Re-materialising: considering dominant understandings of value and systems of production within industrial plastics and the plastic arts

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This paper considers how systems of art production are changing in response to climate crisis, and how artists are re-materialising extractive materials like plastic. This discussion centres on the creative practice of Te Whanganui-a-Tara and Ōtautahi based Pākehā artist Raewyn Martyn and thinks through connections with Pākehā, tauiwi and Indigenous practitioners in the context of earlier ecologically engaged practices. Extreme weather is escalating concerns about cycles of industry reliant on carbon emissions and waste production, and within contemporary art industries there is heightened dissatisfaction with dominant models of production, curation, collection and market-led valuation. We discuss parallel changes within systems of production in the plastics industry (with a focus on bioplastics) and within the art world, specifically Martyn's investigation and creation of biopolymer forms which simultaneously comprise context, ground, and 'image' within each site responsive painting. Attention will be focused on the potentials of circular economies and aesthetics, alongside values that complicate an art ecology within the wider transition away from petro-hegemonic culture.

Introduction

This paper begins by discussing the practice of Te Whanganui-a-Tara and Ōtautahi based artist Raewyn Martyn, to consider how systems of art production are evolving within accelerating ecological and climate crises. It discusses systems of production within the plastics industry and the art world, specifically Martyn's *Greywacke love poems: returns*, a site responsive series of biodegradable paintings, that appear and disappear into the landscape. It then considers connections between contemporary Indigenous, tauiwi and Pākehā practitioners, who are re-materialising extractive materials like plastics, in the context of current crises and earlier twentieth century ecologically-engaged practices.

Martyn's work reorients us to materials and histories of extraction from the now 'dormant' Owhiro Bay quarry, bearing scars of its mined reserves and facing the sea on the south coast of Te Whanganui-a-Tara. Wellington City Council bought and closed the 80-year-old quarry in 2000, and after recontouring, it is being progressively planted with endemic species. Rimurapa (Sinclair Head) and Pariwhero (Red Rocks) were made scientific reserves in 1983 and 1972

respectively, administered by the Department of Conservation. Land north of the 4WD track, from the quarry to Sinclair Head, is administered by the City Council. The site has parallel and intersecting histories; it remains a rugged coastal ecosystem facing increasingly intense weather and tides, a space for recreation, and for conservation within the Te Kopahou Reserve. There is documented knowledge of pre-European Māori settlement along the South Coast area, and iwi associated with the area include Ngāti Mamoe, Te Atiawa, Ngāi Tara, Ngāti Toa, Ngati Ira and Rangitāne.

Greywacke love poems materialises connections between geological, hydrological, and biological spheres, through Martyn's use of mineral pigments, seawater, and mineral pigments from rock fall within the quarry site. Polymers—plastics—are entangled chains that create mass; polymeric substances are many molecules held together in this way. Industrial plastics are currently transitioning between petro-chemical and bio-based plastics (biopolymers). This is heralded as a new innovation (Boyd), however humans have used more or less extractive processes to produce biopolymers for a long time (Lattermann 9). The history of industrialised plastics runs parallel to theories of materialism from the nineteenth century onward, developments of scientific and anthropological materialism feeding into historical materialism, process philosophy, speculative materialism and new materialism (Basile 2017; Gooch 2020). And it runs in parallel to colonisation, with the economic dominance of the oil industry, its petroleum-derived plastics, carbon emissions, and post-consumer waste streams. The latency of bio-based plastics within the twentieth century is a result of petro-hegemony— dominance of petro-chemical polymers (Haluza-Delay 4)—the future of biopolymers might escape this. In her artworks and writing, Martyn has been looking toward creative use of both petrochemical and bio-based polymers in the past and present, and how these practices can destabilise and break our petro-hegemonic relationships to plasticity.

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). In new materialism, flat ontologies collapse binaries and hierarchies of life and non-life, human and non-human, into an interconnected more-than-human life and planetary aesthetics (Sanzo; Apter)—this is not new to Indigenous thinking (Todd). Martyn's PhD research 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 Lydon 3; Grindon 305).

