



PERFORMANCE
PHILOSOPHY

ALGAE SYMPOIESIS IN PERFORMANCE: RENDERING-WITH NONHUMAN ECOLOGIES

SARAH BLISSETT INDEPENDENT SCHOLAR

In the following article, I develop the concept of 'rendering-with algae' as both a practical and conceptual tool for investigating how algae agencies transform bodies and environments through a series of performance experiments. I explore embodied ways of making-with algae as collaborators in performance practice that seeks to address processes of ecological destabilization as matters of combined human and nonhuman agency. This work relates to a wider body of PhD research, which investigates transformative relations between algae-human bodies and environments as matters of cooking in performance through an ecodramaturgical method. Performance scholar Lisa Woynarski theorises how ecodramaturgy operates beyond traditional theatrical forms as an analysis of performance more broadly that connects ecological thinking to the material world. She extends ecodramaturgy to 'thinking about meaning-making strategies, in a variety of performance forms in relation to ecology' (Woynarski 2020, 9–10). My embodied approach to ecodramaturgy draws on this theorisation and explores material and narrative threads of relation between algae, human and nonhuman bodies and environments, through a variety of fields of research and practice, with the aim of forging new creative ways of working with nonhumans in performance. This research builds on performance scholarship and practice at the intersection of performance and ecology (Kershaw 2009; Bottoms 2012; Woynarski 2020; Arons and May 2012; Lavery 2015; Donald 2016, 2019). I also draw on scholarship in fields of new materialism and posthumanism (Alaimo 2010, 2016; Bennett 2010; Barad 2003, 2007, 2010; Haraway 2008, 2016) to develop what I propose as an embodied ecodramaturgical and sympoietic approach to collaborative algae-human performance research.

Throughout this article, I consider Donna Haraway's concept of 'sympoiesis' aligned with my embodied approach to ecodramaturgy. Haraway proposes sympoiesis as a process of 'making-with' nonhumans across a range of interdisciplinary practice that reflects on the ecological interdependencies demonstrated by biological systems such as 'cells, organisms, and ecological assemblages' (2016, 60). In a similar vein, ecodramaturgy theorises the work of intersecting practices from fields of performance and ecology that highlight how material relationships inform stories around changing ecologies. Performance scholar Teresa J. May (2017) draws on Haraway's theorisation of sympoiesis to argue that the term ecodramaturgy encompasses practices which have 'spun counter narratives and invented alternative forms that resisted environmental and cultural imperialism by exposing its mechanisms, amplifying the voices of those places and peoples it has silenced or ignored, and advocating ecological reciprocity between and among land and people' (1). May posits ecodramaturgy as a mode of performance analysis and practice concerned with reciprocities between bodies and environments. In foregrounding ecological reciprocities between humans, algae and environments, this article seeks to uncover alternative practices to the representations that render algae bodies as silent commodities.

Between October 2015 and September 2019, I embarked on a series of performance encounters and experiments with algae organisms. These encounters occurred across numerous sites, spaces and times from mountaintops in the Lake District to gardens in South London, intertidal zones in Norway and old growth forests in Finland. Engaging with algae ecologies through multisensory embodied inquiry became a process of opening myself up to a field of perception beyond the human and at the same time delving into the fabric of what drives my own creative practice. As creative collaborators algae might seem an unlikely choice and, at the start of the research process, I found myself grappling with taxonomies in an attempt to unlock an approach to working with them in practice. I became immersed in a world of scientific literature and discovered their vital role in diverse and interconnected ecologies. Algae are fundamental to earth's planetary ecology; collectively, they produce over half of earth's oxygen, compose expansive habitats, act as a vital food source for multiple species and sequester vast amounts of carbon from earth's atmosphere (Brodie 2017). I discovered there are more than seventy-five thousand species of algae encompassing both micro and macro varieties, the latter being more commonly known as seaweeds, and that these organisms inhabit every environment on earth from oceans, rivers and lakes to glaciers, sediment, rocks and trees. They even grow on human teeth.

Algae-human relationships extend from everyday encounters breathed in air, ingested as food and witnessed as patches of green on fences or walls, to invisible connections with ancient algae deposits that are extracted as fossil fuels, drive global capitalist economies and are entangled with cycles of carbon that contribute to global warming. I propose that these entanglements highlight an ecodramaturgical perspective on anthropogenic climate change that reveals the effects of how carbon is digested as food and fuel by human and nonhuman bodies to generate and transform life on earth. Despite their crucial role in earth's ecosystems, algae organisms are frequently overlooked as agents whose photosynthetic capacity makes life on earth possible. Instead, like much nonhuman existence, the binaries of Western thinking often relegate these beings to the realm of capitalist commodities where forms such as spirulina are labelled as 'health foods' and

others are 'harmful algal blooms' when they resist becoming products for human consumption. Exploring a diverse range of algae lifeforms throughout my research challenged me to rethink forms of multispecies existence that are inextricable from environments. This article discusses the first phase of my research into 'cooking-with algae,' through the method of 'rendering.' I consider algae as collaborators in this work, whose stories and material ecologies sediment concepts such as 'algae rendering' and compose the threads of my thinking through embodied performance practice. The following article attempts to articulate how working-with algae has shaped my perception of ecological relationships, along with my artistic practice, in ways that continue to develop through an ever-changing dance of agencies with these 'plant-like' beings.

