H2O Life and Death conference paper

I am Phytoplankton **by Kassandra Bossell**

> *Comparative Umwelt mapping at the edges of culture, aimed at describing cultural objects as these are perceived by non-human eyes, can enrich our understanding of the (largely anthropogenically affected) 'near abroad' of the human ontological niche, or human semiosphere. The human realm is not neatly distinguished from the non-human, instead, the human and the non-human interlink. (Morten Tønnessen, 2015)*

Figure 1 Kassandra Bossell, I am Phytoplankton, 2018

Oxygen
Imagine if you couldn't take every second breath. It's impossible, for we need a certain amount of oxygen to live. Turn this idea inside out, imagine the death of the oxygen makers. Microscopic marine algae called phytoplankton make half the oxygen in the atmosphere. They form the base of most aquatic food webs and thereby support all ocean, lake and river life; warming and acidification of these bodies of water could lead to their endangerment or adaptation and cause wide-spread extinctions.

Humans have a habit of valorising the seen over the unseen, and more so if it is beautiful. It is only through the aid of scanning electron microscopy that we can see these organisms, and so have only just begun to value their importance in the interconnected webs of life. Rather than seeing all things in nature as a *resource*, humans have begun to understand that each organism has an interdependent role within complex ecological networks that interact to produce emergent properties essential to the maintenance of these networks.

My research into the Anthropocene and its correlating social effect of a human lens through which we see our lives led me to consider what it would be like to experience life from the subjective perspective of a non-human organism. I explored the fine corporeal structures of phytoplankton by enlarging them to human scale in sculptural forms. Positioning them within an immersive installation, I used light and sound to emulate their underwater habitat. By rendering the invisible visible, and shifting scales, I encouraged the viewer to imagine being part of the living field of this essential non-human community.

With similar interests, early twentieth century biologist, Jacob von Uexküll controversially contested the prevailing view that all organisms except for humans were machine-like and senseless. He pioneered studies into how organisms perceive and react to sensory data as signs and thereby established a theory which conceived of non-humans as living, perceiving subjects (99-119). Von Uexküll's species-specific idea of 'Umwelt' (phenomenal or self-world) is a subjective perceptual reference frame, distinguished from their 'Umgebung'(surroundings). This controversial attribution of subjective agency to a non-human organism directly opposed prevailing notions of them as being objects, 'machine-like and senseless.'

Philosopher, Thomas Nagel extended this theory in a now-famous article, "What is it Like to Be a Bat?" by proposing that this exclusive subjective reference frame also exists between human subjects. As contingent, limited and finite creatures with specific perceptual sensibilities, he conceives humans to be equally unable to access one another's world view.

In his formulation, one can only imagine another being's reality by conjuring an *imagined* subjectivity through personal experience of similar physical properties or mental states. 'When asked to imagine *sensorily*, one imagines C-fibres being stimulated; if asked to imagine *sympathetically*, one puts oneself in a conscious state resembling pain. These two ways of imagining the two terms of the identity statement are so different that there will always seem to be an explanatory gap.' Nagel thereby extended von Uexküll's study of the inability to know another's phenomenal world between non-humans to include humans, making imagination the only tool of access.

Although it is impossible to escape our biological frame of reference in fact, I have created artworks to elicit an imagination of belonging within a network of life-forms. While I acknowledge Uexküll's concept of the impossibility of being or experiencing outside of one's subjective 'Umwelt'[1], my work pursues his shift from the consideration of an externalist to an internalist viewpoint. Even as Nagel proves the insufficiency of objective or subjective perceptual knowledge alone and the insurmountability of the gap between them, my aim is not to *gain knowledge* of a non-human's perspective, but to seek out *empathy* by viewing them as a *subject.*

As this work intersects with marine biology as well as philosophy and fiction, I will firstly introduce Phytoplankton as an organism and then discuss the installation and its philosophical underpinnings.

Interdependence
Figure 2 SEM of Radiolarian

Phytoplankton are photosynthesizing microscopic organisms that occur almost everywhere that has sufficient light and water - in oceans, rivers and lakes; marshes and bogs; rock faces and damp moss; even on the feathers of some aquatic birds. Some have been captured by other organisms and live as endosymbionts, for e.g. in corals. An endosymbiont lives to mutual benefit *inside* another organism, like the bacteria within humans. Phytoplankton synthesise organic compounds from aqueous carbon dioxide and are thus called *primary producers*. Their crucial roles of fixing carbon and producing oxygen are endangered by changing temperatures and acidity within the oceans. Each phytoplankton type performs invisible (to the human eye) mineral interactions to maintain ocean life.