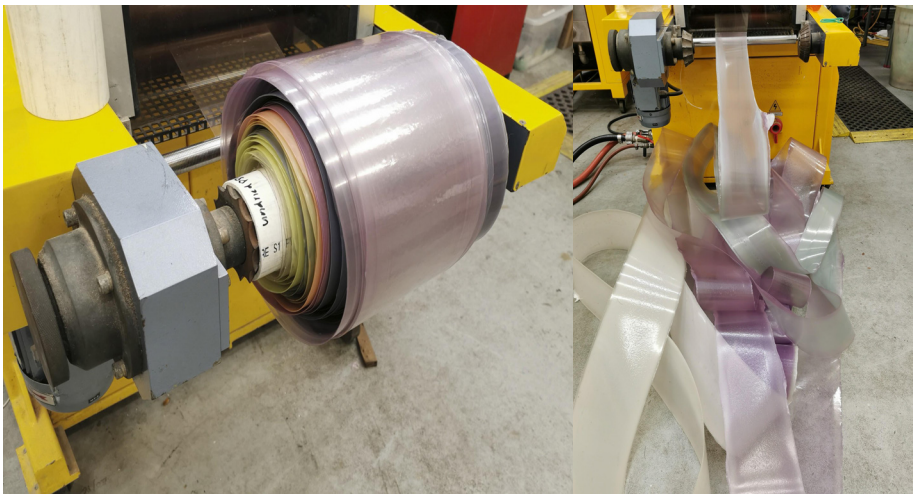

Fig. 1 Documentation of lab work at Scion, a crown research institute in Rotorua. The film extruder machine at SCION is used to melt and blend pellets of bacterial and plant-based polymers. Pigments are added at intervals, creating a spectrum of colour as the mix moves through the machine and heated rollers press and stretch molten polymers into a thin film. Photos © Raewyn Martyn

Martyn's collaboration with scientists at Scion, a crown research institute, has enabled extrusion of plant and bacterial polymers (biopolymers), mixed with pigments ground from greywacke rock fall at the disused Owhiro Bay Quarry, on Te Whanganui-a-Tara's South Coast.[1] This produced a range of greys and oxidised oranges, while additional pigments with ecological and art historical resonance were used as a complementary colour palette, this included biogenic and sedimented calcite, which also sequesters carbon (Siddall 201 1-11). The biodegradable artworks were sited back amongst the South Coast rock forms and the pigments then perform a kind of 'return' through the medium of the biopolymers, a gesture of remediation (Lepawsky 56) within the cultivated foreshore areas of Owhiro Bay (Atkinson and Bouzaid 7). The water-soluble and/or thermo-plastic forms are shaped through processes of extrusion, hydration, layering and heat forming—reconfiguring and re-materialising at molecular and formal levels (Martyn, *Greywacke* 3). These processes are fluid, with the biopolymers changing form and colour across material states. This also resonates with art historical understanding of how colour and paint are made: 'by people, often in dusty, dirty, non-sterile environments. Their composition is therefore not fixed.' (Siddall 201 4). Petrologists and mineralogists know that colours are also unfixed: *Colour itself can 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 201 3).

Fig. 2 Raewyn Martyn, *Biobitumen—a greywacke love poem*, 2019. Still shots of road and curb-side action, presented with edited video as part of Circuit Aotearoa New Zealand, AURA Festival, Newtown, 2019. 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 from the nineteenth to the late twentieth century. Artwork © Raewyn Martyn (with photography by Rachel O'Neill and video editing by Johanna Sanders)