Part 1: Rendering *Pharmakon*

In culinary terms, 'To render' means 'To melt down (fat) in order to clarify it. Also: to obtain or extract (fat) from meat, an animal, etc., by heating' (OED 2009). Taking this term as a methodological starting point, my research aimed to break down the traditional culinary concept of 'rendering' and rework it beyond anthropocentric narratives of consumption through embodied ways of thinking and making with algae. To establish a departure from anthropocentric culinary 'rendering,' I drew on further definitions of 'rendering' as a verb, where 'to render' means 'to express or represent' and 'to cover (stonework, brickwork, etc.) with cement or a similar material; to paint (an external wall) with render' (ibid). These last two meanings of 'to render' developed through embodied encounters with cyanobacteria¹ algae, during which I witnessed lichens² covering fences, walls, rocks and trees, alongside theoretical investigations into cyanobacteria ecology, particularly algae blooms across the surface of bodies of water. This attentiveness to everyday encounters with cyanobacteria was inspired by what Anna Tsing (2010) calls the 'art of noticing,' where one becomes open to the nuanced ways that beings are bound together in a web of relations.

What I term 'algae rendering' in this article operates as a mode of material relation between algae and environments, in contrast to anthropocentric, utilitarian, representations of algae as 'harmful' or 'healthy.' 'Algae rendering' also draws on philosophical considerations of 'rendering' as a process of nonhuman performativity³ and reflects on how material embodied relations are translated into narrative representations of algae. Anthropocentric definitions of algae as 'healthy' or 'harmful' reveal how language and taxonomic categories are entangled with material effects but, crucially, how these effects are filtered through an anthropocentric lens. Derrida's (1981) concept of the 'pharmakon' reveals the relationship between language, matter and meaning in ways that highlight anthropocentric binary oppositions such as nature/culture and poison/remedy. For example, Derrida states that the pharmakon, 'constitutes the medium in which opposites are opposed, the movement and the play that links them among ourselves, reverses them or makes one side cross over into the other (soul/body, good/evil, inside/outside, memory/forgetfulness, speech/writing, etc.)' (1981, 130). The concept of the 'pharmakon' is useful to my ecodramaturgical research method, as it reveals anthropocentric tendencies to create binary oppositions, which are inextricable from each other. The pharmakon of 'algae rendering' is a further conceptual tool that

extrapolates and produces different ecological relations between algae and human bodies and environments in modes of performance practice which are explored further in this article.

Algae cross species divides between plant and animal, often defying straight-forward taxonomic classification and highlighting alternative modes of multispecies being. For example, forms of cyanobacteria that live as symbionts in partnership with fungi to become lichens or the zooxanthellae algae that live within the tissue of coral reefs. Seaweeds are perhaps the most 'plant-like' group of algae beings, but they also encompass forms that appear more mineral such as coralline algae that grow on rocks and coral reefs. My 'rendering' encounters and experiments engage with algae through different co-constituting agencies, alongside modes of transformative human-algae ecological relation, rather than taxonomic classification alone. Taxonomy and species categorisation highlight the anthropocentric role of language in nonhuman representation, particularly when the materialities of certain algae blur taxonomic divides between plant or animal species, yet nonetheless they are put in specific linguistic boxes. The arbitrary division of algae according to taxonomy alone is part of anthropocentric, linguistic, representation that disregards their different material effects, particularly when so many complicate and blur the lines of categorisation through their relations and modes of material being. Gilles Deleuze elucidates this thinking in terms of how radical differences between beings determine multiple effects when he states, 'Bodies are not defined by their genus or species, by their organs or functions, but by what they can do, by the effects of which they are capable' (Deleuze & Parnett 1987, 60). What I term 'algae renderings' intend to move beyond taxonomy and investigate how the language used to describe algae can also consider their ecological entanglements through modes of material relation.

The group of algae organisms classified as cyanobacteria, commonly known as blue-green algae, encompasses a variety of single-cell micro-algae from freshwater to marine species. When I first encountered cyanobacteria, I observed them as colourful splatterings of blue-green on walls, fences, trees and pavements. These material ecological co-relations between cyanobacteria and other organisms and environments inspired new ways of working with them in my creative practice and a curiosity about their role in different ecosystems. Cyanobacteria cover almost every terrestrial and aquatic environment on earth from soil layers to glaciers and oceans (Vincent 2007). In occupying these environments, cyanobacteria exhibit similar characteristics and create large 'blooms' on the surface of water, ice, rock or snow (Seckbach 2007). Cyanobacteria species also embody dual anthropocentric representations that label them as either 'healthy' or 'harmful' (Brodie & Lewis 2007; Margulis 1981; Round et al. 1990). In one thread of scientific analysis, cyanobacteria are described as the organisms responsible for producing the atmospheric changes necessary for life on earth to develop. For example, the pioneering evolutionary biologist Lynn Margulis (1981) hypothesized that cyanobacteria were responsible for first producing oxygen in earth's atmosphere. Margulis states that a global oxidization event occurred on earth when one type of cyanobacteria algae absorbed another micro-organism containing chlorophyll into their bodies thus enabling them to photosynthesize through a process of partial digestion called endosymbiosis.⁴ Haraway (2016) draws on Margulis' work on endosymbiosis to highlight the unfolding and interweaving of different modes of ecological relation evident in the concept of

