-active subjectivity, an intra-subjectivity within specific systems (Hogue 2010, 146; Barad 2007,174; 208-212)[171]. The processes described above can reset the boundaries of our future empathy

Loss of emotional composure can also be thought of as a form of entropy and disorder, occurring within processes of empathy. It registers as aesthetic and embodied recognitions of experiences, feeling, and emotion beyond our own. Beyond the individual, the loss of objective composure involved in empathy may generate subjective and intersubjective decomposure at a larger scale. As introduced in Section Four, Bruno Latour's Compositionist Manifesto (2010, 474)[172], develops a systemic understanding of planetary aesthetic formations—human and more-than—emphasising that humans are part of larger disassembling and assembling bio-social systems where heterogeneity and difference flourish (Trafí-Prats 2017, 326). Latour's compositions are metabolic, with *the pungent but ecologically correct smell of "compost," itself due to the active "de-composition" of many invisible agents.* (Latour 2010, 474). This is decreation beyond the self, and it provokes questions about what and whom is made invisible within Latour's compost? (Leong 2016). I'm curious about how larger-scale discomposure can occur without flattening or obscuring specific agencies and inequalities.

Simone Weil's decreation retains this systemic perspective and encourages a reconstitution of

171 Barad formulated an account of agential realism that refuses conventional separations between different objects and subjects, and 'mere intersubjectivity' doesn't fulfil this (Barad 2007).

172 Latour considers 'compositionism' through shared roots with words like composure, compromise, and compost, and as an alternative to destructive modes of critical thinking (Latour 2010, 474). Donna Haraway uses the same root words to critique the term posthumanism: *I am a compost-ist, not a posthuman-ist: we are all compost, not posthuman. The boundary that is the Anthropocene/ Capitalocene means many things* (Haraway 2015, 161).

intersubjective experiences into social movements (McCullagh 2018, 166).[173] Weil and Bataille had an adversarial friendship and approach to aesthetics—piety vs excess—at the same time as shared interests in the sacred, and how it informed metabolic and systemic thinking about phases of life and death (Biles 2007, 6; Irwin 2002).

> *Except the seed die. . . It has to die in order to liberate the energy it bears within it so that with this energy new forms may be developed. So we have to die in order to liberate a tied up energy, in order to possess an energy which is free and capable of understanding the true relationship of things.* (Weil 2002, 35).

The derangement of the Adam installation also resonates with processes of entropy, in geology, climate breakdown, and social change. Decreation, and Weil's writing about forces like gravity, allow us to see these at planetary, cosmological, and intimately personal scales. As discussed in Section Four, these are time-based processes, seen in the works like Jay DeFeo's *The Rose*, 1958-1966, Gustav Metzger's *Recreation of First Public Demonstration of Auto-Destructive Art*, 1960, remade 2004, 2015, Gordon Matta Clark's *The Land of Milk and Honey*, as part of *Museum* (1969), Andy Warhol's *Oxidation Paintings* (1977), and Helen Chadwick's *Carcass* (1986). In the stairwell, figurative elements are deranged toward an oddly simultaneous objectification and dematerialisation, on the edge of dehumanising (Irwin 2002, 71), but somehow a decreation that also retains a subjectifying figuration, beyond the human.

> *decreation is not destruction, which makes the created pass into nothingness. Decreation makes the created pass into the uncreated. "Uncreated" does not imply the obliteration of the created. It is its infinite future, into infinity.* (Moreau 2016, 2)

Artists often work with the yet-to-be manifest physical frame in mind, as they compose and imagine the alternative realities found throughout human art histories. Frames contribute to the compositional boundaries of the picturing and imaging—the edges of what is imagined and visualised and materialised on a canvas or surface. Even a sculpture or installation can have a visible or invisible frame, whether that be an architectural frame, a social, or metaphorical one—these are frames within the system of the artwork. In the following paragraphs I extend my thinking about compositional derangement in painting to consider precedents for ecological and systems thinking in non-Indigenous painting theory. *The Great Derangement* (Ghosh 2016), 'reframes' the 'wicked problem' of climate change (Montagnino 2020, 115). This idea of conceptual frames and framing draws from Gregory Bateson's systems thinking (Bateson 1972).

Katherine Foo (2019, 230-234) describes how Jacques Rancière's three regimes are relevant to

173 In *The Poem of Force*, she had already developed a poetics of force (Irwin 2002, 71), showing force as a dehumanising gesture that reduced people (and non-human organisms) to objects. Weil's decreation involves a destruction of the self, or an explosion of the self and its subjective boundaries, not dissimilar to the explosive materialism of Deleuze and Guattari's artisans (1987, 345), discussed in Section One.

understanding undisciplined environments and visual politics. I think the 'undisciplined' and unframed or informe (Bois & Krauss 1997) share the possibilities for curiosity and empathy described later in this section. Curiously, the ethical regime of images that Ranciere identifies is not necessarily 'just' in pedagogy—ethical images exercise power rather than redistribute power. Rancière's ethical regime is pedagogical in nature: aimed at educating citizens about ethical ways of doing and making, but it is his aesthetic regime that allows for use and activation of ethics, including a redistribution of the pedagogical making and doing. When empathy is involved in the aesthetic regime it is also carried within the redistributions of emotional economies (Fraser 2018, 97; Ahmed 2004; 2014).[174]

In the 1970s, an ecological theory of picture space and perception developed to acknowledged that the viewer or receiver was present within a specific environment, drawing information from an array within a larger ecology of context and conditions (Gibson 1978; 1966; Rogers 1995). This differed from the dominant idea that perception was constructed through already known codes, encoded into the artwork (Gibson 1966, Rogers 1995). The ecological approach to perception of picture space, shares in the economy and systems thinking of artistic practices of that time (Patrizo 2020), along with the theories of Bateson (Harries-Jones 2010) and can also be linked to the ecology and economy of affect and feeling involved in Sara Ahmed's thinking. As described by Rogers (1995, 122), the viewer/perceiver's interaction with their environment and their own embodied knowledge that is relational within specific spaces and sites, informs their assessment of what is internal to any picture.

> *Pictures are inherently ambiguous. The argument that picture perception is based on informative structure need not deny this fact. Artists and experimental psychologists can exploit pictorial ambiguity, or they can constrain it.*
>
> (Rogers 1995, 123)

As mentioned toward the end of Section Two, Nancy Fraser *(Nancy Fraser - Against* 29:11, 2021) uses pictorial space as a metaphor for the compositional dynamics of capitalist economy, describing its figure and ground relationships. While in *Painting as Model* Yve-Alain Bois takes Hubert Damisch's earlier text as the starting point for economic and ecological systems approach to painting, including 'models' like: perceptive; technical; symbolic; and strategic (Bois 1993, 245-257). Neither Bois nor Damisch mention Bateson and the ecological systems thinking that could inform an ecology of painting.

Instead, Bois draws on Bataille and the idea of informe, which involves a decategorisation and resistance of systemic organisation (Boise 1993, 253). However, in the context of painting and picture space, decategorisation and entropic disorder can allow for reordering and recomposition, for new systems of

174 Such redistribution is also key to Nancy Fraser's understanding of justice (Fraser 2018).

pictorial space to emerge (Boise 1993, 254).[175] In the context of the climate crisis, systems thinking has also influenced our thinking about socially engaged arts practice, with ecological thinking changing the composition and boundaries of who and what is included in community and 'life'.[176] Lucy Lippard writes: *There's no reason to exaggerate the elusive power of artists. They can't change the world … alone. But with good allies and hard work, they can collaborate with life itself* (Demos et al., 2021, 47), I would suggest that these collaborations involve processes of empathy.[177]

Metabolic Processes

Empathy metabolises our everyday experiences, in localised or place-based situations, and at larger scales; in moments of disorder, misunderstanding, unfamiliarity and curiosity. Empathy is often experienced strongly in relation to people and events that we're already connected to, but it also occurs within the unfamiliar. Unfamiliarity can provoke curiosity and desire for the emotional connections that empathy is associated with. Like the surrealists mentioned in Section Three and Four, science fiction writers like J. G. Ballard—with his animacies: self-painting paintings, singing plants, and geomorphic crystalisations—defamiliarise the familiar, provoking curiosity for what exists beyond conventional reality and traumas of war and post-war life (Bell 2021)[178].

Whether encountered for the first time through a science and technology-oriented YouTube video, an object or artwork, the material instability of biopolymers can provoke curiosity about larger systems of production and creative possibility. In the following paragraphs I suggest that curiosity, empathy, and imagination all influence the ways our social and material world are produced and reproduced (Zurn 2021, 12).[179]

In the 2017 exhibition *Non-human Narratives* curated by Yasmin Ostendorf at Jan van Eyck Academy in Maastricht, I made an edible and replenishable table top of food-grade cellulose, using seawater coloured with calcite (chalk like the Maastrichtian Group below the city), and chlorophyll extracted from mint using absinth spirits. The consumption of fragments of the installation was a kind of communion and transubstantiation for

175 Bois writes: *the confusion of the vertical and horizontal proposed by one side of modern painting was taken for an essential mutation, participating, if you like, in a critique of optics* (Boise 1993, 254).

176 See also, ecological thinking and aesthetics in: Morton 2007; Morton 2010; Morton 2016.

177 In Lippard's chapter, Describing the Indescribable: Art and the Climate Crisis, the exhibition *Weather Report: Art and Climate Change* curated for the Boulder Museum of Contemporary Art in 2007, is revisited with analysis of how each work provoked understanding through affect and concept, pulling these threads through to contemporary cultural climate movements like Standing Rock. Lippard reminds us that the social is an imagined form that can be reimagined and made visible in many artforms. Now 83 years old, and largely working in localised and place-based ways, Lippard's earlier interests span the gamut between surrealism and it's biomorphic and polymorphic offshoots – including the seminal exhibition *Eccentric Abstraction* (1966), touched on in Section Four, including works by both Bourgeois and Hesse, through to the Anthropocene and climate breakdown.

178 Ballard saw that what was needed from pre-war surrealism was somewhat different to what became necessary within post-war life: *The techniques of surrealism have a particular relevance at this moment, when the fictional elements in the world around us are multiplying to the point where it is almost impossible to distinguish between the 'real' and the 'false'—the terms no longer have any meaning* (Bell 2021, 948).

179 In their critiques of curiosity, Perry Zurn (2021), considers curiosity *as a social praxis tuned to specific political formations. Curiosity is a series of investigative practices that are informed by and constructive of political architectures.* (Zurn 2021, 12).

Fig. 78, 79. Raewyn Martyn, an edible painting made for the group show *Non-human Narratives* curated by Yasmin Ostendorf at Jan van Eyck Academy in Maastricht.

visiting school children—who became fascinated by the idea of a painting they could eat. By taking a substance into our own organism and metabolising it, our relationship is different.[180] If we rely on that consumption as a food source, the relationship is also different. There's a long history of artworks made out of edible materials, including Natalie Jeremijenko's (*FlowerXFloss* 2013), that beneficially alters the internal microbiome.

In Chicago, later in that summer of 2017, an afterschool workshop involved discussion of what cellulose was. Halfway through the conversation a child speculated: "it's like getting ink from a pen, blood from veins." I tried to explain that it was something more in between, like the substance of a cell wall, collapsing. This conversation later metabolised into a poem for a cellulose poster presented as part of *Howling Bawling* (2018), within The Art of Forgetting exhibition at the Jan van Eyck academy.

In November 2021, studies showed that microplastics similar to those found in the food chain had proven to cross the blood/brain barrier in mice (*Mouse Study Shows*, 2021). This research has intensified individual and collective realisations of our intimacy with the petrochemical plastics that have previously been compartmentalised as dirty and other, 'waste'.[181] What kinds of material empathy are involved in these realisations?

Curiosity and empathy are also forms of desire, for expansion of our shared imaginaries and intersubjectivity, and what we consider

Fig. 80. Raewyn Martyn, photograph taken during the after school workshop that informed a poem for *Howling Bawling* (2018).

180 During 2017, in conversation for *The Use Book* (Black and Martyn 2017), scientist Cilla Wehi spoke of the level of care a community might feel for a species that they rely on as a food source. The level of connection between species where they are respected and valued as a food source might well be an impure or selfish form of care, but it is still care.

181 As mentioned in earlier sections, this has come together in my reading, with the reframing of relations developed through the CLEAR Lab and work of Max Liboiron, and the work of Tina Ngata. They share a recognition of the living kin who preceded the fossilisation and petrochemical forms (Liboiron 2020).

possible in the world—whether these are omens or aspirations, or somewhere in between. Within our existing imaginaries, Elizabeth Povinelli writes that acknowledging the pervasiveness of a 'carbon imaginary' also opens up space for alternative desires (Povinelli 2016, 37). Here in Te Moananui-a-Kiwa, Lana Lopesi presents 'Moana Imaginaries' (Lopesi 2021), which demonstrates how art also generates imaginaries and desires within the social world.