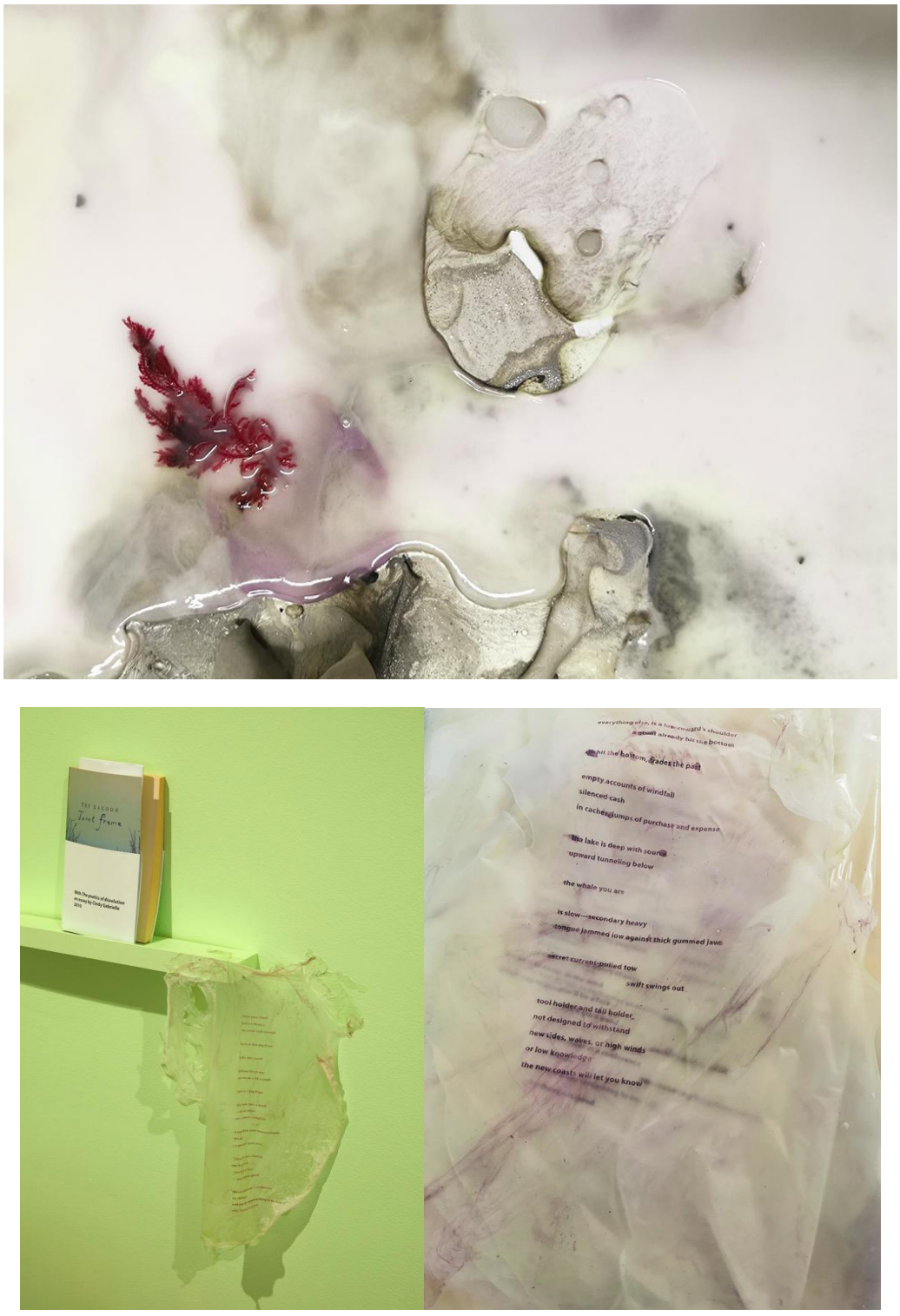

Fig. 3 Top: Rehydrating and reconstituting cellulose material between the phases of *Greywacke love poems: returns* (2019). Bottom: detail of *Climate change heartbreak poems* for *The Slipping Away* exhibition at Gus Fisher Art Gallery, Auckland, 2019. Poems were cast in cellulose made using seawater, calcite and serpentine mixture, and purple pigment that was drawn up from the etched text, as the cellulose dried. The poems were then partially dissolved and adhered to the gallery reading nook's green walls. Photos © Raewyn Martyn

This research grew out of interest in the physical possibilities of paint, and has become motivated by questions of how creative practices are challenging petrochemical technologies of production and the circulation of material value in an art ecology still dominated by the exhibition and collection of objects with known archival measure. More broadly, there is the question of where biopolymer research and materials are being generated within institutions and industries bound to serve capital interests. Petrochemical plastics have been widely used within creative practices since the twentieth century and despite the archival problems with many 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 (Marçal).

The materials for *Greywacke love poems: returns* (2019), were used previously in projects including its sister work within the Courtenay Place Lightboxes (*Greywacke love poems),* and the Circuit AURA Festival in Newtown (Wellington), before being used again at Owhiro Bay. Parts of a companion work shown within *The Slipping Away* at Gus Fisher Art Gallery (2019) were integrated into the pool of re-worked material. The *Greywacke love poems* lightboxes 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. The sedimentary and metamorphic processes of orogeny described within the poems become analogous to systems forming and deforming under pressure. Events within the lithosphere are ongoing, through deep time into present moments, intimately linked to cycles within the atmosphere, biosphere, and hydrosphere (Martyn, *Greywacke* 41).

Fig. 4 Raewyn Martyn*, Greywacke love poems*, Courtenay Place Lightboxes Whanganui-a-Tara, 8 April to 9 June 2019. Sixteen digital photographic composites that rework images taken on site and in the studio working with the biopolymer materials; on eight free-standing lightboxes. Photos © Raewyn Martyn

The conversational approach to researching understanding of the geological, social, and ecological history of the quarry location involved talking 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. This happened over time, as material languages emerged in response to the interactions with members of the public and those who Martyn had made direct contact with through universities, iwi and local government, and Crown Research Institute Te Pū Ao, Geological and Nuclear Sciences (GNS).

These methods are informed by research-based and process-based site-responsive practices of the twentieth 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 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 and place. Yve-Alain Bois and Rosalind Krauss's 1997 book about post-war art, *Formless* (Bois and Krauss), borrows George Bataille's use of the term informel (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 40). A growing number of artists, discussed in the Transitional Practices section of this paper, are now approaching these ongoing systemic and aesthetic concerns within the current social and ecological crisis, where post-human paradigm shifts are influencing many levels of cultural production (Braidotti 1186). Rosi Braidotti has described this situation as the "posthuman

predicament," the "convergence of post-humanism on the one hand and post-anthropocentrism on the other" (1181).