sympoiesis. Haraway (2016) states that, 'Critters interpenetrate one another, loop around and through one another, eat each other, get indigestion, and partially digest and partially assimilate one another, and thereby establish sympoietic arrangements that are otherwise known as cells, organisms, and ecological assemblages' (58). Considering material algae ecologies through the lens of sympoiesis also highlights the ecodramaturgical method of this research, which means to uncover, digest and breath-in different forms of algae through encounters and stories about their role in earth's changing environments.

The environmental effects of different forms of cyanobacteria determine whether they are regarded as 'harmful' or 'healthy' by humans in terms of their impact on wider ecologies. For example, cyanobacteria are also described as 'harmful algal blooms' (HABs), when they are damaging to economic productivity and interfere with modes of human food production. I propose that these representations are anthropocentric 'algae renderings,' forms of algae representation and consumption by humans that emerge through specific material encounters of rendering that are inscribed within a wider politics of capitalist consumption. In this sense, cyanobacteria algae demonstrate a 'pharmakon' of anthropocentric 'algae renderings' that labels them according to binary logic as 'healthy' or 'harmful' in terms of how their effects impact humans.

Feminist science studies scholar Astrid Schrader (2012) reveals how anthropocentric representations of algae reveal a complex web of entanglements between human and algae bodies. Schrader unravels links between how algae are described pejoratively as 'Harmful Algal Blooms' (HABs) and a wider politics of representation that inscribes ecosystems with human utilitarian values. In response to humans labelling these algae as 'harmful,' Schrader asks "to whom?" (ibid) aptly highlighting how the language used to describe nonhumans so often depends on anthropocentric logic. Schrader also explains how human activity is inextricable from the causes and effects of these blooms. She writes, 'In order to reproduce, algae need not only sunlight but also nutrients such as nitrogen and phosphate. Agricultural run-off containing plant fertilizers and waste from industrial animal farms have supplied coastal waters and estuaries with a large dose of these nutrients' (2012, 77). Industrial farming creates nutrient-rich coastal waters for algae, materializing further environmental impacts on ocean ecosystems in the form of HABs that interfere with the fishing industry. Larger organisms in the ecosystem, such as fish, suffocate as a result of the blooms, causing a loss in productivity from potential 'food energy' (Diaz and Rosenberg 2008). HABs are considered 'harmful' because certain forms are damaging to economic productivity, which create losses in the commercial fishing industry and a decline in coastal tourism. Therefore, the causes and effects of algae blooms are entangled with the ecological and economic impacts of capitalist production that are designed to maximize food production for human consumption. Systems of human food production and consumption are entangled in a politics of representation that labels the nonhuman ecologies responding to anthropogenic environmental change as 'harmful,' inscribing ecologies in anthropocentric discourse.

Schrader (2012) considers how additional financial investment is being made to create new modes of ecosystem adaptation in environmental monitoring systems that can predict cyanobacteria blooms and their 'harmful' economic impact. This act of algae monitoring is reflective of the wider

capitalist politics underpinning environmental change with the potential to further impact ecosystems according to the anthropocentric logic of capital and consumption. Schrader elucidates this point stating, 'as the algae species become reduced to a series of genes or chlorophyll content that can be quickly quantified, the speedy detection of their harmfulness come to embody and materialize the very anthropocentrism assumed in the notion of "harmfulness"' (87). Cyanobacteria are forms of algae that often create these blooms and are commonly linked to the impacts described as 'harmful.' An ecodramaturgical lens on HABs, in terms of algae rendering, reveals how cyanobacteria blooms that emerge as coverings on the surface of watery environments, in response to higher nutrient levels from industrial farming, are inscribed with the material effects of anthropogenic environmental change and perpetuate this cycle. I propose that material-discursive frameworks of 'algae rendering' highlight the ways in which human-algae ecologies are entangled in a politics of anthropocentric representation and consumption that are transforming environments.

Spirulina are forms of cyanobacteria that expose a different set of ecological relations and thus reveal another side of the 'pharmakon' of algae-human relations in which algae become either poison or remedy according to the binary logic of 'healthy' or 'harmful.' Western capitalist representations label spirulina algae as 'healthy' based on their viability as products in the form of health food supplements with combined ecological and economic effects. In contrast to HABs, spirulina are valued as a 'health food' and were first introduced to the US health food market as a high-protein and detoxifying food supplement in 1979. These algae were labelled a 'food of the future' in the 1980s owing to their potential as a sustainable food resource and by the mid 1990s there was a global market for algae food supplements and new commercial algae farms were developing across the world (Henrikson 2010). Algae are currently farmed commercially for biofuels, food, aquafeeds for agriculture and are also being used in sustainable design. Increasing financial investment and research into the 'green' potential of algae is being made to combat issues of food and fuel shortages as a result of climate change. These examples of 'algae rendering' as products highlight human-algae relations that commodify algae as part of a capitalist economy that perpetuates cycles of nonhuman consumption. These algae renderings reveal the logic of capitalism through which the economic viability of cyanobacteria as human 'health' products fuels production and consumption of certain forms of algae as commodities and how these processes in turn are perpetuating an increase in the devastating effects of climate change.