These desires are what Hannah Arendt identified as *a space of [bodily] necessity leaking into public* and into the political thought that constructs and navigates that social space (Povinelli 2016, 3). This is striking because it allows us to think of imagination as another of those bodily needs, leaking into public and into political thought.[182] Multiple and diverse imaginaries are needed to understand 'multiple meanings' and meaning-making that prefigures collective attitudes and actions, creating political mandates for systemic change (Burke 2018, 95; Eriksen 2015, 527-30).

Art and cultural work are often consumed at fast rates (with indigestion), and this speed of attention and consumption is playfully engaged by artists who bring slow works, or works that come fast but in small pieces, or with time between. Curiosity is piqued in a sustained way over time, often with use of social media (as mentioned in Section Three). The outdoor phase of *Greywacke love poems returns* (2019), involved encounters of this kind, where curiosity was engaged through public visibility of unfamiliar materials in an unexpected context.

This public curiosity and material empathy differs from Liberal empathy (Povinelli, 2011), which ultimately sustains a feeling of separation from those around us. The conventional construct of empathy often allows us to continue to exclude, rather than actually embrace ourselves as interconnected (Povinelli 2011). Likewise, Perry Zurn has considered invasive tendencies of colonial and white supremacist curiosity within arts and educational institutions, versus anticolonial curiosity that raises questions around conventions and existing power dynamics while also leaving room for unknowability. Zurn considers forms of curiosity that know their limitations, observing an ethics of care, while also reaching beyond the individual (Zurn 2021, 6).[183] I think this is a space where art can do its intersubjective work.

> *Even recent efforts to analyze curiosity as an affect—a feeling or an intensity that disorients us and opens up space and time for questions—largely retain this emphasis on the individual interior and personal experience.* (Zurn 2021,11)

Sentience

182 Art 'works' within the cultural and relational sphere of politics, influencing perspectives and value formation, as well as transfer of knowledge – and images. For artists working within the climate crisis, there is shared interest in contributing to paradigm change – moving away from extractive carbon economies. Processes of cultural change involve reciprocity of interest, including flows of both self-interest and interestedness within attention economies (Demos et al, 2021, 47).

183 *Such a curiosity would engage rather than objectify, empathize rather than examine.(15) It would love rather than anatomize, and appreciate rather than aestheticize.(16)* (Zurn 2021, 5).

Peter Sjöstedt-H, describes Whitehead's claim that within this organic realism, all organisms and organic matter have sentience—including those that have become aggregate, like the plant and silicate (fossil) matter within doors and windows (wood and glass, or the calcite I often use as a pigment connected to family origins in Scotland and England). Differentiating sentience from the brain-extended consciousness that has limited our categorisations of what is sentient or not, Whitehead is able to avoid the dualism and separations of sentience and insentience, to advocate for a panexperientialism and panpsychism[184] that metabolises reality (Sjöstedt-H 2016; Weber 2006).[185]

Creative and sentient processes within geology and ecology are analogous to those within art. Whitehead writes in the preface to Process and Reality (Whitehead 1979, xiv) that interconnected processes of becoming and perishing are primary creative processes[186] In geologic formations like greywacke, the re-ordering and aggregation of materials into larger forms is part of this larger metabolism; within a disordered association of parts, metabolic processes and sedimentations can form new structures. In human and more-than-human entropy and empathy, these processes that emerge within disorder can lead to the aggregation of new relationships and new qualities and exchanges within existing relationships.

In painting, abstraction takes many forms, including the liquid becoming and mutation that is witnessed in Jess Charlton's footage of *Paint over, use again* (2021). Within one artwork there can be tensions between concrete crystallisation of reality and expressive gestures and affects happening within the real time of the substrate.[187] Either approach externalises internal emotional or site responsive energies. And then there are the process-based and indexical abstractions that are hinged to physical events and actions, intentional and more-than-intentional, human and more-than-human authors, figures and grounds.[188] In the arts and sciences we can think of the biomorphic and biomimetic tendencies as warm abstractions, with their potential sentience, curiosity, and empathy.

Biophilia and the Death of Painting

Since the 1840s when Paul Delaroche saw a daguerreotype and declared painting to be a

184 Michel Weber (2006) complicates framing of Whitehead as a monist thinker – a thinker who aggregates toward oneness as opposed to dualism, pluralism and nihilism (Schaffer). Whitehead's oneness allows for pluralism, refusing to see singularity and universalism as the only ways through duality (Schaffer 2018).

185 Organic realism is linked to an earlier 'radical empiricism', formulating a kind of 'panexperientialism' indiscriminately considering experiences and the metabolism of being through time (Griffin 1977; Weber 2006, 118).

186 First published in 1929, Whitehead was writing this text in the late 1920s, as my grandmother Evelyn Adams was making the childhood artworks I've borrowed for use in *Paint over, use again* (2021). This was also when bacterial polyesters were being observed by Lemoigne in Paris, as interwar industrialisation of plastics was democratising plasticity, and as Bataille and Artaud were working through their ideas of base materialism, where the metabolisms of Marx's pastoral rifts were made visible.

187 painting alla prima (at first attempt)

188 Alberto Toscano, writes about the ways that scientific and artistic abstraction crystalise lived theory and praxis. It's important to recognise how these abstractions are embedded in social reproduction and politics (Toscano 2008, 59). And as they move through the flows of communication and power, there can be *an incapacity for certain abstractions to communicate across disciplinary and intellectual fields* (Toscano 2008, 59). Toscano writes that *today's abstractions can no longer afford to be lifeless and detached. ...The cold abstractions of yesteryear must be replaced by what we could call warm abstractions.* (Toscano 2008, 58).

technological and perceptual obsolescence, 'the death of Painting' has acknowledged the limits of the medium's aesthetics. The death narrative resurfaces at anaesthetic (unfeeling) and critically or socially disappointed moments within the ongoing history of Painting (Hammer 2013; Bois 1990; Crimp 1981;).[189]

Death narratives about painting become complicated in a very literal and material sense by the metabolic thinking outlined above, and through use of biophilic (life loving) paint mediums. The questionable 'newness' of biomaterial inventions also asserts the ongoing possibility of regenerative approaches to 'old' mediums.

The anaesthesia that takes away our capacity to feel during surgery is a medical intervention into our sensory system, our consciousness and memory. It is also present in our cultural worlds, where anaesthetic affects and interpretations might reduce consciousness and memory at the edges of human experience, distilling (and removing) extremes like pain and joy. Susan Buck-Morrs (1992) and Cressida Heyes (2020) have written about the desire for anaesthetics in the face of the shock of modernity and the aestheticisation of politics into the form of war (Benjamin 1935).[190] Buck-Morrs was writing in 1992, as theorists of affect were confronting social and political aspects of subjectivity and identity, seeking to understand how these factors impact feeling/unfeeling and aesthetic processes. Depending on the situation, this might reclaim Benjamin's thesis, politicising aesthetics toward a more reparative politics.[191]

Regenerative and reparative aesthetics animate, invigorate, or awaken the anaesthetics of a conventional medium.[192] This might include a time-based extension or expansion of feeling over time and within space, so that it is slower or not all at once. Stefania Caliandro describes how Paul Klee's understanding of the empathic response differs from Worringer (1908), who Klee also writes about in his own notebooks. Klee's empathy is less oppositional than Worringer's, *resuming the aesthetic theories in visual perception, which, since the end of the nineteenth century, have envisaged the animation of inanimate or even abstract forms through empathy* (Caliandro 2019, 19).

The reproductive, or generative qualities of catastrophe or 'creative destruction' (Thom 1975; Sobel & Clemens 2020) are found in the 'auto-destructive art' of Gustav Metzger, and artists working with disorder and entropy (Metzger 1962).

189 When I first entered art school in the early 2000s, it was Douglas Crimp's death narrative that I encountered. He was writing in the 1980s, he had seen an end of painting in Daniel Buren's anaesthetic stripes, but only if they were to be more widely identified as part of the coded system of Painting. If the stripes were recognised by everyday audiences as painting objects, and as aesthetic, they would have achieved an end to Painting (Crimp 1981).

190 Without using the term anaesthetics, Martin Hammer (2013) identifies Kenneth Clark's (1935) concerns about a loss of feeling in art, and aligns this with Walter Benjamin's assessment of the aestheticisation of politics. Clark was also concerned with the aesthetic manipulations at work within fascism (Hammer 2013).

191 Sedgwick (2003) writes of reparative reading and Heyes works with these ideas in Anaesthetics of Existence (2020).

192 Within the manifestos and scholarship around particular art movements like minimalism, intentions around aesthetics and anaesthetics are carefully analysed. The post-minimalist and process-based artists I've discussed in Section Three and Four, make aesthetic interventions that privilege particular aspects of feminist and embodied feeling that exist within the artists experiences of class, race, and gender.

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, 2012,174). Smithson's entropy includes in-between spaces of non-site—between the self and non-self, the individual and collective.[193] Smithson was also reading Alfred Jarry's symbolist writings about the paradoxical methodologies of pataphysics (Lewis 2020; Shanken 2013, 5). In Section Six I discuss the playful pataphysical possibilities of the subjectile, that open space for the paradoxical processes of both entropy and empathy.

5.3 Conclusion

Material empathy is a process of understanding how materials behave in relation to internal and external conditions, including the creative practices that materials are involved in. In Section Five I have worked to understand my own material empathy, ethics of care, and processes of composure and discomposure. In the Adam Art Gallery phase of *Greywacke love poems: returns* (2019), I saw this play out at architectural scale. The face of the stairway holding the place of the old quarry cliff face, allowing layers to be laid down in sheaths then pulled apart with upward and downward gestures and reconfiguration. Some of these movements felt like geologic gestures, animating the wall face as a site of ongoing composition. Meanwhile these extensions and unfolding elements were also figurative, withholding representation, with more-than-human figures losing or refusing composure.

At a planetary and cosmological level, Emily Apter's planetary aesthetics becomes a larger frame for the processes of empathy and biopolymer materialism (Apter 2013,134-139). This kind of empathy occurs within the entropy of 'natural' systems, including the anthropogenic aspects of those systems. We are confronted with the illusion of boundaries between ourselves, our material production, and the ecosystems we are part of.

Thinking about empathy as part of these processes of realisation, I've reconsidered the 'organic realism' within Alfred North Whitehead's thinking—where both spontaneity and stubborn facts are active. In the current moment, this is met with the agential realism of Barad, and capitalist realism of Fisher (Barad 2007; Weber 2006, 118; Fisher 2009). These realisms enable a sentient reciprocity that isn't reliant on consciousness (Sjöstedt-H 2016). Even without a brain, biopolymers have the capacity for some self-organisation via the ongoing energetic exchange of the molecular arrangement and rearrangements of shape memory.

Within theories of an affective turn, exercising

193 Smithson was influenced by Bataille's (1985, 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.*

empathy creates affects within events (Gauld, 2014). Visible or articulated processes like the regulation of feelings during emotional labour (James 1989), and expressions of solidarity, are affective at an interpersonal and interspecies level, at societal and ecological scales. As discussed in Section One's 'alter-globalisations', within biopolymer aesthetics and its processes of entropy and empathy, the affective turn is at work, making visible and foregrounding "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, 120). This kind of 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" (Kramer 2017, 120).

6: Surface Active Agents

6.1 Introduction:

The term subjectile is a conjunction of the words subject and projectile, used in reference to a surface or interface of an artwork (Derrida 1994, 158).[194] In the 1920s and 30s it was used to refer to the site of the 'ground' in a painting or drawing (*Subjectile*, n.d.). For Antonin Artaud, the subjectile was where work occurs, where matter is 'volatilised', and where the form of a 'work' emerges through processes of force that are connected to Earth and 'nature' (Shaw 2017, 21; 225; 235-236). Jacques Derrida described Artaud's subjectile as: "*a sort of skin with holes for pores"*, historically, and perhaps persistently, devalued because: *"we oppose just those subjectiles that let themselves be traversed (we call them porous, like plasters, mortar, wood, cardboard, textiles, paper)."* (Derrida & Caws 1994, 154–71; Martyn 2018). Like Georges Bataille, Artaud was interested in a revaluation of materials and the thresholds between high and low. The subjectile can be thought through in the context of Batailles's base materialism which invoked shifting figure and ground relationships, through liquid metaphors and unbounded forms (Barthes 1972, 239-48).

In this exegesis I extend Artaud and Derrida's ideas by thinking through subjectile surfaces as spaces of assembly and diffraction, between individual and collective subjective and objective agencies (actions and interventions) (Haraway 1992; Barad 2014). These surfaces are human, more-than-human, psychic, physical; figures and grounds—spaces of visible and invisible aggregation, action and intra-action of matter (Barad 2007). Paintings are one of many such aggregates, microbial biofilms are another. In the biopolymer artworks discussed in this exegesis, the paint material is its own substrate, its own ground, and in humid conditions it can also be a biofilm. In this section, I discuss my understanding of the biofilm subjectile in my own work, and in painting more broadly.