Material Histories

Within Aotearoa mātauranga Māori material culture practices—historical and contemporary — there is a continuum of work with biomaterials: harakeke, bone, bird feathers, kuri (dog) fur, native timbers, pounamu (greenstone), shells. Preceding European colonisation, this emphasis was arguably centred on materials sourced through relationships with the surrounding world, acknowledging and honouring sophisticated understandings and values of interconnectedness and prestige emerging from cultural and spiritual knowledge systems. Post-colonial settlement (with exposure to an array of new materials and material forging technologies), there were extensive incidences of Māori co-option and adaptation of new materials and technologies not previously available (Schaniel). Binary classifications of 'natural' and 'man-made' become redundant when considering the ways in which materials have been used, adapted, manipulated, and re-constituted by human beings through pre-industrial, industrial and post-industrial periods, across Indigenous and settler-colonial contexts.

Both petrochemical (acrylic, enamel) and plant-based paints (oils, tempera, gouache, watercolour) have also shaped Western painting as an activity and history, generating rich iconographies (and iconoclasm), while postmodern practices used newer media as content and material. A whole spectrum of industrial, post-industrial, and future materials are now used by contemporary artists. This includes research integrating biomimicry, biogenesis (including biomineralisation), and symbiotic production like the bacterially metabolised polyesters in Martyn's work.

For many Pākehā and tauiwi artists of Martyn's generation, consciousness of accelerations in climate change contributes to shifting perceptions of nature and culture, the climate crisis and its extreme weather events and projected impacts make it clear that we cannot separate ourselves and our wellbeing from the larger ecosystem. The likelihood of an increasing occurrence of global pandemics is just one example of the extended impacts of global heating. These shifts in thinking, combined with stronger understanding of localised Indigenous knowledge, are influencing both material production and presentation of artworks in a range of contexts: social media, gallery-based, and off-site contexts. Moments of engagement with an audience become events rather than object-led encounters that might reinforce a mind and matter dualism. The material interfaces associated with event-like encounters can avoid dualistic externalisation of matter, involving physical media and materials in ways that reveal material processes and a more molecular and granular understanding of media: physical,

biological, and digital—the data of which can also be understood as genetic (Mitchell 116). Media histories that are framed as archaeologies and geologies, reveal narratives carried within flows of matter—becoming sedimented or losing visibility (Parikka 14). Thinking in this physical way, can expose the materiality of social elements like the "subjective epiphenomena" of values, memories, and beliefs (Fox and Alldred 36).

Fig. 5 Raewyn Martyn*, Greywacke love poems*, Courtenay Place Lightboxes, Te Whanganui-a-Tara, 8 April to 9 June 2019, sixteen images on eight free-standing lightboxes. Photos © Raewyn Martyn

Following on from the lightboxes *Greywacke love poems,* situated in the CBD from April to July 2019, a second phase titled, *Greywacke love poems: returns*, was commissioned for installation in situ on the foreshore and coastline of the old Owhiro Bay quarry site for several weeks in November 2019. This took the work beyond the frame of the lightboxes, situating unstable and emergent material forms within the quarry site, creating encounters with a de-stabilising aesthetics (Foo 232) without the stabilisation of photographic print or frame, while also disrupting familiar patterns within the landscape. These moments of destabilisation are generated within the biopolymer's material cycles in response to shifting conditions, and as

Martyn observes these changes and works in response—processes of disordering and reconfiguration.

Histories of extraction

Settler-colonial capitalist systems (including the arts and higher education) extract time and labour along with knowledge and cultural capital. These conceptual, cultural, and aesthetic currencies are produced through individuals and networks, resourced by ongoing exploitation and capital gains of coloniality and extractive industries (Bourdieu 183). Within conversations about arts and sustainability, it becomes apparent that sustainable ecological practices can sustain extractive tendencies—recycling and waste capitalism, or appropriative use of Indigenous knowledge, for example.

Within discard studies, the waste colonialism of exported plastic waste intersects with capitalism as a lingering drive to extract further value from waste, while also sustaining the status-quo production of plastics. In 2018, New Zealanders learned that much of our plastic recycling is sent to Malaysia and burned (Blake-Persen). Max Liboiron (Métis) and Tina Ngata (Ngāti Porou) have discussed the whakapapa of plastics pollution activism within the specific colonial dynamics of Aotearoa, much of which is also documented in Ngata's earlier blogging as "The Non-plastic Māori" (Liboiron; Liboiron and Ngata).

Newly announced Australian hydrothermal technology allows all post-consumer plastics to be recycled at a molecular level—the Catalytic Hydrothermal Reactor (Cat-HTR) does this by using hot water at a high pressure to turn plastics back into oil. This complicates historical narratives of what is possible within material cycles ("Australian Recycling"). There is also evidence of bacterial degradation, where naturally occurring (and often polymeric) bacterial biofilms coat microplastic fragments that have found their way into the ecosystem, becoming hosts of 'bacterial consortia' that consume the petrochemical microplastics (Chowdhary et al. 454; Yuan et al. 2-3).