Figure 3 Navicula radiosa diatom
Figure 4 Installation view, Navicula radiosa diatom

Diatoms are phytoplankton with transparent cell walls made of silicon dioxide, i.e., glass. They are one of the largest and ecologically most significant groups of organisms on Earth, as they account for as much as 20% of global photosynthetic fixation (carbon fixing through the conversion of carbon dioxide into organic compounds); this is more than is produced by the world's tropical rainforests. Once incorporated into silica-rich sediments, diatom frustules

[1] Although the Umwelt theory suffered from its reliance on Uexküll's false premise that the environment (including its mixture of species) is generally stable, his speculations about the actual nature of the inner worlds of non-human beings reworked the philosophical foundation of biology by moving the emphasis from an effectual toward a perceptual perspective. His work established groundwork for biosemiotics and systems biology and influenced philosophers including Ernst Cassirer, Martin Heidegger, Maurice Merleau-Ponty and Gilles Deleuze.

may survive for hundreds to millions of years in fossil records and can be used by ocean scientists to monitor changes in freshwater or marine environments.

Figure 5 SEM of Actinoptychus diatom
Figure 6 Installation view, Actinoptychus maritalis diatom

Figure 7 SEM of Rhabdosphaera Claviger Coccolithophore
Figure 8 Installation view, Rhabdosphaera Claviger coccolithophore

Coccolithophores are made up mostly of calcium carbonate, or chalk. During the calcification process, carbon is incorporated into the coccoliths, hence their importance for climate change. Essentially limestone, these beings are those who make even deep water look a bright milky aquamarine colour. They have a spherical structure, enclosed by plates called coccoliths, which make up their exoskeleton or *coccosphere*. It is the shedding of these tiny calcium-rich scales into the surrounding waters that cause blooms to be easy to spot in satellite imagery. This bloom makes the presence of the phytoplankton indirectly visible, whereas they are revealed directly only through a microscope.

Figure 9 Photo of Coccolithophore Algae Bloom, Bering Sea.

Dinoflagellates are uni-cellular or multi-cellular marine or freshwater plankton with one or more whip-like organelles called flagella. These are used for propulsion and to collect food.

Figure 10 Dinoflagellates
Figure 11 Lamprocyclas maritalis, dinoflagellate
Figure 12 Installation view, Lamprocyclas maritalis, dinoflagellate

The global population of phytoplankton are experiencing effects from anthropogenic warming and this has become an area of active research. According to a study published in 2010 by Steinacher et al, using four global coupled carbon cycle-climate models, they projected that over the 21st Century, phytoplankton productivity will be affected by changes in the *atmospheric supply of nutrients, the rate of temperature-dependent biological reactions* and the *vertical stratification of the water column*. We do not know the effects of these changes.

Beyond the Human

A conception of the human as embedded within nature rather than separate from it is an ancient notion cherished by Indigenous societies world-wide. Australian Indigenous understandings of connectivity in ecosystems precede contemporary theories of ecological connectivity. Deep Ecology and Gaia Theory are a contemporary return to an ancient knowledge of connectedness, co-becoming and embodied ontology which Indigenous people have lived since the beginning of their stories. These western concepts may be epiphanies for those engendered by western culture but comprise only the first step in layered Indigenous sacred knowledges. As Bawaka Country et al point out, ‘Humans are only one part of it. Humans are part of Country along with the mullet, the tides, the moon, the songs and stories, along with the spirits, the plants and animals, the feelings and dreams (Country et al., 269-83.)’.

Figure 13 Kassandra Bossell, I am Phytoplankton, 2017, installation view

Paralleling the deep ecology movement of the 1970s, speculative realism in philosophy rejected anthropocentric 'philosophies of access' (Harman) which privilege the perspective of humans in relation to objects. Philosopher, Bruno Latour expands this idea in his contention that a rejection of the entire subjective / objective opposition is necessary due to our dependence on concepts of non-human natures. Environmental philosopher, Timothy Morton concurs with Latour's proposition and further suggests that our ecological assumptions are so caught up with a transcendent concept of nature that it is necessary to relinquish it entirely.[2] He recommends a fresh vocabulary for discussing *environmentality* in both content and artistic form. To this end, Morton describes his notion of a dark ecology,[3] an ecological criticism that has the form of a film noir. Like humans and the Anthropocene, the noir narrator begins investigating an external situation, from a supposedly neutral point of view, only to discover that she or he is implicated in it. In his words, 'the point of view of the narrator herself becomes stained with desire. There is no meta position from which we can make ecological pronouncements' (Morton, *The Ecological Thought*).