As Minhea Mircan described in *The Allegory of a Cave Painting* (2015), sometimes the visible and

194 Derrida writes: *The notion belongs to the code of painting and designates what is in some way lying below (sub= jectum) as a substance, a subject or a succubus. Between the beneath and the above, that is at once a support and a surface, sometimes also the matter of a painting or a sculpture, every- thing distinct from form, as well as from the sense and representation, which is not representable. Its presumed depth or thickness can only be seen as a surface, that of the wall or of wood, but already also that of paper, of textiles and of the panel.* (Derrida 1994, 158)

invisible, human and more-than, come together (Mircan 2015; Barikin 2017, 270). Painted 12,000 years ago by people of Ngarinyin speaking Wilinggin country in the Kimberley area of Western Australia (Tacon 2021; Doring 2014, 476)[195], the Gwion Gwion cave paintings' host a biofilm that is an example of nonhuman cohabitant relations; a self-painting or self-conserving painting, arguably sidelining the role of the colonial art conservator. In these paintings, cyanobacteria and fungi produce continuous restoration, sustaining the vibrancy of the colour, and etching the image deeper into the quartz. Mircan describes how *two temporalities and two vectors of meaning overlap. A mask that is identical to that which it covers* (Mircan 2015).[1]

Such biofilms, anthropogenic or otherwise, adhere to surfaces; pebbles in a riverbed, arterial walls, cave walls, abattoir floors, and our teeth. Within these coatings, surface active agents (surfactants), alter diffractions within interfacial and surface tension, influencing initial aggregation of the film, and future changes. They have similar effects in commercially available paint. Surfactants change the way liquid, gas, and solids move between their boundaries (Cho 2015).

Walter Benjamin thought through differences within the figure and ground dynamics of drawing and painting, the way in which the background/ground was held as passive or unfilled was key to drawing, whereas painting might occupy the substrate in more holistic ways. Thomas Gould writes that his thinking comes close to Jacques Derrida's interpretation of Artaud's subjectile: *drawing subjects the 'area' it appropriates as a background, in the senses of both domination and constitution (it is exactly this dual sense that Derrida develops with his distinct but comparable term for the material support of the drawing, taken from Artaud: the 'subjectile')* (Gould 2021). I don't think it's necessary to separate drawing and

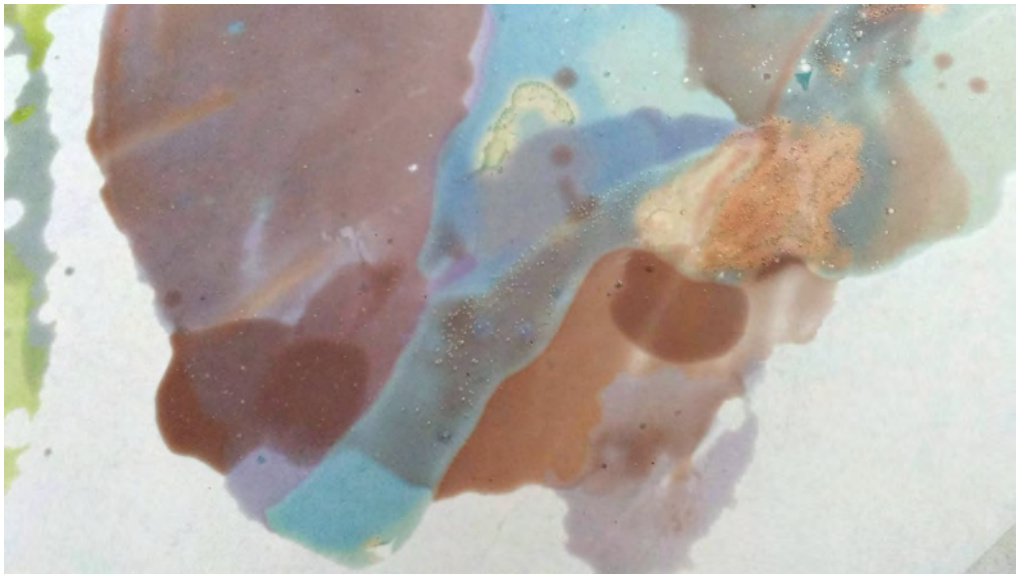


Fig. 81. Raewyn Martyn. Experiments with agar and cellulose mixtures (2018).

195 In the version of Surface Active Agents published in Antennae Journal (2018), I focused on the role of the microorganisms and their conservation of the artworks, I did not acknowledge the painters of these works and this resulted in an unintentional erasure of their authorship. Here in the PhD I have attempted to amend this.

painting in this way, it seems out of date within contemporary practices, as many paintings move freely between the two ways of 'subjecting' and subjectifying a ground. But the questions of figure and ground dynamics remain vitally important within pictorial and compositional systems, and relevant to my understanding of bio-based substrates as live subjectiles.

Wikipedia carefully notes that the "subjectile" is a theory, not a fact; a tool for analysis of art objects (*Subjectile*, n.d.).[196] It can be interpreted as simultaneously the throw and the thrown (Derrida 1994, 169). I interpret the processes of the subjectile as events, incident-based.[197] Within the subjectile interplay, there is an art event (or series of events) between subjective and objective modes, that may result in an art object. These events occur within particular conditions and in the presence of surface active agents at work within the material aggregations, as they emerge. These agents include the artist and their audience, and the more-than-human agencies like microbial organisms, weather, and atmospheric conditions in the social and physical world. Material scientists might call these "interfacial forces", where conflict or stress play out in generative ways. Their activity can result in different materialisations, and altered subjectivities.

My current thinking about the subjectile has developed from my MFA work at Virginia Commonwealth University in Richmond, where I began making large-scale wall paintings, delaminating acrylic latex house paint.[198] These paints are dependent on petrochemicals that are by-products of the oil industry. Working in my studio, I painted over each wall painting in fast succession. At one point, masked edges built up and an accumulation of moisture between layers led to delamination (the paint peeled from the substrate). I began to intentionally create the conditions for this delamination of paint from wall and floor surfaces in the studio, peeling and unfolding sections of paint to complicate figure and ground relationships at an architectural scale. This process transformed the paint from two-dimensional surface into three-dimensional material—membrane-like sheets of surface; layered and extended.[199]

This section also discusses painting as boundary work. Boundaries are sites of intersubjectivity and interdependency, semiosis and biosemiosis, decreation, composition and decomposition—between spaces, structures, beings, agents, matter, ideas, forces, practises, and actions, etc. These

196 "Subjectile." *Wikipedia,* Wikimedia Foundation, 15 October 2021, https://en.wikipedia.org/wiki/Subjectile.

197 And in relation to the four-dimensional aspects of painting discussed in Section Four.

198 I was reading about the architectural interventions of Gordon Matta Clark and came across the term subjectile again.

199 At this time I was reading about Gordon Matta Clark's architectural interventions and concept of 'anarchitecture', a text by Pamela Lee referred to the subjectile and reminded me of my earlier reading around that term during undergraduate study. As mentioned in Section Two, the peeled paint became unfamiliar, seamless coating unfolding and transformed into unstuck material; waste – not usually visible as such. This generated a narrative of collapse, where the material trajectory of the acrylics didn't allow for reconfiguration. In the wake of the 2008 economic crisis, this language seemed like necessary grief. It also became a provocation – to create a painting that could become fluid again.

intersubjective and interdependent relations are inherent to 'nature': *the 'self-enjoyment of being one among many, and of being one arising out of the composition of many' (Whitehead 1929/1978: 220)* (Neesham 2016, 3).

The compositionist thinking I discussed in Section Five (Latour 2010, 474), has informed what Stefania Caliandro describes as recent changes in semiotic theory, where the dyadic (signifier, signified) or triadic relations (sign, object, interpretant) are expanded to include the network and conditions of interpretation, an ecology of semiosis (Caliandro 2019, 5). This includes the ways contemporary theorists conceive the 'ground' of artworks as thresholds, where forces are at work and differences become visible or emerge (Caliandro 2019, 54). These differentials are enmeshed, not necessarily oppositional, in Section Six I diffract this understanding of semiosis and renewed interest in earlier concepts of biosemiosis, and painterly ideas of the ground and subjectile.

6.2 Surface Active Agents

Bioactive figures and grounds

In the biopolymer substrates used in all phases of *Greywacke love poems: returns* (2019), the material becomes both medium and support. It takes the form of both figure and ground, and as a substance and subjective space, it is immediate and mediated with the capacity to mediate and be mediated (Manning 2018).

This means that the power dynamics of passive or active ground are embedded within the painting material itself, the figure is already working from within the ground, and vice versa. Aspects of these shifts in subjectile dynamics were also at work in the earlier polymer materialisms I've introduced in Section One, Three, and Four, where artists like Lynda Benglis, Lee Bontecou, and Heidi Buchner produced substrates that operated as both figure and ground. Artaud refused the label of 'art' for the works on paper that he made, Ros Murray writes that he was more interested in existing *at the limit, under the constant threat of annihilation, … in a material sense this is evident in the importance of deformation and decomposition for Artaud, where he always sought to create a sense of incompletion* (Murray 2014, 137).

In practises of painting, drawing, and writing, this way of thinking about 'mediums' and mediation can inform figure and ground relationships that are more fluid and perhaps even symbiotic or metabolic—the figure can feed off the ground and vice versa. In bioactive substrates this metaphor of figure and ground relations can become literal, with biogenic pigments and textures generating figurative elements that are feed from the substrate. In the diffractive practices I've described in earlier sections, the digestion of text and image through reading, editing and critique are forms of sustenance, learning, and care.

One term for symbiotic generation of materials is symbiogenesis, where one organism or form of

matter finds its way into another being or entity to create a new arrangement, a new form of life (Capra & Luisi 2014). This involves a transgression of the separations between one entity and another, between surfaces—skins, perhaps—and allows us to rethink the boundaries of surfaces and identities, inside and outside ourselves, as more porous. At the cellular level of surfaces, cellular membranes are permeable through the work of biological surface active agents (biosurfactants), undertaking the worlding of biological alter-globalisation (mentioned in Section One & Three) (Malabou 2008, 80; 2011, 73).

Interfaces like subjectiles are sites of semiosis, and biosemiosis; where meaning-making emerges within 'live' biological processes (Tønnessen et al 2018). In thinking through the biosemiosis of cellulose-based paint and the surface active agents involved in the formation of biofilms discussed in *Surface Active Agents* (2018), I have read more about distinctions between organisms in biosemiotics, where basic signals can operate like signs or 'proto-signs':

> *Bacteria are capable of receiving and emitting signals …Signals are used to initiate or modify activities directly, without any mental interpretation. But processing of signals in bacteria is not deterministic, because signal transduction is handled by biomechanisms (e.g., proteins) which are meaningful products of the adaptive evolutionary process. Bacterial cells therefore represent an example of semiosis without mind, or proto-semiosis (Sharov and Vehkavaara 2015).*
>
> (Tønnessen et al 2018, 325)

These signals and biosemiotics can be seen as part of what Emily Apter describes as planetary aesthetics, expanding the signalling and relational canvases or interfaces into a cosmological frame (Apter 2013, 135). Within this context, in 2018 I worked to blend small amounts of marine algae with wood-derived cellulose to create a biofilm composite of terrestrial and aquatic origins (*Not standing still,* 2018).[200] I'm interested in the ways that cellulose, circulating within living and dead organisms, is involved in processes of material transfer between land and sea, through biodegradation, sedimentation, and air-sea exchange; cycles within the hydrosphere, atmosphere, and lithosphere. Cellulose becomes a medium, carrier, and binder of biosemiotic archives of many kinds, including interactions within energy and carbon cycles where particulate matter is quantitatively related to emissions. This is perhaps a more intimate level of planetary aesthetics, but perceived at the scale of atmospheric carbon exchange, it is part of a cosmological or planetary subjectile.

Within a biofilm, microorganisms are held together within extracellular polymeric substances (EPS) which determine the film's physical qualities; strength, elasticity, and permeability (Ziemba et al. 2016). The EPS of the painterly biofilms made for *Not standing still* (2018), and *Autumn Sunday* (2018-

200 see appendix for *Not standing still* (2018).

Fig. 82. Raewyn Martyn, *Autumn Sunday* (2018–2021) with animation by Johanna Sanders for the track by musician and artist William Henry Mung.

2021), is the cellulose emulsion; amphiphilic—both hydrophilic and hydrophobic, in the work made for *Not standing still* (2018), it is made porous through the pseudo-biomineralization process.[201] *Autumn Sunday* (2018–2021), is an animation made with editor Jo Sanders, for Ōtepoti Dunedin-based musician and artist William Henry Meung. Developed during September 2018 at Enough Room for Space residency in Drogenbos, near Brussels, as part of their ongoing Uncertainty Scenarios series, the photography happened over the course of an autumn weekend during the local apple harvest. The work uses cellulose and agar medium, cast in sheets and exposed within the Senne valley, known for the Brettanomyces Bruxellensis wild yeast which becomes an agent within the film. The sensitivity of the cellulose/agar biofilm is analogous to the light sensitivity of celluloid film. Measuring or graphing other forms of light and atmosphere to create some kind of "biograph".