Representations of algae as 'harmful' or 'healthy' reveal the ongoing materialisation of algae-human relations that are often dependent on the logic of Western capitalist systems of human commodification and consumption. The concept of 'algae renderings' demonstrates how ecological relations between algae beings and environments compose and recompose each other through representations that materialize in different ways. At the same time, the 'pharmakon' highlights the entanglements through which 'algae renderings' operate in terms of a combination of discourse and material effects driven by anthropocentric language that both relies on and generates binary logic. The 'algae renderings' described in this first part encompass surface coverings of algae on bodies and environments as well as representations of algae through language that reveal an anthropocentric 'pharmakon' which further generates cycles of nonhuman

consumption. Together, these notions of 'algae rendering' and the 'pharmakon' demonstrate a web of nonhuman performativity intertwined with human systems of meaning-making and capital that are performative of changing environments.

These changing environments demonstrate what Karen Barad outlines as nonhuman performativity, where all bodies, human and nonhuman, emerge as agential through material-discursive practices that produce differences between them (2003, 810). Barad's formulation is crucial to how I consider modes of 'algae rendering' as the material ecological transformation of bodies and environments, which are inextricable from anthropocentric representations and the effects of climate change. Different configurations of cyanobacteria 'algae rendering' described in this first part emerge through what Barad terms 'spacetime-matterings,' defined as, 'the ongoing rematerialisings of relationalities, not among pre-existing bits of matter in a pre-existing space and time, but in the ongoing reworkings of "moments," "places" and "things"—each being (re)threaded through the other' (Barad 2010, 268). This article itself constitutes an example of anthropocentric algae rendering through language that is continually shifting in the process of writing and reflecting on past research and experiments. My ecodramaturgical approach seeks to weave together different material and linguistic threads of algae-human ecology in order to engage with how language itself shapes many of the paradoxes of anthropocentrism that inform my attempts to move towards collaborative ways of working-with algae. To grapple with these ideas further, I began to explore material ways of working with algae in practice that follow on from this thinking and my embodied encounters with cyanobacteria. Embodied encounters with modes of 'algae rendering' inspired new ways of working with algae in practice that sediment knowledge of surface coverings of algae bodies in relation to my own. This next section presents images of these encounters and considers the applications of 'algae rendering' as a mode of performance analysis and practice.

Part II: Algae Rendering

My encounters with cyanobacteria emerged in material forms through 'algae rendering' of environments. These forms of algae materialized through symbiotic associations with fungi as lichen on trees and rock. My investigation into material examples of 'algae rendering' is an attempt to consider modes of algae-environment relation that operate beyond the pharmakon of anthropocentric representations as 'healthy/harmful.' I began by observing how algae generate a visible transformation in the composition of a body or environment by forming a covering on the surface. I observed these examples of 'algae rendering' through my encounters with cyanobacteria, which appeared as patterned surface coverings of lichen on trees, rocks and fences in various locations throughout the duration of my research. I continue to wonder at the sight of these familiar flashes of green.

The following is a selection from a series of images taken on my mobile phone during encounters with cyanobacteria in forms of 'algae rendering.'

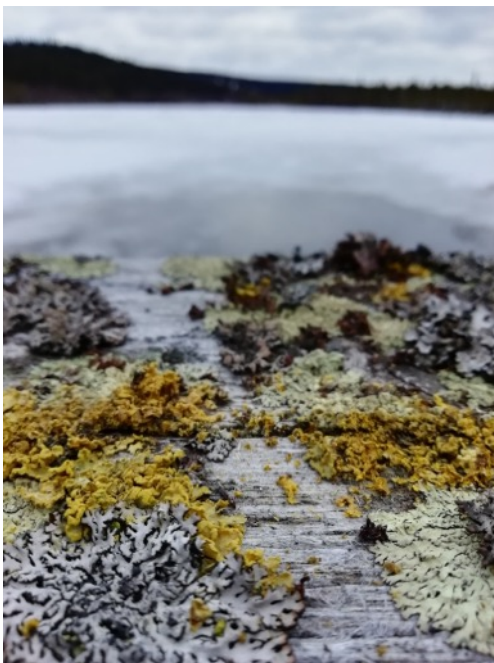
Encounters with Algae Rendering:



Redhill, Surrey, UK 2017



Brigsteer, Cumbria, UK April 2018



Paljakka reserve, Kainu, Finland, April 2019



Stonehenge, Wiltshire, UK July 2019

These encounters with cyanobacteria generated a further aspect of ecodramaturgical inquiry into how my interpretation of 'algae rendering' could be applied to the analysis of other artists working with algae. An example of this notion of 'algae rendering' in practice is an installation artwork by Helen and Newton Harrison (1971) entitled *Notations on the Ecosystem of the Western Salt Works with the Inclusion of Brine Shrimp (Shrimp Farm)*. The work was composed around ecosystem interactions between the micro-algae *dunaliella*, the brine shrimp *artemia* and salt water. The installation involved four connected tanks filled with water, *dunaliella* algae and different amounts of salt; brine shrimp were then added to each tank. In hypersaline water environments where there is a high salt content, *dunaliella* produce an organic chemical in the form of a carotenoid as a reaction to the salt. The brine shrimp digest and synthesize carotenoids from eating the algae that contain this pigment, which gives their bodies a pink-orange colour.⁵ Over the course of the production of the artwork, Helen and Newton Harrison added increasing amounts of salt to each tank. The algae continued to photosynthesize and produce more carotenoids in response to the salt content of the water. This created a transformation in the colour of the four tanks from blue-green to pink and red in a colour spectrum of carotenoid-producing algae. The artwork formed an ecological feedback loop that is characteristic of what art critic Jack Burnham describes as 'systems aesthetics' (Burnham 1974), which highlights the tenets of technological and organic entanglements between beings and environments. The Harrisons' artwork represents algae and brine shrimp ecological relations through an installation that itself reproduces the ecosystem. This demonstrates another example of 'algae rendering' through the simultaneous imitation and reproduction of algae ecology in a form that creates a material transformation of the environment of the tanks.

Shrimp Farm is shaped by both human and nonhuman agencies in ways that demonstrate a multispecies approach to the creation of an artwork. Newton Harrison describes how the inspiration for the project came from a conversation about the ponds where someone from the museum that hosted the work described using algaecide to keep the ponds 'clean' from algae. The idea of cultivating a living artwork from organisms that the museum was trying to destroy was amusing to Harrison (Burnham 1974). This example highlights another aspect of the pharmakon of algae-human relations that I propose depends on different anthropocentric representations of algae ecology; the project challenged the anthropocentric ideology of the museum by celebrating the algae. The Harrisons envisaged the final phase of *Shrimp Farm* as a performance, where the shrimp would be the main ingredient in a performative feast that marked the end of the exhibition. Newton Harrison describes the final act of eating the artwork after the exhibition:

The taste was appalling, with a slightly rotting, crunchy, and extremely salty algae-like flavor. I tried making a shrimp soup. Adding capers made the broth a little better. Anchovies made it possible to take a taste, but nobody wanted a mouthful. In a last-ditch effort I mixed the shrimp, capers, and anchovies in a blender, then added chopped chili peppers to make it a bit spicy. During performance mode at art parties, people felt somewhat obliged to taste a dollop on a cracker- but no one asked for seconds! (Newton Harrison 1971)

Harrison articulates how the final staging of this algae ecology involved serving the shrimp as food for human consumption. However, the algae and shrimp disrupted the envisaged plan for the work

because of their combined flavour. The algae and shrimp formed a chimeric relationship as artwork and food for human consumption but at the same time were unpalatable. This chimera disrupted human mastery over the outcome of the work as the nonhumans were inedible through the very process by which the Harrisons intended to render them as human food, thus nonhuman agencies changed the ecology of the work from a system of human food production to one of algae transformative relations. There is a similar dynamic evident in this artwork as there is in HABs, where methods of industrial farming produce the conditions required for algae blooms to grow to an excess and interrupt the fishing economy; one mode of human production and consumption interferes with another. The intention of the artwork to eventually become a system of human food production might challenge the notion of algae as collaborators within the work. However, the combined agencies of algae, shrimp and humans together generated the material transformations that created the work.

Shrimp Farm demonstrates another example of what I propose as 'algae rendering' through a multispecies approach to artistic practice, where material ecologies of algae bodies and environments visibly transform an environment in ways that reveal combined forces at work. Algae renderings in this example emerged as a visible transformation in the environment through the materialisation of algae relations, which changed the colour of the tanks and illustrated algae agencies in action. The reciprocal dynamic between the ecosystem and visible changes in the colour of the water show the overall ecology of *Brine Shrimp* was co-created by the algae, salt, shrimp and Helen and Newton Harrison.

Part III: Rendering-with Algae

My embodied encounters with cyanobacteria 'algae rendering' led to a series of practical experiments that investigated ways of working with algae led by algae material relations. The experiments explored principles of 'algae rendering' as the agential capacity of algae to transform bodies and environments as a surface covering that emerges through ecological relations. My approach aimed to develop a collaborative human-algae framework that moved beyond anthropocentric binary definitions of algae as 'healthy/harmful' or as products for consumption and I term this way of working 'rendering-with algae.' I used paint as both a form and medium for embodied exploration of 'rendering-with algae' in terms of how algae ecological relations transform the surface of different environments. Barad reminds us that concepts and material practice compose each other. She writes, 'Concepts do not refer to the object of investigation. Rather, concepts in their material intra-activity enact the differentiated inseparability that *is* a phenomenon' (Barad 2010, 254). This principle of material-discursivity is intrinsic to the framework of 'rendering-with algae.' For example, Derrida writes, 'In Greek, *pharmakon*, also means paint, not a natural color but an artificial tint, a chemical dye that imitates the chromatic scale given in nature' (1981, 132). Derrida's illustration hinges on Plato referring to painting as a *pharmakon* in the *Phaedrus*, which he later parallels to writing in terms of how both function as expressive mediums. Drawing ecodramaturgical and sympoietic threads between linguistic and material encounters

with 'algae rendering' developed into experiments with forms of painting that further explored combined human and nonhuman agencies at work in practice.