This leaves us wondering, what are the conditions for more humane more-than-human economies? And what are the critical perspectives that enable practice-based researchers to pursue these?

The Capitalocene and its carbon imaginaries (Povinelli 16), including petrochemical plastics, are frameworks to understand how extraction materialises and becomes embodied as capital within our systems of cultural production—these terms help us understand the conditions of extractive economies and invite us to imagine and activate alternatives. In a related

provocation, Oli Mould suggests that real "creativity", currently co-opted toward extractive growth of the status quo, needs us to reclaim our creative imaginary. For Mould, creativity is "a power because it blends knowledge (from the institutional and mechanistic level to the precognitive), agency, and importantly desire to create something that does not yet exist. Far from being reactive, it is proactive; it drives society into new worlds of living" (8).

Josephine Berry outlines how transgression of norms and disruptive creative tendencies within modernity and the avantgarde became a tool for neoliberal governmentality. As ideas of 'progress' came to dominate, change in *service* of 'progress' normalised in-process uncertainties. In some senses this creates freedom, in other ways this allows the government to manage emergence and expectations of change. In response to these concerns, the arts might reclaim this relationship with change, to lead resistance to the emergent nationalist politics that govern extractive practices within the settler-colonial climate crisis (Berry and Dunphy 94).

Anti-colonial and revisionist art histories address biased devaluation of materials. Plastics are in fact "ancient," some naturally occurring and some human-made, some are considered kin, used by humans for almost as long as any other matter, and Max Liboiron of the anti-colonial and feminist CLEAR Lab in Newfoundland has written about the need to reconnect and reconsider human relationships with plastics, and has been in conversation with Tina Ngata (Ngāti Porou) about specific relationships within Aotearoa (Liboiron and Ngata).

These material biases were sometimes gendered, as art historian Monika Wagner describes: "material, valued as raw, unsightly, natural or even female - in any case low in rank" (Lattermann 2). Glass became an early "luxury material," while plastics and biopolymers were further devalued over time (Lattermann 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"' (Lattermann 9).

Fig. 6 Raewyn Martyn, *Greywacke love poems; returns*, 1 – 17 November 2019. Bacterial polyester thermoplastic, moulded an existing greywacke boulder in front of the old quarry. Photo © Raewyn Martyn

Transitional Practices

Within accelerating climate change, artists have developed their practices in continuation of responses to social and technological changes of the 1960s and 1970s. This exists in some parallel with contemporary Indigenous and anti-colonial practices—which have much longer histories (Tonga; Reweti and Rakena). Twentieth century movements connected to painting, such as Arte Povera, process-based work and happenings, began to destabilise material expectations. By appropriating and misusing industrial materials, and by making precarity visible and material, artists generate a prefigurative aesthetics of systems and norms that are vulnerable to change, within a larger continuum. Invoking alter-globalisation movements that resist the inevitability of late capitalist conditions (Lenco). Nicolas Bourriaud has written about the visualisation and materialisation of system failure and change within contemporary culture: "To oppose a system, one must first conceive its nature as precarious… seeing the operative system as a fragile installation" (36). Within a moment where artists are returning to an aesthetics of flux and radical change (Brady 3), Josephine Berry's concerns about the normalisation of precarity are also an important consideration here.

Biopolymers are one example of how materials can provoke curiosity of larger systems of production and creative possibility, whether encountered for the first time through a science and technology-oriented YouTube video, a designed object, or an artwork, this curiosity is the kind of desire that can help expand our shared imaginaries and what we consider possible in the world. This raises further questions about how art generates new desires within the social world—what Hannah Arendt identified as a "space of [bodily] necessity leaking into public" and into the political thought that navigates that social space (Povinelli 3). Elizabeth Povinelli writes that acknowledging our "carbon imaginary" also opens space to desire alternatives to extractive capitalism (Povinelli 37). This linking between Arendt and Povinelli is striking because it allows us to think of imagination as another of those bodily needs, leaking into public and into political thought. Art 'works' within the cultural and relational sphere of politics, influencing perspectives and value formation, as well as transfer of knowledge—and images. 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 95; Eriksen 527-30).

Western art history uses the term 'plastic arts' to describe the malleability of a wide range of artistic mediums beyond plastic itself. Post-human paradigm shifts, including our increased understanding of neuroplasticity and epigenetics, have complicated both material and conceptual terms of plasticity as they find their way into the plastic arts. Catherine Malabou differentiates creative and transformative plasticity from the qualities of flexibility, elasticity, and repetitive reproduction that are closely associated with late capitalism (Malabou). This parsing out of terms is relevant to what we are calling 'transitional practices' and 'circular aesthetics' where artists are responding to current social and ecological crises with a return to materiality; a return that draws from process-based and social practices, and where malleable forms of relational aesthetics are investigated in attempts to differentiate subjectivity and labour (Bourriaud 42-44).