Like the agar in Alexander Fleming's bacterial paintings (c1920s) (Dunn 2010), Gordon Matta Clark's *The Land of Milk and Honey, & Museum* (1969),[202] Liz Larner's *Culture* (c1987), or Anicka Yi's *You Can Call Me F* (2015); and industrial microbial remediation of waste, a cellulose paint substrate can be used to feed

201 Not technically biomineralization, it is more like a pataphysical attempt at biomineralization.

202 *"yeast, sugars, sperm oil, chocolate yoo-hoo and meat and vegetable extracts, …to provide nutrients for the various microbes that were circulating in the air."* (Harris 2022).

and grow cyanobacteria or biomineralized[8] pigments. Paintings grown in this way could begin to explore aspects of the biosemiosis.

In their paper Biosemiotics and Phenomenology (2018), Morten Tønnessen, Timo Maran, and Alexei Sharov, ask whether there is phenomenology beyond the human.[203] They note Merleau-Ponty's discussion of flesh and skin as a corporeal and metaphorical boundary and threshold between human and more-than-human sensory experiences. This could be human skin or skins more generally, whether they be biologically specific; attached and living as part of a particular organism, or detached and circulating in the material world, as objects or synthetic assemblages.

Lucy Bradnock has written about Nancy Spero's use of Artaud's ideas, within her larger feminist project that moves away from phallogcentric composition and "undermines the symbolic order" (Bradnock 2005, 8). Describing Merde, Fuck You (1960), Bradnock writes: *interior and exterior are confused, conflated: we encounter the realm of the in between, the passage from one state to another* (Bradnock 2005, 10). Spero began mixing visual and written language within her paintings after reading Artaud's work, during time spent away from the dominant New York School abstraction, where semiotic, figurative, and linguistic hybridity were discouraged (there were limits to the explosive qualities of abstraction in the United States at that time) (Bradnock 2005, 5).

Nancy Spero's interest in Artaud is feminist and critical of dominant forms of language, with an aim to, *'further fracture the already fractured writings of Artaud,'... The work bears early witness to the insertion of the body into the linguistic order, the dislocation of meaning and the destruction of the self, that Spero would discover in the 'fissured, deteriorating, petrifying, liquefying, coagulating, empty, impenetrably dense' mind of Artaud. 16* (Bradnock 2005, 5).[204] For Nancy Spero, the subjectile enable painting to move beyond dominant semiotic and symbolic orders. And, beyond a phallogocentric field of vision. This aligns with my own thinking about the unboundedness and derangement of the Adam Art Gallery work. In fact, one part of the painting became known as 'The Oyster', for its yonic qualities, and this reminded me of a work made for the 1708 gallery that became known by the gallery manager as 'The Flesh Book'.

As noted during discussions of biomorphism (Section Three), the boundaries of interspecies phenomenology and the meaning-making processes of biosemiosis, have been questioned. Nazi collaborator Jakob von Uexküll's theory of 'umwelt' — 'self-centred world' within a specific environment (Cobley 2014, 348)[205] —forms the

203 They write: *It appears that the methodology of biosemiotics has a clear resemblance with that of phenomenology, but with the important difference that several biosemiotic perspectives can be applied to all living organisms, rather than just to humans. Just as phenomenology, biosemiotics too explores the nature of mind, consciousness, and intentionality, but our field does this in all kinds of organisms with varying levels of complexity* (Tønnessen et al 2018, 323).

204 Bradnock (2005), is citing Susan Sontag in an introduction to Artaud's collected writings.

205 Environment or surroundings that make up an organism's objective world (Cobley 2014).

Fig. 83. Raewyn Martyn, 'The Oyster' as seen in *Greywacke love poems: returns* (2019–2021), as part of *Listening Stones Jumping Rocks*, at the Adam Art Gallery, 2021. Photo courtesy of Anne Noble.

basis of these ongoing discussions and critiques. Von Uexküll's commitment to identitarianism and nationalism led to the umwelt's use as justification of white supremacist and nationalist ideas of social order and belonging. The legacy of his work therefore involves deeper consideration of differences between inclusive and exclusive forms of belonging-with and becoming-with, within the phenomenological thresholds of subjectivity that we inhabit and share. As Kate Wright writes about the role of disciplinary shifts exhibited in the emergence of fields like the Environmental Humanities:

> *becoming-with offers a metaphysics grounded in connection, challenging delusions of separation—the erroneous belief that it is somehow possible to exempt ourselves from Earth's ecological community.*[2] *Donna Haraway tells us that "[i]f we appreciate the foolishness of human exceptionalism then we know that becoming is always becoming with, in a contact zone where the outcome, where who is in the world, is at stake."* (Wright 2014, 1.)

Interfacial zones

Our understanding of surfaces and boundaries within the physical world (and within the conceptual world), become important for establishing the structures that support symbiotic systems that are often more equitable conditions for life. Surfaces and boundaries become the meeting point or interface for such symbiotic relations, and access to those interfaces—freedom of interaction—reveals power relations and inequalities within a system. And as McFall-Ngai describes, many organisms *require particular microbial conditions. If the right microbes which typically occur in assemblages called biofilms, aren't on a rock or other substrate, larvae do not - and perhaps cannot - settle there* (McFall-Ngai & Tsing et al 2017). There have been attempts to understand the autopoiesis of symbiotic interactions, like those that occur within biofilms, and via biosurfactants, in analogy with human social networks. Human self-generating networks of communication are seen as equivalent to the metabolic networks within biology that generate molecular structures (Capra & Luisi 2014).

'Interfacial zone' is a term used within polymer science to describe the interface between a matrix and its molecular content. This is where mass and material are made possible. The activity and forces that occur within this interfacial zone determine the material qualities of the polymer, like strength and flexibility. To use this as an analogy for art making, the interface of an artwork is *active as an artwork emerges, including "interfacial forces", such as the atmospheric conditions or social situation, where conflict or stress are embodied and generative* (Martyn 2018b).

In commercial paints, surface active agents reduce interfacial tension between liquid and solid, increasing the paint's wetting ability, ensuring it spreads easily, and doesn't "bead" off smooth surfaces. As in biofilms, surfactants influence paint's initial aggregation, subsequent diffractions, and physical qualities over time. They also affect the

coating's water resistance, because surfactants, like many forms of cellulose, are amphiphilic.[206] Surfaces become permeable membranes through interaction of surfactants because surfactants with more hydrophobic molecules (like oils or other lipids), resist and therefore "liberate" water. These hydrophobic parts of the surface material release water to (and through) other hydrophilic parts of that surface. The assemblies that develop are molecular networks; when hydrophilic or hydrophobic molecules desire to associate, they assemble. The introduction of surfactants disrupts or encourages these associations. Cellulose itself is a potential surfactant, working in interaction with other surfactants (Tardy et al. 2017).

In Neri Oxman's *Aguahoja* (2018–2020), which I've come across more recently, composite sheets are three-dimensionally printed in different grades of cellulose and chitosan materials, with the arrangement of layers altering the degradation behaviour of the corresponding parts of the sheet. Eventually, the work feeds back into the soil system where the sculpture is located.

Metabolic rifts in the picture plane

A century before STEAM (science, technology, engineering, the arts, and mathematics), one of the predecessors of surrealism, symbolist Alfred Jarry, formulated a parody of science called pataphysics. Pataphysical science is a poetic approach to empirical scientific knowledge and involves playful disregard for rational methods, it influenced artists within surrealism and beyond, including Robert Smithson (Shanken 2013).[207] After installing *Greywacke love poems: returns* (2019) at the Adam Art Gallery, I was reading about the contemporary potential for a 'pataphysical turn' (Shanken 2013, 5; Lewis 2020), including the 'tinkering' and 'hacking' described by Lewis and Friedrich (2015) and McKenzie Wark (2004), that enable the forms of 'combinatorial' exhaustion and repurposing suggested by Deleuze (1995).[208] The 'derangement' that emerged within the Adam Art Gallery work, and the 'misuse' of Scion machines to produce material, seem like examples of combinatorial approaches and pataphysical composition. The works feature aesthetic development that evades my capacity to categorise or evaluate it according to taste. And a misuse of material that moves beyond tinkering into a material and systemic hack, where the dominance of petrochemicals and their slick aesthetics within industrial paints and plastics are refused.

hacking's main function (as with tinkering) is

206 Amphiphilic compounds are able to interact with both the inside and outside of a cell membrane. The hydrophobic part enters the lipid membrane, and the hydrophilic part maintains contact with the outside liquids.

207 Edward A. Shanken writes: *both Jarry and Smithson can provide a useful corrective to an overly rationalistic approach to art research, offering the field – and contemporary art in general – potentially valuable tools* (Shanken 2013, 5)

208 Tyson E. Lewis proposes a 'pataphysical turn' in arts-based research and summarises the approach through *three interconnected themes: (1) a postmetaphysical examination of the laws of particularities, (2) an investigation of extreme cases, and (3) the constitution of imaginary solutions.* The 'pataphysical turn' creates space for paradox that generates unexpected or surprising 'pataphysical aesthetics'. Lewis describes how both Gilles Deleuze and Georgio Agamben incorporated aspects of pataphysics into their own theorising of the generative space between art and science (cDeleuze 1987,*1997, 2004*; Lewis 2020). Jarry differentiated pataphysics as a science of particulars, rather than generalisations or universals. And Deleuze and Agamben both develop this idea further through the idea of combinatorials (Deleuze 1995) and paradigmology (Agamben XXXX) (Lewis 2020).

Fig. 84. Jess Charlton, still shots from *Playing the Machine* (2021–2022).

> *not causing chaos, or establishing a more creative, efficient, or revolutionary function for the object, although those may be outcomes. Instead, hacking repositions the very possibility of determining functions and meanings back into the common*
> (Lewis & Friedrich 2015)

Pataphysical approaches help generate different and more intimate relationships with materiality.[209] Alongside the transitional and reparative tendencies mentioned in Section Four, many artists are engaging ideas of thresholds, boundaries, membranes—interfaces between human and more-than, bios and geos. These are also material sites for emotional and spiritual exchange—intersecting ecological and colonial legacies and politics, where these exchanges activate cultural differences (Rödder 2017).

As vessels of communication, painting, image-making, and their histories have sometimes mediated rifts between rational and irrational forms of knowledge production.[210] As a medium, paint carries both physical and psychic energies, whether that be via the actual radiation of particular mineral pigments or through emotional transmission of energies through physical colour and gesture, drawn through the artist and into the viewer. The painter as a spiritual medium is a feature of surrealism (Warner 2003), and this role has also been part of many material cultures through time, preceding art historical constructs of the painter as an identity or deity.

Ongoing colonialism entrenches rifts between subjective and objective dimensions of human experience, and between the time-based and energetic circulations of material culture. Māori Scientist Dr Ocean Mercier spoke in the context of Aotearoa-based Pākehā artist Joyce Campbell's exhibition *Disrupted Ecologies* (2019) about how non-Indigenous rationalisation hinders opportunities for sustained and embedded tikanga and mātauranga Māori within science research. The relationship between the observer and the observed (Mercier 2013, 25), means that the ideal of objectivity has always been to unnecessarily exclude subjective knowledge. The boundary work within this interface can embrace both subjective and objective understanding, already interconnected and privileged by mātauranga Māori understanding (2013, 24). In some ways, Joyce Campbell's body of work, with its elements of pataphysical experiment, operates between world views and between science and art.

In Section Two I described Bataille's interest in the nineteenth century metabolic rift—defined by Karl Marx as the separation of labour from nature, and town and country (Foster 1999). This is pulled into the twenty-first century by Nancy Fraser, who

209 As discussed in Section One, Gilles Deleuze identifies an artisan as someone who has intimate knowledge of their materials, at every day and cosmic levels (Deleuze & Guattari 1987, 345).

210 I think of painting as a medium in all senses of the word. Paint and paintings sit between walls, surfaces, and whatever forms of life are happening beyond them—within the worlds we are part of creating every day, and in understanding the spiritual and psychological dimensions that are less tangible and visible. Paint mediates between subjects and objects, generating images and fields of vision to refuse a binary of objective or subjective experience. Our recognition of figures and grounds within paintings reveals the cantering of particular subjects and objects within hierarchical picture space. For more discussion of figure and ground and the agencies of painting, see Graw (2018).

explores the divisions of productive and reproductive labour within neoliberal *mutations* of capitalism (Fraser 2014, 149-150). Productive labour remains compensated with wages, she states, while many forms of reproductive labour; childcare, informal education, and cultural production, are not. As mentioned in Section Six, Fraser goes on to reframe metabolic rift through dystopic pictorial metaphors—of mutating figure and ground relationships (Fraser 2014, 149-150).[211]

Fraser's analogies are drawn from non-Indigenous art-historical analysis of pictorial space. These picture planes continue to change over time: figure and ground relationships shift and perspective alters—perhaps involving more-than-human perspective. Google Earth and its digital picture plane allow us to share the perspective of birds and insects, for example. This perspective has been influencing contemporary painting for several decades now, while at the same time anti-colonial work is undertaken to reclaim visual systems from colonisation.[212]

For Fraser, divisions and separations within the foreground and background of capitalism are not limited to a simple binary of figure and ground. The "hidden abode" of production (Fraser 2014, 143) in the picture already painted by Karl Marx, is not the only figure or object of attention—reproductive labour is also brought forward, and the shifting grounds are multiple. For Fraser, the boundaries between productive and reproductive labour shift depending on how specific communities and societies recognise them, and how these boundaries might be reset in response to events. Fraser describes these shifting dynamics as *boundary struggles* (Fraser 2014, 154-156).