These experiments aimed to avoid anthropomorphising the algae as painters or objectifying them as paint but instead attempted to explore the agential and transformative relations that emerge between algae and environment. These 'rendering-with algae' experiments explored bodily meeting points where matter and meaning combined in terms of how human and algae bodies operate in dynamic material forms of co-relation, rendering each other. Haraway reminds us that 'if 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' (Haraway 2008, 244). The following experiments involved improvised site-responsive movement scores with algae paint and aimed to forge new connections between myself, algae and environment.

Rendering Experiment 1: Render Dance 1

Render Dance 1 was devised and performed in an area of woodland in Brigsteer, Cumbria in April 2018.

I devised the experiment as a dance of human and nonhuman agencies that materially linked each action to wider ecologies of 'algae rendering.' In *Render Dance 1*, I performed a site-responsive dance using algae paint made from combining spirulina, seaweed and lichen. My movements remarked 'algae rendering' processes, where algae cover the surface of different environments, and generated new relational ecologies between my body, tree and soil. The paint marked contact points between my body and its environment, rendering my body in algae paint. I improvised movement in response to changes in the air temperature and textures of leaves underfoot and shifted my weight between contact with the tree and ground.

After the experiment, I photographed impressions left by the algae renderings on my body. The following is a series of images taken once the paint had dried to form new modes of 'rendering-with algae.'



Render Dance 1 translated acts of 'algae rendering' into new forms of making-with nonhuman ecologies. The term 'rendering-with algae' describes the ecodramaturgical process of making-with algae through new modes of rendering that are performative of algae ecological agencies. There is an aspect of algae performativity in which new material relations between my body and algae emerged through practice in dialogue with the performative ways that algae transform bodies and environments. Through an ecodramaturgical lens, algae are performative of ecological transformation in *Render Dance 1* through the medium of paint and through the movement of human and nonhuman bodies, which imitates algae material ecologies but also generates new material relations with algae.

'Rendering-with algae' exhibits modes of entangled ecological relation between human and algae bodies, environments, matter and meaning that are performative of continually shifting ecological connections, which are re-written throughout *Render Dance 1*. This way of working is also informed by Karen Barad's theory of 'intra-action' (2003, 2007), which demonstrates entangled modes of being and relating to the world. Barad's theory of intra-action draws on Niels Bohr's (1963) quantum physics insights to propose that beings do not precede their relations but are in constant modes of becoming. These dynamics are integral to 'rendering-with algae' as a material-discursive approach to performance that explores relationality as a continuous process of becoming-with through different acts of rendering. Crucial to Barad's theory of intra-action is the concept of the 'apparatus,' again developed from Bohr's experiences working in the laboratory. Barad (2007, 140) explains that apparatuses are both methodological tools and modes of practice through which material-discursive phenomena emerge.

In *Render Dance 1*, the limits of what might be termed 'apparatus' are inscribed through the actions of the experiment and how they facilitate the operation of 'rendering' as an unfolding of different ecological relations between algae, human and nonhuman bodies. Barad explains how 'intra-actions include the larger material arrangement (i.e., set of material practices) that effects an agential cut between "subject" and "object"' (2007, 148).⁶ This shift between subject and object in *Render Dance 1*, through contact between humans, nonhumans and environment establishes a dance of agencies, which is performative of the transformative capacities of algae. Human and nonhuman bodies were rendered by the algae and inscribed with new forms of connection between algae and environment. Traces of the algae paint decomposed after experiment as nutrients for the soil so that the boundaries of the dance continued to shift. Apparatuses, according to Barad, 'are not mere observing instruments, but *boundary-drawing practices*—specific material (re)configurings of the world—which come to matter' (140). The apparatus of 'rendering-with algae' developed through an embodied ecodramaturgical approach to performance that is performative of ecological co-creation and meaning-making between humans and algae.

Rendering Experiment 2: Render Dance 2

Render Dance 2 was devised and performed during a residency with Singing Apple Press in Mere, Wiltshire, in August 2018. I developed the experiment from *Render Dance 1* with the aim of exploring how painting also becomes a form of writing relations with algae. I considered how the

material of the algae paint, in connection with my body, performed a mode of re-writing algae-human ecologies as an alternative to the pharmakon of anthropocentric binary renderings of nonhumans through language. *Render Dance 2* was composed of the same elements as the first dance with the addition of three pieces of blank paper around the base of an apple tree. These blank pieces of paper were marked with algae paint at different stages in the experiment through gestures and movement in combination with my body, the soil and tree. After the dance, I lay still and let the paint dry on my skin in the sun. Traces of the algae paint were left on my body, the tree, paper and soil. The drying process viscerally sedimented an embodied understanding of rendering in a layer of algae paint that I felt tighten and crack on my skin. After the experiment, I photographed the impressions left by the algae.

The following is a series of images taken during the experiment *Render Dance 2* and after the paint had dried to form new modes of 'algae rendering.'