In painting and sculpture, during the 1960s and 1970s, work by artists such as Lynda Benglis, Eva Hesse, and Christine Hellyar, included the 'hacking' and customisation of both 'natural' and industrial materials like latex, and were contextualised within the exhibition and book *High Times, Hard Times* (Siegel) and in the *Christine Hellyar Art Timeline* (Ensor and Hellyar). Jeffrey Meikle notes an optimism toward plastic in arts and design during this period, an attitude described in German as "plastikoptimismus" (231). Heather Davis places this optimism in contrast with plastic realities explored by artists in the early twenty-first century, such as Tomas Sareceno's *Museo Aero Solar* (2007) (Davis and Turpin 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 of artists working in these ways, but the practices mentioned here were happening as Martyn was developing her work with paper and petrochemical latex paint: 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)—repurposing plastic-coated electric cabling, spiralling in proximity to oil blobs that reference the Rena oil spill. And more recently, 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. The plastic optimism of these works is different from that earlier plastikoptimismus and grows through *ihi* and a reconnection with a Māori *whakapapa*.[2]

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

Within the ongoing expanded field of painting in the early twenty-first century, shifting systems of visualisation and re-materialisation have developed through process-oriented and site-responsive practices: the medium has become mutant, and networked through transitivity, provisionality, reassembly, contamination, and entanglement (Siegel 29-87). During the early twenty-first century, the grief found within unmonumental, provisional, and transitive practices of the 2000s is now met with the urgency of transition away from a disposable carbon-based culture toward a more circular bio-based culture (Brady 3). Increasingly, artists are using processes, materials, and aesthetics, which are adaptive, reconfigurable, self-supporting, prefiguring collective and responsive knowledge, and in some cases self-generating; this has been described by Benjamin Noys as the "aesthetics of communization" (4). This is a reorientation rather than a forward movement—again, many Indigenous cultures have continued to orient themselves this way.

Roland Barthes understood our relations to plasticity in his personal essay "Plastic" and while writing about George Bataille's base materialism and the liquid and plastic metaphors in Bataille's *Story of the Eye* (Barthes and Lavers). Barthes' writing about plastic materiality in the wake of the nineteenth century, and its museological collections of matter, has been traced through to the beginnings of new materialism (Ireland and Lydon 3; Grindon 305). According to Annette Lavers, Barthes "writes of plasticity as a migration of objects and their signifiers …revealed as the states of the same identity… extended like the successive moments of the same story (Barthes and Lavers 240).

The plasticity that Barthes describes is a less collectable one— a polymorphic alchemy—where a shapeshifting poetic plasticity meets industrial chemistry. Barthes' plasticity was a predominantly petrochemical one, and can now be re-evaluated, with a more symbiotic biopolymorphic alchemy in mind. This is resonant with William Bateson's "economics of flexibility," extrapolated into ecosystems of flexibility, where organisms' qualities of plasticity are seen in context of a larger system (Harries-Jones 2373). There is an irony that petro-chemical objects in museum collections (labour-saving 'throw away' material), are causing conservators headaches as they attempt to suspend their molecular breakdown, and deal with their outgassing (Museum of Modern Art 00:35:30 - 00:40:00).

The biopolymer mediums used within Martyn's work are an example of this biopolymorphic alchemy at work. They readily move between liquid and solid, shape shifting to produce alternative and fugitive visual languages, often absent from much biopolymer research that attempts to meet the industry standards set by petrochemical plastics. Martyn's biopolymers don't fit conventional plastics industry expectations—clean and sterile (until they absorb toxins through use or circulation as waste like microplastics) (Tonuk 73; Alaimo 131; Davis and Turpin 351). This is also seen in the plastiglomerate work of Kelly Jasvac, alluded to above. The provocation to a dominant art collecting mode is significant, as the consistency and stasis of an art object remains highly valued, or with conceptual, instructional, or performative works, the material components can be single-use or temporary props, rather than involve ongoing processes of transformation and re-materialisation.

We think of Mata Aho, 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 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." (Mata Aho Collective). This could be seen as a reclaiming of the Anthropocene through an Indigenous lens, amplifying the 'who' that is being centred and valued in the process, *and* as a

means of honouring, and interrogating the materials. This Indigenous reclamation of often synthetic or petrochemical industrial materials offers a counterpoint to the biopolymer explorations of Martyn but share a compulsion with the expanded narratives and loaded histories that materials carry. The practice could be considered a different register of a transitional practice?