> *Equally fundamental to capitalism, finally, is the ontological division, pre-existing but massively intensified, between its (nonhuman) "natural" background and its (apparently nonnatural) "human" foreground.* (Fraser 2014, 153-54)

In the creative arts, like political economy and sociology, the systemic separation of the natural and cultural aspects of these fields has been called into question within the climate crisis—where social inequities are compounded by ecological crises. Writing about the ongoing metabolic rifts within the field of sociology, John Foster notes: *relations between society and its 'natural' or 'material' substrate." "Sociology," according to one prominent environmental sociologist, "was constructed as if nature didn't matter" (Murphy 1996, p. 10)* (Foster 1999, 368). Foster goes on to revise our understanding of how Marx wrote about nature and culture: *the necessity of ecological sustainability, and what he called the "metabolic" relation between human beings and nature. In his theory of metabolic rift and his response to Darwinian evolutionary theory, Marx went a considerable way toward a historical-*

211 She does this to describe, for example, how neoliberalism *foregrounds* a marketisation of environmentalism through further commodifying valuation of natural resources, against a "background" of global warming.

212 Artist Lisi Raskin is currently working on an animation as part of her pedagogical series *(Some of) The Mechanics,* which aims to unpack and retool methods within art pedagogy and practice with deep ties to colonial and settler colonial oppression. In this new work entitled, *(Some of) The Mechanics of Perspective*, Raskin synthesizes recent anti-colonial thinking about Western perspective in order to provide context and prompts that assist in the rethinking of drawing as a visioning tool for collective liberation.

environmental-materialism that took into account the coevolution of nature and human society. (Foster 1999, 373). The artisan-artist role operates within this rift, and is part of the work that Pākehā can do to reconnect their material relationships. I see artworks as just one of the important interfaces of such work.

Research in the field of discard studies often uses specific forms of waste—like the industrial by-products used to generate some biopolymers—as boundary objects through which to explore and confront the effects of colonialism. Waste can be used to provoke a discussion about how the territorialisation of waste has its roots in colonialism—particularly relevant given the way Western-generated flows of waste are diverted into developing economies for processing (Liboiron 2018). As a boundary object, waste becomes a medium through which to understand power and changing human waste interactions (Shaunna 2014).[213]

The boundary work of discard studies, and the transitional processes I discussed in Section Four, align with the kinds of ethico-onto-epistemologies described within new materialism and posthumanism (Geerts 2016), fields of enquiry that grew out of science, technology and society studies (STS) during the 1970s. However, as noted in earlier sections, prefigurative resistance, and what is termed more-than-human thinking, were already present within many Indigenous knowledge systems. This is of interest to Ben Buchanan (Te Atiawa, Taranaki), a Te Whanganui-a-Tara-based painter who has been making paintings of lonely plastic shopping bags, floating within abstract colour fields, entangled with curious broken twig motifs and leaf patterns. These paintings are vibrant wastelands where disparate elements are held in relation. Buchanan is working at the intersection of Pākehā abstraction and Toi Māori, and in his blog he has written about the convergence of painting, flat ontologies of taste making, and Western extractions of indigenous knowledge (Buchanan 2019).

The Objectile

In a metacognitive and pedagogical sense, I think people doing teaching and learning (both students and teachers) can think of themselves as 'mediums' too. What we are doing regularly breaches boundaries of knowledge, whether that be our own personal knowledge systems or our shared ones. By way of attention and encounter, boundary work gives rise to boundary objects which, for the purposes of imagination, can be conceived as three-dimensional, sculptural and material. Such objects materialise between fields of study as obstacles. They move outside of a two-dimensional picture plane—that of a figure and ground relationship—and can be imagined

213 Such realisations around the geo-politics of waste resonate with nineteenth century ideas of metabolic rift (Melillo, 2014), where human waste at that time became disconnected from the metabolism of local pastoral spaces. As noted in earlier sections, such metabolic metaphors were extended during the interwar period of the 1920's by George Bataille who explored theories of economic excesses and base materialism (Noys, 1998). During the same period, in 1926, early biopolymer researcher Maurice Lemoigne began to regenerate waste streams into some of the bacterial thermo-plastics used within my artwork. Lemoigne's experiments occurred before extractive petrochemicals came to dominate our relationship with plastic (Jahns 2009, 2-6; Latterman 2015,9).

at a large scale (Rödder 2017, 93-116; Rathwell, Armitage 2016, 21). For Nancy Fraser, boundary struggles exist within a large-scale scenography and picture space, where background conditions are also figurative or agential, and the actors include species beyond the human. The processes of composition and decomposition remain unfixed (Fraser 2014, 158).

In this PhD, biopolymer artworks become boundary objects—artworks become an interface between subjects and objects. They produce intersubjectivity. Historically, the relationships forged between art and science have brought forth new art-making mediums and materials, whether through alchemy, experiment, or the scientific methods of basic chemistry. The medium-specific advances in paint pigments is just one example of innovation generated through art and science collaboration. (Friedstein 1981, Elkins 2000, Kafetzopoulos; Spyrellis; Lymperopoulou-Karaliota, 2006).[214]

The subjectile is also related to Deleuze's 'objectile', an object that exists in the subjective imagination, and in fiction, that may well remain speculative or anticipatory, rather than materialising in the physical world. Several examples are given, like Alfred Jarry's pataphysical inventions, Paul Klee's *Twittering Machine* (1922), and Duchamp's *Large Glass* (1915-23) (Brasset, O'Reilly 2021, 208). These artworks bring together paradoxical materials and forms, and/or their incomplete physical state creates anticipatory objects.[215] These speculations and anticipations are time based, messing with past and present (Brasset, O'Reilly 2021, 207-208).

Like the biofilms discussed earlier, these anticipatory and atemporal objects (and surfaces), need new semiotic approaches. Stefania Caliandro has surveyed changes in the ways that semiotic understanding emerges, including the importance of physical morphology of forms versus the dominance of cognitive processes of recognition (Caliandro 2019, 1-2). Caliandro cites morphogenetic theory within sociology, which theorises the emergence of structure and agency within society through cycles of agency within nature and culture (Archer 2000, 121).[216] In thinking through Caliandro's revision of semiotics within artworks, the objectile and subjectile can be used to understand the fields of practice from which more speculative morphologies emerge.

Critiques of morphogenetic theory point to an overgeneralisation of the term 'structure', noting that there are important differences between 'natural' structures and social or cultural ones. Morphogenetic respondents pose that their use of the term structure is interchangeable with the term culture (Newman 2019). This provokes me to think again about how

214 The social and relational turn that emerged to define the arts in the 1960s continues to influence the contemporary contexts of painting and science, if in different ways, again altering relationships between the fields. Science technology and its intersection with society studies (STS) has formed the ground of key works by scholars like Donna Haraway, whose ideas are key to many artists working today.

215 *"the formal equation between animal and machine, between organism and mechanism" (similar to the ambiguity between bird and airplane in a number of works). According to Wheye and Kennedy (2008), the painting is often interpreted as "a contemptuous satire of laboratory science"* ("Twittering Machine").

216 Sociologist Margaret Archer developed ideas of morphogenesis as an intervention in postmodernism's privileging of language, seeking to reestablish the generative qualities of practice alongside language (Archer 2000, 121)

the word culture is already used within 'nature', like the spontaneous culturing within processes of fermentation, for example. And how this kind of culture is structural— a conditional gathering or assemblage and formulation of parts.

Greywacke love poems: returns (2019-2021), reconstituted for the Adam Art Gallery stairwell, is located as the base layer of the curatorial construct, it becomes a sedimentary ground and substrate within viewers' own figurative experiences of Listening Stones Jumping Rocks. Within the composition of the cellulose adhered to the stairwell surfaces, derangement allows figuration to destabilise a static gestalt. The destabilised ground of the once exterior stairwell wall is a site of exchange between boundaries of above and below. And the historical inside and outside—the integration of the existing exterior stairway into the new-build gallery space. Such interfaces and boundaries within the physical world can be understood in analogy with the creative subjectile.

Work that occurs at boundaries—whether they be physical or conceptual, macro or micro, or anywhere between, is work that can be intersubjective and plays at the edges of interdependencies between spaces, structures, beings, matter, ideas, practises, and actions, etc. For Whitehead, these intersubjective and interdependent relations are inherent to 'nature': interdependence, not dependence, is an ontologically given characteristic of nature (Neesham 2016, 3).

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 the more-than-human figures and grounds suggested earlier in this section (Derrida & Caws, 1994). Elizabeth Grosz 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 (Grosz 2008, p. 70). Like Grosz, Artaud and Bataille's imaginary also enlarges the interface of human and more-than-human sensations.

Science and art bring forth new and old forms, objects, and materials for reconsideration, recontextualisation, and reconfiguration. There are differences between the epistemological frameworks that inform the processes of recombination. How are materials found or identified? Are they already perceived by the human eye or touch? What scale are they? How are they appropriated or taken? How are they rearranged or reconfigured? In a sense, the bricolage of matter shapes methodological testing grounds within both the sciences and arts. My awareness of this has influenced my use of diffraction as a method, and encouraged me to approach studio work with a pataphysical attitude.

Reassembling within boundary struggles

Ros Murray's (2014) interpretations of Artaud's use of the word subjectile in a letter from 1932 discuss passivity and activity within figure and ground dynamics. Murray interprets Artaud's use of the term subjectile, in 1946, *as a normalising force that is to be challenged; the subjectile is implicitly likened to the form and the idea, or the way in which the form is always bound to an idea. In order to disrupt the representative form as an expression of an idea, the material support must be spoiled, messed up and partially destroyed* (Murray 2014, 123). Artaud writes, *"I'm including a bad drawing in which what is called the subjectile has betrayed me"*, and Murray interprets this instance: *The subjectile here appears almost as a subject that is capable of betraying the artist; the drawing is bad because the surface on which it was created had an active role, rather than simply being an inert, blank page* (Murray 2014, 122). I can see how this can be interpreted to mean that the ideal or desirable ground is passive, but it also demonstrates that grounds can be active.

Agency within 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). As mentioned earlier in the exegesis, the bacterial polyester used in *Greywacke love poems: returns* (2019–2021), is produced through bacterial metabolization of waste streams—the bacteria extract the excess energy from the waste. It is a more symbiotic process, a materialism that involves reciprocity and reproduction—shifting the generative atmospheric conditions of background and foreground, and influencing the passivity and activity of agential figures within a picture plane.

To make *Greywacke love poems* within the quarry, a site of "naked colonial extraction" (Martyn, O'Neill, & Knox 2019), situates shame in a physical and relational space. Shame inhabits these love poems and so does an intent of return, interpreted in multiple ways, including the literal 'Land Back'. These 'returns' mean that the poems become invitations—for more reciprocal relations, for things that return from shame.

I was talking to friends about some of the shared origins of materialism, surrealism, and personalism. How these movements of thought develop subjective (personal) and intersubjective (collective) narratives to support movement of ideas between individual and social systems of knowledge. I found myself talking about grieving processes as a way of understanding how narratives of loss are processed at subjective and intersubjective levels of experience. And how, at a collective level, Donna Haraway's writing about ecological grief and refuge (Haraway 2015) are lucid explorations of this. Haraway talks about grief as a necessary part of grappling with the climate crisis, and acceptance that there is already loss and there

will be more loss. Grieving allows us to realise what is at stake and prioritise actions and ways of living within and beyond that grief.

Haraway's writing reminds me of being nineteen years old, at university. My brother was having one of his first experiences of psychosis at the time, and I was experiencing anxiety and depression about this so began seeing a counsellor. One of the most striking things we spoke about was grief—when someone close to you experiences psychosis, there needs to be a grief process to make way for what comes next. For family members of people experiencing long-term or Chronic Psychotic Disorders, experiences of this complicated grief are common, and referred to as disenfranchised grief, because the processes of loss are unfixed, or unattached to an event of death. (Rachamim, Lilach, et al, 2021).

I've come to think of psychosis as a shared experience, as intersubjective.[217] I don't pretend to understand my brother's experiences, but psychosis involves discursive processes—whether that be conversation with people who are physically present, or interlocutors who exist beyond corporeal reality. And my brother and I have this history and future of attempting to understand what psychosis is, within our individual and shared experiences of it, our realities will always be somewhat, past/present/future. A tasting room or potluck of reality.