In *Render Dance 2*, I began to consider how the algae paint became a second skin for my body through contact with the nonhuman bodies of the tree and soil. Stacy Alaimo claims that to effectively challenge the system of dichotomies that sever nature from culture, it is important that the body be not just a place that has been inscribed by cultural forces but a threshold where nature and culture dissolve, a rhizomatic place that connects 'desperate distances' through elemental relations (Alaimo 2012, 137). Alaimo declares that in order for the human constructed nature/culture divide to be abolished we must begin to rethink the way we understand skin and the body. The skin is a liminal space, a contact zone, porous membrane, organ and ecosystem through which the body senses the world. Alaimo also problematizes what might be described as a further anthropocentric divide between 'body' and 'environment,' stating that, 'the substance of the human is ultimately inseparable from the "environment"' (Alaimo 2010, 2). In this sense, the divides between body and environment remain fluid within this work and boundaries are drawn at different points in the practice to highlight how these continue to shape each other through different relations. The apparatus 'rendering-with algae' attempts to bridge binaries through a process of reciprocal transformation between human and nonhuman bodies and environments that reveals how algae are active ecological agents and collaborative creative subjects.

Both *Render Dance 1* and *Render Dance 2* explored acts of 'rendering-with algae' through painting and movement in site-responsive work. These practical experiments sought to investigate the material ways that algae transform bodies and environments in a new interplay of algae-human agencies in creative practice, in contrast to the pharmakon of anthropocentric binary renderings of algae through language. For example, defining algae in terms of their utilitarian function as either healthy/harmful works in conjunction with taxonomic categorisation that labels beings according to a system that disregards material agency in favour of bodily characteristics. As a counter to these dominant systems of nonhuman representation, I devised rendering-with algae as a mode of creative encounter to explore algae agencies in acts of material transformation. These embodied acts of rendering-with algae also transformed my understanding of how algae are performative of ecological change across different scales.

The algae were agents in the creative practice and also contributed to the knowledge-production process through the meaning generated in each experiment. Natasha Myers elucidates an approach to rendering that informed my experiments, emphasizing once again how matter produces meaning. Myers investigates the work of a group of molecular biologists working on a form of protein molecule modelling called 'crystallographic rendering' and refers to the complex 'ontological choreography' of the scientists in the laboratory to describe how rendering can be understood as intra-active performative practice. Myers states that, 'Renderings are not just performances; they are also performative' (Myers 2015, 19). Myers' analysis of 'rendering' as performative describes how the scientists interpret and translate protein molecule bodies from one form into another, sometimes imitating the form of the molecules with their own bodies as well as working with technology to create computer-generated models, thereby producing a range of different entities through understanding the form of nonhuman bodies. The apparatus 'rendering-with algae' explored improvised movement and painting with algae bodies as a dance

of mattering, movement, agency and affect between humans and nonhumans, which became performative of new material modes of ecological transformation of bodies and environments.

Myers' example emphasizes how the work of the scientists is iterative as well as how the agencies of the nonhuman protein bodies shape the work of the scientists. The rendering of bodies in Myers' example occurred through human embodied translation and imitation of nonhuman bodies, which generated new models of the protein structures as digital renderings. Myers explains that in computer modelling, rendering is the process of outlining an image to make it appear 3D. She writes, 'a model is a rendering in the sense that it embodies, performs, and sediments a modeler's form of knowing. In the making, models are inflected with the affects of their modelers, and these inflections engender further effects as models are put into circulation' (133). My experiments in 'rendering-with algae' also revealed this, where a new model of algae ecology developed through my interpretation and imitation of the principles of algae ecology. This interpretation in turn became embodied knowledge that I performed as algae-human ecological relations, which generated new algae-human bodies and insights into algae ecological relationships. These experiments sedimented new forms of knowing and being with algae through performance, which I propose highlights an embodied ecodramaturgy that connects ecological ways in which algae are performative of changing ecologies with the mediums of movement and painting as principles of 'rendering-with algae.'

'Rendering-with algae' developed as an apparatus for performance making-with algae through research, embodied encounters and observation as ways to creatively explore how algae transform bodies and environments. Through an ecodramaturgical approach to engaging with theoretical and practical aspects of 'algae rendering,' these experiments developed new configurations of algae-human performance. After conducting these experiments, I began to explore potential new narratives that could expand ways of thinking about 'algae rendering' at a time of climate change. In turn, this work loops back to earlier considerations around the role of language in shaping human-nonhuman relations, specifically how 'rendering-with algae' could be regarded as an apparatus or material-discursive tool for performance practice which also highlights issues around nonhuman representation.

Part IV Algae Sympoiesis

In this final part, I consider how my embodied ecodramaturgical approach to rendering-with algae generates what I propose as a theory of 'algae sympoiesis' in performance. Haraway states that, 'Sympoiesis is a word proper to complex, dynamic, responsive, situated, historical systems. It is a word for worlding-with, in company' (Haraway 2016, 58). 'Algae sympoiesis' is the synthesis of the embodied ecodramaturgies of this algae-human performance research, and the links between algae material relations and narratives that have emerged through exploring 'algae rendering,' to produce new relationships between human, nonhuman bodies and environments. Algae sympoiesis is ecodramaturgy in practice that brings together principles of 'algae rendering' and practices of 'rendering-with algae' to reveal new ways of thinking about the combined human-algae agencies impacting climate change. The following stories bring together these aspects of inquiry

and invite further thinking about how entangled narratives and materialities of algae rendering are performative of environmental change in wider ecologies.