Fig. 7 Mata Aho Collective, *Aka*, and installation view of *Àbadakon/Continuous Fire,* 2019. National Gallery of Canada, Ottawa. Photos © Mata Aho

Fig. 8 Mata Aho Collective, *Mahuika,* installation view *To Make Wrong/Right/Now,* Honolulu Biennial, Hawaii, 2018, curated by Nina Tonga. Photos © Mata Aho

Aotearoa Bronwyn Holloway-Smith included an aspirational zero waste framework within her PhD thesis appendices, outlining some of the questions she asks of herself and her practice. While many practitioners in Aotearoa aspire towards a zero waste or low carbon practice profile, the orchestration and explicit planning of this is less evident or stated. Martyn shares ecological aspirations, but also widens the framework within which complicities with historical extractive processes are considered and folded back into the projects.

I aspire to be a Zero-Waste Artist by:	When I need things, I consider:	
1. **Refusing** what I do not need 2. **Reducing** what I do need 3. **Reusing** (and repairing) what I have 4. **Recycling** what I cannot refuse, reduce, or reuse 5. **Rotting** (composting) the rest.	PRACTICALITIES	• Is it within budget? • Can I source/produce it in time? • Is it suitable for the project duration? • Can I borrow it, or find a suitable second-hand item?
	ETHICS	• Is it made from materials with low environmental impact? • Has it been produced under ethical working conditions? • Is it culturally appropriate for its destination?
When completed, materials from temporary works should again be considered under the 5 R's. *NOTE: There is a preference for outcomes to be made Open Access if appropriate to the material & concept (for example documentation licensed under CC) in order to share this knowledge with the world, and reduce the waste of time and energy spent by others investigating the same territory.*		

Fig. 9 Bronwyn Holloway-Smith, Zero-Waste Artist Framework, published in her PhD exegesis *The Southern Cross Cable: A Tour: Art, the Internet and National Identity in Aotearoa New Zealand*, 2018. Image © Bronwyn Holloway-Smith

Transitional practices re-materialise 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* posts) can be understood as a form of extraction from the contemporary art market. While cultural production since the 1960s has more readily included process-based and ephemeral practices, material trace, documentation and object retention remain dominant forms of circulation. Voracious commodification within art markets adapt to embrace arguably 'de-materialised' artworks, including time-based, performative, instructional, dialogical, and online works that utilise virtual reality (VR) and augmented reality (AR) technologies. Martyn's experiments with 're-materialisation' tease out alternative processes of such commodification, including a range

of responses to moments where it is possible to resist, accept, release, and dismiss the artwork as commodity.

Circular Economies

In Aotearoa, iwi like Tūhoe are leading the way in adaptation of existing industrial-scale systems with collaborations such as the "Road to Nature" (Hudson), which uses pine tar within a composite biobitumen—existing asphalt is already a somewhat circular material, but conventional petrochemical bitumen is challenging and costly to recycle. During research for *Biobitumen*, a greywacke love poem by Martyn for the Circuit AURA Festival in 2019, street-level conversation with roading engineers informed understanding of localised bitumen production and use. These same roading engineers were not aware of Tūhoe's Road to Nature project, and standing on the footpath on Willis Street, divergent sources of knowledge were exchanged between the artist and the engineers in context, among the people, cars, buses—with the exposed base course and new asphalt flowing before them.

Texts focusing on 're-materialisation' within art production more recently tend to refer to translation from the digital sphere into a physical manifestation, whereby the hand-made process is coded to enable digital production of "coded objects" and "transitional objects"—designers are now able to iterate and rework objects at a fast and economic pace via three-dimensionally printed "rapid prototyping" (Harrison 2-3), further complicating the idea of 'the medium is the message' (McLuhan). In 2013, Dew 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 a larger socio-political world. Thus, the material form can now be placed on equal footing with the idea (2-4).

In Martyn's investigations the object occupies a crucial position, veering away from permanency. Its fluidity, its responsive metamorphosis through states of being and its dynamic, direct relationship (co-existence) with site and atmosphere are prioritised. With materials like biopolymers, ongoing re-materialisation is part of the conceptual and physical life cycle of the work, and the value of this fluidity is located in their unfixed qualities where polymer molecules remain reconfigurable, allowing for changes over time. These changes can be programmed with specific triggers of activation through exacting production processes like four-dimensional printing which have added value within industrial and biomedical applications, or with the more improvisational activations found within Martyn's work.

Within conventional systems of production, impermanence can be seen as the path to waste: fast fashion, inbuilt obsolescence in service of "creative destruction." Within a circular economy, however, the fluidity of impermanence allows for material flows that mean waste is always avoided. This approach developed from fields of "industrial ecology" and "ecological economy," which emerged in the late 1970s. These fields have produced ideas such as "inter-system ecology" whereby human economic systems and ecological or "natural" systems are integrated (Korhonen et al. 37-40). Circular economies depend on that moment where waste is possible, and how an economy continues the circulation of carbon feeds sources within the boundaries of interconnected systems. Critics of the circular economy note that there must also be a shift away from fossil fuels and a reduction in overall production—degrowth. In the Middle Ages, before the oil industry, old clothes were turned into paper, food waste was fed to chickens or pigs, and new buildings were made from the remains of old buildings. The difference between then and now is the resources used (De Decker).