6.3 Conclusion

In Section Six I thought through biopolymer materials as subjectile materials, and considered how the social and political qualities of material interface generate intersubjectivity and intra-subjectivity (Barad 2007). When thought of in relation to painting, surface active agents (surfactants), alter the way we conceive of pictorial space.

I considered the prospect of biological alter-globalisation (Malabou 2008, 80; 2011, 73) within a bioactive subjectile. I link this to an ongoing interest in 'reparative aesthetics' (see appendix: *Plastic Feelings* 2020), and although my investigation of these two strands has been limited, I look forward to developing these ideas further.

I also considered subjectility and intersubjectivity in a more personal way, through my understanding of psychosis and schizophrenia as an interface of reality. Experiences of psychosis necessitate a more open and playful approach to perception and intersubjective communication. During this PhD research I have seen this influence my working methods in subtle ways, and I will continue to develop my understanding of this in future research.

217 Beyond counselling, and before the time of Google search or accessible psychology texts, another way of grappling with this was to treat the library shelves like an immersive space of discovery. I would look up books with the word schizophrenia or psychosis in the titles or descriptions, it didn't matter too much whether they were fiction, psychology, or philosophy. But I gravitated toward the philosophical, and art historical, including the automatic fiction of surrealists. This is how I encountered Antoin Artaud, Georges Bataille, Anais Nin, and Deleuze and Guattari.

Table of Key Findings

Section One: *Adventure: Biopolymer Aesthetics*

Explosive and agential materiality and the role of artist-artisan can be traced through non-Indigenous feminist new materialism, post-minimalist and process-based work, abstract expressionism, and the base materialism of Bataille and Artaud (who also site impressionist and post-impressionist material practices like that of van Gogh) (Deleuze & Guattari 1987; Derrida & Caws 1994).

Explosive materiality and affect theory become effective when reconnected to specific material conditions and atmospheres of coloniality, race, class, and gender (Leong 2016, Bell 2018).

Biopolymer aesthetics and its affects of instability contribute to the aesthetics of undisciplined environments (Ranciere 2004; Foo 2019). These aesthetics help materialise decolonial atmospheres and alter-global futures.

Adventure and play are affective methodologies that generate curiosity and empathy. I link adventure and play to histories of pataphysics and the boundary work between art and science, and between non-Indigenous and Indigenous world views.

Geological, geochemical, and geomorphic metaphors found in *Greywacke love poems: returns* (2019), can be interpreted in connection to Deleuzeguattarian geophilosophy through the feminist new materialist work of Elizabeth Grosz and reconnected to specific material condition of coloniality (Todd 2016; Povinelli 2016; Leong 2016; Bell 2018; Yusoff 2018).

Biopolymer aesthetics are part of a larger planetary aesthetics. These include terms like cosmogenesis, entropic reordering.

Section Two: *New & Old Materialisms*

Biopolymers have long material histories within Indigenous and non-Indigenous cultural practices. The language of newness distracts us from the realities of past, present, and future extraction and production.

Diffraction of past, present, and future plasticities, enables us to think through both colonial and Indigenous futurities. Personal family histories locate my work within the specific colonial and anti-colonial conditions of Aotearoa.

Pakeha and non-Indigenous tauiwi need to recalibrate their connection with plastic materials (Liboiron and Ngata 2020).

Playful misuse of industrial production processes and machines contributes to diffractive understanding of biopolymer aesthetics and circular bioeconomy in Aotearoa.

Section Three: *Hydrophilia*

Hydrophilic paintings can move between liquid and solid states; and enable bioactive substrates for symbiotic and metabolic processes of composition.

Hydrophilic paintings can be understood through hydrofeminism, as part of a systemic approach to new materialism that acknowledges the specific conditions of colonisation.

Unstable, provisional, and transitive material languages generate prefigurative aesthetics of system change related to climate crisis and social change. Within the art market and systems of conservation, this also provokes reconsideration of archival measure.

Artist-artisans have used DIY production processes through Indigenous and non-Indigenous histories.

Neocolonial taxonomies of 'new' materials are a provocation for Aotearoa artists to articulate their own relationships to materials.

Plastic polymorphic compositions include: biomorphism, hydromorphism, and geomorphism.

Section Four: *Four-dimensional Painting*

Painting is four-dimensional and five-dimensional. Thinking about paintings as temporal and energetic systems helps us understand their processural, transitional, and reparative qualities.

Four-dimensional painting includes geomorphism and 'deep time' of processes like erosion and sedimentation, along with anthropogenic processes like compost.

Index, trace, incident, accident, play, accumulation, reconfiguration, and repair are time-based methods involved with composition, decomposition, and derangement.

Section Five: *Entropy & Empathy*

Entropy and empathy are compositional processes, within individual or collective emotional composure and decomposure, and within the world and its interpersonal and intra-active situations and relations.

Affirmative relation and diffractive wordplay of terms like entropy and empathy generate a shift in the dominant dualities of physical and psychological processes, and between sentience and insentience.

Curiosity can provoke empathy, and I think both curiosity and empathy are forms of desire for the world beyond ourselves and the possibilities for world beyond our own.

Material empathy needs to be informed by recent theories of 'critical empathy'. This can attend to historical biases within care and empathy, while it also risks the extended reach of 'neoliberal' care.

Section Six: *Surface Active Agents*

Paint skins and biological skins are both associated with Artaud's concept of the subjectile.

Bioactive subjectiles generate biosemiotics.

Hydromorphic, biogenic and geomorphic substrates lend themselves to the concept of reproductive surfaces, a site for boundary work, and the agencies and animacies of such surfaces.

Appendix

Included in the following pages of this document:

Plastic Feeling (2022). Published as part of *Competitive Plastics* (Part Two), by Objectspace.

Alt-Text (2022). Published as part of the *Migrating Pedagogies* chapbook series by Eohippus Labs (upcoming).

Appendix URL links:

Greywacke love poems: returns (2019)

Surface Active Agents (2018), in Antennae Journal #45, pages 5-10.

Elite Professional Players (2018), as part of *Margaret van Eyck—Renaming an Institution, a Case Study (Volume Two: Comments, Contexts, and Connections)* September 2018, ed. Hagen Verleger, Peradam Press.

Plastic feeling

When I entered art school in the early 2000s, there was a predominant aesthetic of pared-back materiality and affect with an underlying feeling of restraint – perhaps a reaction away from the more excessive painterly languages of the 1980s and early 1990s. The 'plastic arts' had moved toward cleaner forms and compositions, with mediation of materials through video and photographic processes. The way people talked about art also felt restrained, excluding aspects of subjectivity by 'reading' and reducing artworks in particular ways. I've always wondered if this aimed to resist consumerism and the flashiness of the art market, resulting in an unintended undercurrent of austerity and scarcity.

It was a big deal to encounter work by Judy Darragh. Her work offered aesthetics of excess, generosity, plenitude and 'returns' that were hard to find elsewhere within empowered forms of Pākehā art culture. We could talk about this turn to generosity happening within different communities of practice at the time, including Indigenous and rainbow communities. Here I've focused on my own experiences, as discussions of affect and feeling were discouraged during critiques, and embodied language or expressions of emotion were often used with irony. In this environment, painting and its more excessive gestures were held up as examples of aesthetic indulgence, without a deeper conversation about what excess is, or its art histories. I know people who dropped out of art school because they weren't able to refuse feeling in that way.

Materials

Plastics are old materials, with Indigenous and diasporic use of bio-based plastics preceding colonial and petrochemical ones – the dominance of oil industry plastics came about through a series of undemocratic choices, not necessity. Tina Ngata (Ngāti Porou) and Max Liboiron (Métis) remind us of our relationships and responsibilities to the fossil fuel-derived plastics which people here in Aotearoa are intimately connected with, through both whakapapa and legacies of colonisation. From my Pākehā perspective, their writings suggest the kinds of kinship that might transform more binary relationships to petrochemical plastics.[224]

While Darragh's prolific use of plastics reflects our levels of consumption and waste, there's also something generous and subversive at work, where plastic excess creates a sense of wealth, and possibilities of re-use and redistribution resist a reductive aesthetics of scarcity. This shift in perception is materialised within her installations, providing examples of how feelings and relationships to materials can change along with our own aesthetic actions in the world.

224 Tina Ngata and Max Liboiron's discussions about the whakapapa of plastics pollution activism within the specific colonial dynamics of Aotearoa can be found documented in Ngata's blogging as 'The Non-plastic Māori', now archived at: https://tinangata.com. An interview with Max Liboiron, 'Anti-Colonial Science & The Ubiquity of Plastic', 18 December 2019, can be found at: http://frank.rngr.org/interviews/326/anti-colonial-science-the-ubiquity-of-plastic

Affects

Our neurobiological and phenomenological processes of perception come together within affect and aesthetics – our vehicles for feeling. Our aesthetic responses are informed by the way our brains process a whole range of everyday affects and 'edge' experiences (at the edges of normative behaviours), filtering through our emotional processes and narratives.[225] Affects associated with bright and shiny plasticity, and with the aesthetics of 'zany', 'interesting' and 'cute', have been linked to accelerations of late capitalist material production and consumption.[226]

Within affect theory, there is disagreement around the separation between what happens within our brain in response to our daily experiences and what we then experience as feelings and emotion. There are ongoing questions about the biological triggers of feelings, connected to intergenerational genetic and epigenetic factors, as events like trauma influence future gene expression. And questions about how our emotional processing is impacted by the stories we're telling ourselves within personal, social and political contexts, where clickbait is generated with and through intensified feelings. In talking about affective processes, theorists like Ann Cvetkovich prefer to use the word 'feeling' rather than 'emotion', because as a verb, feeling can better acknowledge the body and the mind together.[227]

The word feeling is also used by both Cressida Heyes and Susan Buck-Morss, who have extended Walter Benjamin's writing about the roots of the word aesthetics, in discussing our capacity to feel and respond. In Benjamin's thinking, aesthetic forms can be understood as accumulations and materialisations of more fleeting affects. This aesthetics is countered with a desire for anaesthetics (less feeling), a desire often exhibited as 'disaffection' in the face of social and ecological crisis.[228]

Plastics

To begin talking about affective plasticity in Darragh's work, it's important to talk about the military industrial context of plastics production. Plastics production tripled during World War II: to replace materials made scarce with interruptions to trade, and because both bio-based and petrochemical plastics were lightweight waterproofing materials, used in service of war machines. Art historically, Lee Bontecou is one starting point for thinking about these industrial plastics. Bontecou used plastics in her sculpture during the initial post-war period, as they became commercially available and present within waste streams. Her work repurposing the

225 Michel Foucault, *The History of Sexuality*, 1978, p. 121; and Cressida J. Heyes, *Anaesthetics of Existence: Essays on Experience at the Edge*, Duke University Press, 2020, p. 6.

226 Sianne Ngai, 'Our Aesthetic Categories,' *PMLA*, vol. 125, no. 4, October 2010, https://doi.org/10.1632/pmla.2010.125.4.948, p. 294.

227 Brigitte Bargetz, 'Mapping Affect: Challenges of (Un) Timely Politics', *The Timing of Affect: Epistemologies, Aesthetics, Politics,* Diaphanes, Zürich/New York, 2014, pp. 289–302; and Ann Cvetkovich, *An Archive of Feelings: Trauma, Sexuality, and Lesbian Public Cultures*, Duke University Press, 2003, p. 67.

228 Susan Buck-Morss, 'Aesthetics and Anaesthetics: Walter Benjamin's Artwork Essay Reconsidered', *October*, vol. 62, Autumn 1992, www.jstor.org/stable/778700, pp. 11–30; and Heyes, *Anaesthetics of Existence,* p. 2.

spoils of World War II resonated with the anti-war consciousness of her generation.

In 1935, when Bontecou was about five years old, Benjamin had written about the aestheticisation of politics, where affect and feeling are weaponised within populism – using aesthetic formations to seduce a populace into following fascist agendas. Populist politicians and leaders achieve this by generating and taking on board emotive affects and aesthetic forms – including those already associated with existing fears and hardships – to move their own ideas visibly through culture, gathering followers. This grows the disenfranchised 'mob' mentalities that enable fascism to materialise into the kinds of war machines Bontecou would later reclaim as regenerative and reparative materials.[229]

Affective working-class and middle-class politics are plastic, being moulded and shaped to suit different agendas. We've seen this in Aotearoa during the early festival-like atmosphere of the 2022 anti-mandate convoy, with its chalk drawings of peace symbols and love hearts alongside a range of other '#clownvoy' aesthetics. These affective images were both a façade and a vehicle for more overt anti-government feelings, as jovial events were recorded and narrated for live feed via far-right channels and reposted by religious and wellness influencers on social media. This was a process of melding the fragmented convoy and drawing its storytelling toward underlying far-right agendas – including ableism, white supremacy and misogyny. More violent sentiments were grafted into the anti-mandate messaging, while obscuring the fact that health and wealth inequalities already existed for many, long before Covid and the mask and vaccine mandates were introduced.