In a *Guardian* article (dated 6 July 2020), the headline reads: 'Algae turn Italian Alps pink, prompting concerns over melting' (Agence France-Presse 2020). The piece explains how a group of scientists in Italy are investigating the appearance of pink glacial ice in the alps caused by algae 'that accelerate the effects of climate change' (ibid). It goes on to explain that *Anclonyema nordenskiöldii* algae are responsible for the melting ice. Several other news organisations also reported on the story. The phenomenon described is a process by which algae blooms on the surface of ice sheets absorb the sun's rays and increase the rate of melting. The blooms themselves are caused by rising temperatures owing to anthropogenic climate change. This phenomenon exemplifies a form of 'algae rendering' that I have formulated throughout this article in which algae ecological relations materialise in ways that appear as the transformation of the surface of an environment. The rate at which snow ice absorbs or reflects sunlight is known as albedo quality and algae impact this in different ways, some of which can create carbon-absorbing blooms as well as causing the ice to melt. Algae organisms proliferate in warmer conditions caused by climate change. This feedback loop between the impacts of anthropogenic climate change and algae ecologies is symptomatic of changing conditions, which in turn both signals and materialises further ecological impacts, in this case through melting ice. The story, however, illustrates the anthropocentric algae rendering discussed at the start of this article, which paints a picture of the algae as the cause of environmental change. Biagio Di Mauro of Italy's National Research Council is quoted in the piece as saying that the scientists are 'trying to quantify the effect of other phenomena besides the human one on the overheating of the Earth' (ibid). This narrative, where algae cause the melting ice, highlights how anthropocentric representations of nonhuman ecologies can separate anthropogenic causes from their effects.

In another story of 'algae rendering,' an algae bloom transforms the surface of melting snow from white to bright green in Antarctica (Watts 2020). Research by a group of climate scientists from the University of Cambridge and the British Antarctic Survey published in *Nature* state that, 'Remote sensing reveals Antarctic green snow algae as important terrestrial carbon sink' (Gray et al. 2020). In this example, the algae have formed close bonds with fungal spores and bacteria, creating a new community and potential new habitat. The findings generate an 'algae map,' which the scientists claim could be the missing piece of the carbon cycle jigsaw, as the algae equate to a carbon sink of about 479 tonnes a year (ibid). The research also shows how blooms were found in areas that had experienced the most warming as a result of climate change. This sympoietic example reveals entanglements between examples of 'algae rendering' as the material transformation of an environment, anthropocentric algae renderings through which algae are represented and how these relations impact changing environments. In my research, acts of 'algae rendering' that materialize as algae blooms across ice sheets and increase the rate of melting, while simultaneously acting as carbon sinks, demonstrate the entangled ways in which algae modes of mattering impact wider ecologies of climate change. These material ecologies operate through a pharmakon of anthropogenic causes and effects, which also highlight how algae-human entanglements play a crucial role in earth's changing ecologies. Algae sympoiesis gets beneath the

skin of rendering to consider new worlds of co-creation and connectivity that are infused with the vibrancy of nonhuman agency; embodied ecodramaturgy that explores how humans and algae shape matter and meaning together through performance thus invites new thinking about the ways in which algae-human material ecologies are performative of environmental change.

Notes

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¹ A taxonomic group that encompasses single-cell, photosynthetic, organisms, commonly known as blue-green algae. Cyanobacteria are hypothesized to be some of the oldest lifeforms on earth (Margulis 1981).

² Lichens are symbiotic organisms composed between a fungus and cyanobacteria algae.

³ I draw on Karen Barad's (2003) posthumanist understanding of this term to describe the role nonhuman agencies play in processes of materialization.

⁴ Endosymbiosis is the process by which one cell partially-digests another, in this case plastids, which enabled early single-cell cyanobacteria to photosynthesize in combination with another cell.

⁵ Dunaliella algae also form the main part of flamingos' diet, which makes these birds pink.

⁶ Barad's (2007) notion of an 'agential cut' proposes a rethinking of subject/object as relational, which challenges the dualistic notion of the Cartesian cut that implies an inherent separation between subject and object. Agential 'cuts' reconfigure subject/object relations to reveal how differences between phenomena are made and emerge through encounters so that matters of being are inextricable from relations.

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Biography

Sarah Blissett is an artist, writer and dramaturg who recently completed her PhD in Performance Studies at the University of Roehampton. Her research explores an embodied ecodramaturgical approach to making-with nonhumans in performance. She is interested in how human-nonhuman ecological relationships can be theorised as matters of cooking in performance to highlight new narratives and materialities of environmental change. Her work has been published online with FEAST journal, Something Other and Whitstable Biennale. Recent projects include curating the 'Kelp Curing' research strand of the 2019 Kelp Congress in the Lofoten International Art Festival and an ongoing series of workshops with Modern Art Oxford titled 'How Nature Builds'. Sarah is a member of the Water Bodies collective.

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