Florian Graichen, from SCION, a crown research institute in Rotorua, speaks about the bio-circular economy and bioeconomy, as a cycle that mimics nature, where everything is recycled or transformed without a waste by-product, and the economic base of production moves from fossil fuel-derived materials to renewable biological sources (e.g. algae, bark, wood and other plant fibres), and where bacteria is used as the processing agent. Understanding of these material cycles shifts focus toward thinking of re-use, and thinking of products as an ongoing service, which is believed to encourage businesses to improve the lifespan and recyclability of their products.

Martyn's cellulose paintings can be fully rehydrated and bottled until ready for redistribution, at which point a singular painting might be redistributed as more than one object or surface area—it multiplies, and scale and dimension are called into question—it may become thicker yet smaller or thinner yet more expansive. It might be denser, more concentrated in pigment particles that shrink closer together, intensifying colour. These are alternative conditions of archival measure where physical changes in the material are desirable, whether brought about through atmospheric conditions, or through a programme of reconstitution.

This ongoing re-materialisation means that the artwork becomes more like a service; an activity sustained over time, a verb: a servicing—a painting. The gaps in relation to market value/cultural value/environmental impact provoke a call for more complex or holistic considerations of how value is determined. Within more linear archival frameworks, painting objects are evaluated through their ease of conservation, the levels of acidity, or moisture, or oil, organic matter, size, delicacy, weight, or other physical vulnerabilities. Social media feeds allow for a greater range of transformations and temporalities within an artwork's physical

state, as well as its social circulation and status—a resocialisation of the ongoing activity of a painting, through social media. Martyn began using *Instagram* as a site of both studio work and exhibition work—allowing the studio processes to be experienced as discrete 'ideas' within the *Instagram* feed—further exploring the four-dimensional possibilities and this re-socialised form of painting.

Within such a circular archive, perhaps it is the capacity to shapeshift that might be valued. Further discussion of circular aesthetics might help us to understand how these values are located in artworks. Post-life issues become key. Their very shareability, flexibility, solubility might very well be the thing that makes them last longer, or transverse time and space in unconventional ways. Some of the standard measures become irrelevant. Systems of arriving at and maintaining 'value' within an art market relate to broader societal patterns of extraction, production, and consumption.

Conclusion

Martyn's PhD research proposes practices of transition, where forms and systems of production are unstable and seen as vulnerable to change. Artworks produced within this framework have presented alternative archival qualities that complicate their value, precedents of transitional practices during the twentieth and twenty-first centuries show that these forms of practice can be sustained and recuperated within arts institutions and some private spaces. However, transitional practices like this persist within a local art market that remains predominantly linear and reliant on a material 'end product' for private or public acquisition. *Greywacke love poems: returns* (2019) and the larger PhD project, are funded and enabled through public money, so 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. It is also an example of how painting and installation practices are being re-socialised beyond gallery platforms, to operate as an activity within social media and physical communities.

Artworks like the biodegradable paintings that return matter to cycles of life, create models of material vulnerability and resilience, with their circular, planetary aesthetics and processes, they offer alternatives to visions of neoliberal precarity (Berry). At the same time, these alternatives risk reconfiguring that precarity into something similarly troubling—instrumentalization of creativity in service and sustenance of status quo production and growth (Mould). Holding these risks in mind, this research affirms the need for multiple and diverse material languages that prefigure more just material transitions within our local and global economies.

Greywacke love poems: returns (2019), persists with painting as an activity and service within social media and a public recreational space that connects to multiple histories: geological, Indigenous, colonial and industrial. This work has developed further understanding of how our understanding of material and aesthetic plasticity in the arts has expanded over the past century to include the biological and psychological. And how te ao Māori and international Indigenous-led art and research are influencing Pākehā and tauiwi work within science and arts collaborations—it also affirms the need for further work in this area.

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NOTES

[1] Sampling of this rock fall occurred in conversation with mana whenua; Wellington City Council; and geologists.

[2] Ihi: "essential force, excitement, thrill, power, charm, personal magnetism—psychic force as opposed to spiritual power (*mana*)." Whakapapa: "genealogy, genealogical table, lineage, descent - reciting whakapapa was, and is, an important skill and reflected the importance of genealogies in Māori society in terms of leadership, land and fishing rights, kinship and status. It is central to all Māori institutions" (Moorfield, John C and Te Aka Māori Dictionary).