Benjamin wrote of the genetics of aesthetics, using genetics as a way of talking about history and the liveness of something 'becoming', through time. This wasn't a genetics that overly predetermined anything, but a code that responded to its environment.[230] In this way, Bontecou's feelings about plastic would have changed over time:

> by 1970, with the first Whole Earth Day, plastic conjured visions of ecological destruction, [while], in the twenties and thirties a Utopian strain of thought had surrounded its production. Plastics were then seen as a miracle material transformed from black coal, the 'scrap heap of the vegetable kingdom,' into the streamlined elegance of machine age design. An alchemical triumph, creating something from nothing . . .[231]

Bontecou's work involves aesthetics drawn from the biomorphism of inter-war surrealism – where the more-than-human and more-than-rational

229 Eve Kosofsky Sedgwick, *Touching Feeling: Affect, Pedagogy, Performativity*, Duke University Press, Durham, NC, 2003, pp. 123–51.

230 Walter Benjamin, *The Origin of German Tragic Drama*, introduction by George Steiner, trans. John Osborne, Verso Books, London/New York, 2009, p. 31.

231 Mona Hadler, 'Lee Bontecou: Plastic Fish and Grinning Saw Blades', *Woman's Art Journal*, vol. 28, no. 1, 2007, www.jstor.org/stable/20358106, p. 5.

were seen as ways to interrupt the rationalism and objectification of war. It also borrows the material languages of everyday mass production of plastics, with materials drawn from the aeronautical and automobile industries and the Cold War arms race, and referencing the dystopian sci-fi ecologies that responded to these conditions. A generation later, Darragh shares these interests: *Stainless* (2011) borrows the futurist aesthetics of the DeLorean car which was produced in Northern Ireland during the Troubles. It was a commercial failure but became famous through the *Back to the Future* movie franchise of the 1980s. Darragh saw the vehicle at a car museum in California, and it fed into her thinking around the failures and redundancies materialised within popular culture, art and design, and technoscience – seen in her poster series *Back to the Future* (2010–11) and the reflective plastic wall installation *Bloom* (2010–11), which continue on from the earlier *Laser Bloom* (1999).[232]

Pareidolia

In 1964 a critic exclaimed of Bontecou's work: "Is it a pterodactyl? A Flash Gordon spaceship? An outsize artichoke or a monstrous whorl of giant flower corollas?"[233] The instability of signification is important to how the work generates an aesthetic response that resists further objectification of trauma, it holds space for subjective ambiguity. This strategy was used within surrealism to help people perceive alternative realities.

Darragh's Rorschach work, *Code* (2021), involves 'multi-stable' images that operate like pareidolia – seeing human faces on cliff faces or in other patterns. This is also a feature of Bontecou's drawings and assemblages, where material significations are destabilised through the code switching and cognitive dissonance of images like gas masks that might also be flowers, or portals to other worlds (Bontecou, *Untitled*, 1961). Similar pareidolia is generated through Bontecou's use of metal noses and plastic turrets, taken as found material from aeroplane cockpits and embedded into façades of wall reliefs.

Plasticities

Earlier in the twentieth century, speculative understandings of excess and plasticity appeared in Georges Bataille's base materialism and in the writings of Roland Barthes.[234] Barthes derided the shift from wooden toys to plastic toys – Jennifer Wagner-Lawlor suggests that he thought plastic lacked feeling.[235] In the past decade, Catherine

232 Judy Darragh, *Stainless*, Two Rooms, Auckland, 24 June–23 July 2011, https://tworooms.co.nz/exhibitions/judy-darragh-stainless/; and Judy Darragh, *Laser Bloom*, artwork detail, Auckland Art Gallery Toi o Tāmaki, www.aucklandartgallery.com/explore-art-and-ideas/artwork/8239/laser-bloom

233 Hadler, 'Lee Bontecou: Plastic Fish and Grinning Saw Blades'.

234 Georges Bataille, *Visions of Excess: Selected Writings, 1927–1939*, edited by Allan Stoekl, University of Minnesota Press, 1985, p. 45; and Roland Barthes, *Mythologies*, selected and trans. from the French by Annette Lavers, Hill and Wang, a division of Farrar, Straus & Giroux. p. 97–98.

235 Jennifer A. Wagner-Lawlor, 'The Persistence of Utopia: Plasticity and Difference from Roland Barthes to Catherine Malabou', *Journal of French and Francophone Philosophy*, vol. 25, no. 2, December 2017, p. 74.

Malabou has developed a less anaesthetic philosophy of plasticity, with a focus on plastic's sensitivity and shapeshifting capacities.[236] She differentiates creative and transformative plasticity from the qualities of flexibility, elasticity and repetitive reproduction that are closely associated with the values of colonising and capitalist production. Malabou warns that seemingly plastic ideals of flexibility and constant change easily inflict or legitimise violence, where people's lives, communities, homes, landscapes and ecosystems are transformed in service of capital flows and profits.[237]

Alternatively, Malabou reminds us that plasticity also involves resistance and memory and plastics have a capacity to 'return' and self-reform. She presents plasticity as a form of writing, as a language akin to that of flowering plants. Plastic image-making allows for impressions, mimesis, phantoms, copies and for folding/unfolding returns.[238] Malabou's polymorphic plasticity can be reclaimed and repurposed within our personal and public lives.

Disaffections

Feelings of resentment and ressentiment in the politics of Donald Trump sit beyond the starker examples of hate and fear that we've become familiar with during recent years.[239] Alongside this, there is also the disaffection and 'ambivalent affects' that come with the detachment that people might choose over a polarised position. Disaffection is an important affective formation in itself, and Sianne Ngai has written about how ambivalent feelings present an opening for intervention in nationalist politics. These disaffections destabilise the polar balance, and help us see where movements of far-right extremism might 'fall apart' – where accumulated affects might break down, releasing people from their extreme beliefs.[240] For people attempting to communicate across differences, the ability to recognise and verbalise a more complex range of feelings allows dialogue to become possible again.

I've been thinking about plasticities in the work of Darragh, alongside other Aotearoa New Zealand artists like Joanna Langford and Eve Armstrong who also repurpose petrochemical plastics, as the kinds of plasticity that are part of 'worlding', where artists' installations create space for alternate worlds to materialise. Within this world-making, the

236 Catherine Malabou, *Changing Difference* (*Changer de différence,* 2009), trans. Carolyn Shread, Polity, Cambridge, UK, and Malden, MA, 2011, p. 73; and Catherine Malabou, *What Should We Do with Our Brain?*, trans. Sebastian Rand, introduction by Marc Jeannerod, Fordham University Press, New York, 2008, p. 80.

237 Catherine Malabou, 'The Future of Hegel: Plasticity, Temporality, Dialectic', *Hypatia*, vol. 15, no. 4, 2000, pp. 196–220; *Plasticity at the Dusk of Writing: Dialectic, Destruction, Deconstruction* (*La Plasticité au soir de l'écriture: Dialectique, destruction, deconstruction*, 2005), trans. Carolyn Shread, Columbia University Press, New York and Chichester, 2010; Malabou, *Changing Difference*; and Catherine Malabou, *Ontology of the Accident: An Essay on Destructive Plasticity*, trans. Carolyn Shread, Polity, Cambridge, UK, 2012.

238 Malabou, 'The Future of Hegel' and *Plasticity at the Dusk of Writing.*

239 Adam J. Frank and Elizabeth A. Wilson, *A Silvan Tomkins Handbook*, University of Minnesota Press, 2020, p. 8; and Wendy Brown, 'Neoliberalism's Frankenstein: Authoritarian Freedom in Twenty-First Century "Democracies"', *Critical Times*, vol. 1, no. 1, April 2018, pp. 60–79.

240 Helen F. Wilson and Ben Anderson, 'Detachment, Disaffection, and Other Ambivalent Affects', *Environment and Planning C: Politics and Space*, vol. 38, no. 4, June 2020, p. 593; and Sianne Ngai, 'The Cuteness of the Avant–Garde', *Critical Inquiry*, vol. 31, no. 4, June 2005, pp. 811–47.

material generosity and plenitude becomes a form of reparative aesthetics, where there's a reopening of how excess materials might be shared. In their large-scale installations, a mixture of new and recycled materials are used, and often redistributed back into a circular and/or gift economy if the work remains unsold. Within the colonial and capitalist dynamics of material culture here in Aotearoa New Zealand, their practices alter and create models for the material and aesthetic conditions that we might call 'reparative' practices. Reparative practices include reading, looking, listening, making, where affective attitudes like hope and unconditional love are brought into practice. One example of using the word reparative in this sense is Eve Kosofsky Sedgwick's 'reparative reading', which is transferable to creative material practices:

> Hope, often a fracturing, even a traumatic thing to experience, is among the energies by which the reparatively positioned reader tries to organize the fragments and part-objects she encounters or creates. Because the reader has room to realize that the future may be different from the present, it is also possible for her to entertain such profoundly painful, profoundly relieving, ethically crucial possibilities as that the past, in turn, could have happened differently from the way it actually did.[241]

During 2020, early in the pandemic, the language of economic 'recovery' was being reconsidered because recovery assumes an attempt to return to the status quo. Instead, activists, thinkers and artists – working within paradigm shifts necessitated by ecological and social crises – are reorienting toward the language of 'regeneration'. Economists and commentators too are presenting economic frameworks like circular economy and doughnut economics.[242] I see this questioning of linear progress and production in the work of Darragh, Armstrong (*Arrangement* photographs, 2003–04), and Langford (*The quietening*, 2006–07). They reassemble individual parts, fragments and waste. They leave space for disassembly and redistribution while also communicating the excessive interconnectedness of everyday life.

In an email conversation about this essay, Armstrong noted:

> I relate to both scarcity (making do) and abundance (of found materials e.g. sculptural arrangements). I guess for me it has always been more practical (using what's available, found materials having as much conceptual and aesthetic potential as new materials, and a sense of empathy with those materials) and in a way a response to the big, shiny, immaculate, 'clever' artworks that were being made by many of my predecessors that I could not relate to.

To me this sounds like Armstrong is working with an awareness of the kinds of late capitalist aesthetics that Ngai developed theories of. While

241 Sedgwick, *Touching Feeling*, p. 146.

242 Stephenson, 2020 [please expand reference]

still an undergraduate student, Armstrong worked with these found materials in ways that acknowledge their affective languages beyond the 'big, shiny, immaculate' aesthetics of the art market she was entering into.

Playing the machine

In his 2011 book *Aisthesis*, Jacques Rancière writes of constructivist artists making materials rather than art.[243] Like Liubov Popova and Varvara Stepanova's printed fabrics, or the Dada posters used to skin the streets with poetic propaganda for the imagination. Here in Aotearoa, an incomplete lineage of artist-made propaganda and props comes to mind, including works by Erica van Zon and Bek Coogan and Darragh's sci-fi appropriations *Deadlift* (2012) and *Spotter* (2012). At CoCA Toi Moroki, these works sit in proximity to *...see you in front of the flames* (2020), collages that bring together crowds of dissent – here, they can't escape vibing with the latent violence at work in the far-right-inflected populist narrative playing out a few blocks away from the gallery at the Cranmer Square encampment.

Thinking of Darragh's sci-fi composites *Deadlift* (2012) and *Spotter* (2012), I remember Erica van Zon's handmade posters (2007–12), part of an attempt to watch all of the classic films she'd never seen. Van Zon then produced handmade props and posters from the films, for use as props in her own exhibitions – romantic promotions within an artist-curated pop-cultural history. Coogan has antagonised the real estate industry (*Wholesale Mass*, 2013), producing her own anti-marketing materials from magpie appropriation of property market posters and flyers, defaced and installed en masse. Coogan's exhibitions and installations of collage and poster works like this are often activated with her own presence, sometimes taking on various provocateur personas like She Hulk and Mud Woman, who rally the opening crowd into collective voice.

Rancière clarifies that the

> choice is not between two kinds of art. It is between two sensible worlds: the old one in which art was the name by which writers, artists, sculptors or filmmakers put their practice at the service of a particular consumption, and the new one by which they make things that enter directly into production in common, which is the production of common life.[244]

I've been thinking about this while working as an artist with Scion, a Crown research institute in Rotorua, with laboratories established in the 1940s to create value-added materials from colonial forestry. Scion now works across the horticultural and agricultural industries to generate materials from waste streams and to establish frameworks for circular regional economies in Aotearoa. There are

243 Jacques Rancière, *Aisthesis: Scenes from the Aesthetic Regime of Art*, first English edition, trans. Paul Zakir, Verso Books, London/New York, 2013.

244 Rancière, *Aisthesis*, p. 228–9.

real possibilities for this ‘bioeconomy’ to develop from meaningful partnerships with iwi, redistributing profits into regional communities – localised economic empowerment that can defy the seductive qualities of the far-right populism that exploits uncertainty.

My own recent work uses various bio-based paints to make many-layered and delaminated wall and floor paintings. Initially, I had been using discounted house paint mistints, but, as Rebecca Altman and others have noted, the petrochemical paint and coating industry is a significant contributor of microplastics. The amount of ‘waste’ material generated within my delamination process made me look for bio-based paints that have a more circular material cycle – paint that can be rehydrated, melted or otherwise reconstituted. At Scion, I work with extruder technician Beatrix Theobald to make different blends of bacterial thermoplastic and polysaccharide biopolymers, to be used in works like *Greywacke Love Poems: Returns* (2019). These materials can be reconfigured through heat, triggering ‘shape-memories’ at predetermined heat settings, revealing predetermined forms that can be deformed and reset at higher heat settings. *Playing the Machine I* & 2 (both 2022), made with filmmaker and artist Jess Charlton, at Scion, misuses these same industrial plastics extruders – *Playing the Machine I* features a machine designed to produce rolls of plastic bags, like those you see in the fruit and vege sections of supermarkets. Jess observes us improvising, as we’re interrupting and trapping air flow to blow bubbles of molten polymer before they are pulled upward into the roller mechanism. Jess also improvises, using different mechanisms within the camera and in the editing process that follows. In recent artists’ talks, Jess has spoken of this kind of filmmaking as an ecology, a living system emerging from the surveillance technology of the military industrial complex. Artists now use these machines to make images, altering the visual records circulating in their communities and in popular culture, making and appropriating plastic imaginaries and memories. Judy Darragh’s *Stroke* (2021) is one example of this – a photograph of a studio assemblage that recreates an online image simulating human sight after a stroke.

Within the ecosystems of art-making, extractive systems of monetisation and collection are currently under pressure from groups like Equity for Artists and Arts Makers / Kāhui Ringatoi Aotearoa, who show how inequities within the copyright system and secondary market can be made visible and pliable, with makers coming together and calling for change. At a small Omicron-reduced gathering held in lieu of an opening at CoCA, Darragh’s informal speech acknowledged the individualising mechanics of the art market and called for further collectivisation, intent on more equitable sharing of resources and wealth between artists and between institutions, big and small. It left me hopeful, for a popular embrace of more plastic feelings about the systems we’ve inherited within our arts scene and beyond. Redistributions of material gains can generate liveable incomes for all arts workers and makers, and enable both individual and collective freedom.

[ALT-TEXT:]

I'm a painter and I think of alt-text as a medium.

If you've used slideshow software recently, you'll have noticed how artificial intelligence can suggest 'alternative text' for each picture, embedding a description of the image into its file.[245] This moves beyond naming into a series of afterlives where the images become revisionable with each alt-text description. Alt-text sits between walls, surfaces, and whatever forms of life are happening beyond them.

Close-up photographs of art installations tend to generate images that feel evacuated or isolated from the larger picture space and its recognisable figures and grounds. The suggested alt-text is often surprising, absurd, poetic: 'a picture containing sitting, snow, old, water'. These suggestions have been so striking that I've taken screenshots to remember them, or used the text as an alternate title and micro-ekphrasis. Alt-text offers an ectoplasm of images, where barriers between the inside and outside of images have become porous.

Teaching and learning about art often feel like processes of figuring out how differently we sense, perceive, recognise, and describe— what is shared; and what is coming into view, becoming embodied, what comes to receive and be received. In software, social media, museums, and beyond, alt-text extends our capacity to share, and I think this might also be true within practices of teaching and learning. Alt-text is generated with each object and subject involved in study, sometimes remaining hidden or embedded.

As a medium, alt-text, like painting, carries both physical and psychic energies, whether that be via the radiation of particular mineral pigments or through emotional transmission of energies through physical colour and gesture, drawn through the artist and into the viewer. Alt-text mediates between objects and subjects, generating images and fields of vision to refuse that binary of objective and subjective experience.

The perceived redundancy of alt-text becomes a matter of debate as each new ghosting or resuscitation gestures toward particular cadavers or live bodies of work, at work.

I often find myself writing toward material images more than imaginary ones, and mostly artworks that also exist with what I think of as their 'extramaterial' or afterlife objects — materials orbiting and transmitting the painting like extraterrestrial satellites or moons reflecting light — photographs, documentation, the drawings that may have preceded or emerged from the work itself.

I'd like to write more about images that haven't arrived yet, that aren't yet in orbit or even wanting to, where description or alt-text might change their arrival.

The August 2021 level-four lockdown here

245 For more information about alt-text, see the Alt-Text as Poetry project by Shannon Finnegan, hosted by Eyebeam in NYC, with subsequent collaborative manifestations as a book, workshop, and exhibition. They've observed poetic and experimental approaches to alt-text in the social media of organisations like Death Valley National Park Service and by many artists, giving insight into how the boundaries between image and text are again being reimagined and reconfigured, as accessibility and equity of visual experience are expanded.

in Aotearoa required us to form small and geographically-bound ‘bubbles’. In my bubble, the state of crisis left emotions open and I began to turn to a Google Doc sitting open for my own alternative text — where I could take things that were lurking in not-quite-ready ways behind the research and practice. Perhaps these are stories: the hows, wheres and feels of images as they could land without expecting them to.

[ALT-TEXT:]

This headshot is one of the first times I was photographed in Yellow Springs OH. A 32 year-old woman sitting on a wooden bench at the edge of a grassland outside a 19th century building. A strong fall sunlight on green foliage. Not long after I’d arrived in YSO to teach visual art, there was an event to introduce new faculty to the community and alumni. The college president was sharing anecdotes about each person and talked about how I’d grown up in the South Island of Aotearoa New Zealand, including a place called Bluff, which I’d described as being “about as close to Antarctica as you could get”. From my perspective, this was true. In Aotearoa, Bluff is about as close to Antarctica as you can get. But after the event, a community member took me aside to point out that I was wrong, that Chile was much closer to Antarctica. This was a lesson in how people can take glee in recognising that someone is wrong. And how this glee is a spectral glare over the perspectival system that constructs their world view. As a white person, often working from within a dominant perspective, experiences like this give me some insight into my own biases and also help me support students who experience bias within whatever institution I’m working within. Sometimes this is colonial and imperial bias toward them, sometimes they are bringing those biases to the classroom. Anti-imperial and anti-colonial work necessarily involves the ability to see or describe what is beyond the glare of self-assured knowledge, to know how and with whom it is formed and situated.

When President Roosevelt (Theodore Roosevelt’s great-grandson) asked me about New Zealand, I also told him to watch Season One of Jane Campion’s Top of the Lake, that includes a family of New Zealanders who live at the feet of mountain ranges that rich American tourists often visit and confer with a North American understanding of wilderness. This family from Top of the Lake are abusive, and are abused as they move inside and outside the norms of small-town New Zealand. They’re placed in relation to the professional classes, the Police, the bank managers, the teachers—people who administer norms and also move beyond them in their own personal and professional lives. Corruption and abuse exist in all layers of this society. I offered President Roosevelt Top of the Lake because it challenges ideas people have about New Zealand, and white New Zealanders. It teaches about the layers of ongoing colonisation, where the half-life radiation of white supremacy can be seen in violence. He persisted and watched the whole season, partly because he got drawn in and

partly because he was being a good manager. If I were to attempt an ekphrasis of Top of the Lake as an artwork, I would start by talking about Jane Campion as a painter. Because she studied painting before she was a filmmaker and her work can be described in terms of liquid light. At the 2022 Critic's Choice Awards, Campion gave insight into the limits of a Pākehā feminist filmaker's P.O.V., on stage, quipping about how the Williams sisters didn't have to 'play against the guys' like she did.

There's a photograph of a painting I made when I was eighteen or nineteen, while living at a residential care home near Godalming, Surrey. The photograph and painting are both lost, but I remember its layered orange and pink glow, made in between shifts working as a personal care assistant and in the occupational therapy department. Sometimes I made things during work time too, like drawings of skeletons demonstrating best practice lifting or sitting positions. These were relevant to everyone on site, residents and residential staff—everyone was involved in lifting, whatever their position might be. In hindsight, these drawings could have shown more range of positions and figure/ground relationships. These work artworks also included a book and a mural of metallic blue dolphins, both collaborations with one of the younger residents. The Communication Book was image-based with a corresponding letter and word system, customised to the way she communicated with particular people. The images and vocabulary were developed over a few months as she taught staff members how to use the book and edited it based on how well the conversations went. I'm not sure if it was ever complete or needed to be, because sometimes participation in the editing process was also a teaching and learning process. This made ongoing use of the book itself redundant because people had already learned new ways of seeing, speaking and listening.

The thing about caregiving is that a lot of physical things become perfunctory and you can lose a sense of boundaries between bodies, you need to keep remembering where your edges are. To protect each other, you try to care as you would want to receive care. I remind myself of this when I'm teaching too, we won't always know what people bring with them to the classroom and they won't always know what we bring with us. Sometimes we don't know ourselves. Teaching and learning isn't necessarily about protection of what we bring and the boundaries between bodies of knowledge are not always tethered to living ones, but it's something to think about. Twenty years ago, down the lane from the care home, there was a photo sitting on a small table next to a very nicely upholstered chair in the living room of someone who has met the Queen, maybe a mid-career minister or diplomat who observes her from a distance across lobbies and dining halls. In this photograph the diplomat is standing next to Nelson Mandela and the small frame has been placed at the centre of the room, their life gathering around this particular moment in time as if it makes everything else worth it. I remember just a few things from the

house: this photograph; the tiled edge of an indoor swimming pool, a bed upstairs, and the velvet-cut lawn outside. I remember peeling off clothing and consciousness at the edge of the pool and then sometime around dawn I found consciousness again in the bed. Seeing someone's head rising from between my legs as they entered my body. A violence that won't remain ordinary. The house chef, a friend of a friend, part of a group of caregivers who would go out drinking.

Early in 2020 my Instagram account @fallingwalker disappeared. In an unknown instant I had lost seven years of annotated images, follows and followers, all connected to particular times and places I'd moved between: living situations, jobs, and communities. As a loss, it's not comparable to large experiences of grief and it's not insignificant either. The connections to people and places are harder to recover than the images themselves which have already migrated between various drives and clouds and can slowly reassemble within a new account (@falling_walker).

When I was teaching and living in small-town Ohio, I wasn't making much artwork and photos of things I made now sit on hard drives and cloud services, in between pictures of rural idle and trips to cities nearby. Places like the Cincinnati Art Museum which has been sitting there in the dip of a hillside since 1886, the 'first purpose-built art museum west of the Allegheny Mountains'. During a visit there, students experimented with ekphrasis exercises instead of artwork analysis. In art museums, the alt-text poetry of the institution's own social media captions and regular visitors' social media posts can create points of entry into art-historical and social conversations. We might see the alt text metadata while the image is loading, still rendering from within some 'neutral' or average colour block blur, a veil of itself. For places like Cincinnati Art Museum, the identities and subjectivities that curators and staff bring to the composition of wall texts and social media can be limited by hiring decisions that result in largely monocultural staff who share similar socioeconomic experiences. Seeking out or crowd sourcing the alt text generated within the communities surrounding the institution and its artworks, as well as the local schools and colleges, can draw attention and action to these missing subjectivities.[246]

"Let's wait for the real lecturer" is something I overheard one student say to another during my first week of classes at my current institution. In the photograph of my face (as I continue walking past them), you can see that I'd just begun my PhD after almost fifteen years of teaching and exhibiting in a range of contexts. And that the person they were waiting for was a middle-aged white male who was employed as a 'real lecturer' back in the early

246 'Missing subjectivities' is drawn from conversation within the Flat Earth Pedagogies project, as artist Bek Coogan reflected on the 'missing subjects' within teacher education programmes and school curriculum in Aotearoa New Zealand. This concept of missing subjects and subjectivities was developed further through dialogue between Coogan, and artists Rachael Rakena and Gabrielle Civil.

2000s, with only a BFA — I think that's great, I just think that anyone should have that privilege. Like ten years ago, when I was applying to do my MFA at this same institution, the English head of school who so confidently stated in the rejection letter: "I just can't see where you can go with this". That's okay too, I just wish he'd been able to admit that his own lack of vision did not have to shut down mine. In my memory of that time, there are also multiple exposures of the in-person MFA interview with two other lecturers sitting next to the HOS, uncomfortable but unmoved, not realising that their lack of movement was just as much a form of action.

An art student is crouching with hands scraping at a linoleum floor. Her head is bowed and unaware of the photograph, working in haste because an administrator is scared and angry about the free-form fresco. White plaster poured over the floor, now fully calcified and coloured in small areas with a dilute acrylic stain and tiny stenciled silhouettes of crowded figures. The person who gave her permission did not have permission. That was maybe a month after 911. Fifteen years later there's a similar photograph with sliding doors pulled aside to reveal a large and wild garden in late summer sun. From inside, the floor of the room appears an equivalent size to this exterior and there's a very large puddle of paint spreading outward to the door. This time liquid, not the calcified plaster sediment. Colour is running through the puddle, with several differently pigmented flows poured into the same area of the floor, and at the door there are two little ducklings peeking their beaks over the edge of the puddle. The linoleum floor is the middle grey preferred by art galleries and museums, the perfect photographic ground for documenting artworks and artefacts. The ducks are lingering beyond a line of blue painter's tape, stretched to make an obstructive horizon.

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