Morton focuses on the human involvement as a part of a living network which is not a closed system, but 'a vast, sprawling mesh of interconnection without a definite centre or edge.' (Morton, *The Ecological Thought*). His theory does not try to heal what society has damaged, but to take on a new approach from an awareness that the damage is integrated, a part of us, and that awareness can bring action from inside the 'mesh'. This interconnectedness penetrates all dimensions of life. 'It is radical intimacy, coexistence with other beings, sentient and otherwise… The ethics of the ecological thought is to regard beings as people even when they aren't people." Becoming aware of this interconnectedness is what Morton calls 'the ecological thought' (Morton, *The Ecological Thought).*

The *Chthulucene* is a future epoch imagined by ecofeminist Donna Haraway, in which she calls for the flattening of interspecies hierarchies (Haraway, *Staying with the trouble: Making kin in the Chthulucene*). She maintains that it is our anthropocentric perspective that generates our problematic relationship with the natural world and that this perspective can be renovated with a practice of care. Manipulating a similar transformation of perspective, my research trajectory works towards a sabotage of binary considerations of subjective and objective viewpoints to favour a field of relations. I present a decentralized and reconnected position from which to approach and interact, from within the natural environment. As with the observer effect in quantum theory (Stapp), the observer cannot see themselves as separate from the field of observation. The viewer is in the field.

I am Phytoplankton

Figure 13 Kassandra Bossell, I am Phytoplankton, 2017, installation detail

I am Phytoplankton examines the impossibility of individual identity as separate from local ecologies. I surround the viewer within an ecosystem of floating phytoplankton that have been enlarged (1:50,000) to human size. Has the viewer been shrunk or the plankton grown? We are brought to a level playing field with different biota. I engage scale, materiality and poetic metaphor to offer affective access to a perception of relations aligned with Morton's 'vast, entangling mesh' and Haraway's Chthulucene. At this visible scale, they become

biomorphic forms we can see, admire and relate to. I connect them with familiar species by furnishing their exterior surfaces with pelts of animal, bird, plant and human hair. Amalgamating their differences into a depiction of heterogenous being, I work with Haraway's concept of relationality to dissolve any hierarchy of species in a collective organisation of kin. These tactile entities combine the familiar with the strange, occupying an imaginary space through their suspension. They are cast in polymer gypsum, a relative to the calcium carbonate structures of the phytoplankton called coccolithophores. Their hard, textured interiors and soft motile exteriors glow in the light like luminous dead corals, like humans in both vulnerability and ephemerality.

A single source of directional light examines their tactile materiality, simulating intimate scientific scrutiny. I suspend them in darkness to give the impression of underwater floatation as their feathers and fine hair drift with the passing visitor. An accompanying soundtrack of underwater coral clicks and bubbles suggest an underwater or unconscious space. Outnumbered by surrounding species that subtly quiver, turn and flutter, the viewer can perform their own dance of inquiry. Moving around the installation, they are able to explore inside and outside of the plankton, discovering their own nuanced intimacies of relations.

My sculptural process employs mould making to produce a negative form, thereby representing the interior of the phytoplankton, the space their bodies once occupied. They beckon with this absence, calling the viewer to imaginatively fill the space of their displaced bodies. By entering a space smaller than the eye can see, the viewer is offered the perspective of an illusory microscopic avatar; we are inside their skins and their structure. The shift away from a human vista to an imagined viewpoint from within a non-human organism is designed to solicit sensation, a common physical liaison from human body to plankton body.

This affective viewpoint offers an expansion of relations in material life. Once inside the ecosystem, we can ask: who is this 'we'? In the face of expanded relations, the proverbial 'us' and 'them' detonate. The conception opens onto the flooding of this word, 'we', into a meaning inclusive of all living organisms, and the materials and conditions that make up their local environments. Through this re-evaluation of perspective, my research works towards a spectrum or field of interactions that reflects the network of an ecology.

A pivotal, situated understanding of 'we' in this context is borne out by feminist philosopher, Astrida Neimanis. Equally generated from feminist and phenomenological considerations, her formulation of ontology is likened to a body of water, 'connected, indebted, dispersed, relational. (It is) not only about correcting a phallogocentric understanding of bodies, but about developing imaginaries that might allow us to relate differently' (1-15). She conceives of a more-than-human *hydrocommons* in which we are, share, and connect through water, which engenders and sustains the more-than-human 'us'. In this sense, embodiment is extended beyond our human selves to incorporate other bodies, and water itself. In her words,

> For us humans, the flow and rush of waters sustain our own bodies, but also connect them to other bodies, to other worlds beyond our human selves. Indeed, bodies of water undo the idea that bodies are necessarily or only human. The bodies from which we siphon and into which we pour ourselves are certainly other human bodies (a kissable lover, a blood transfused stranger, a nursing infant), but they are just as likely a sea, a cistern, an underground reservoir of once-was-rain. Our

> watery relations within (or more accurately: *as*) a more-than-human hydrocommons thus present a challenge to anthropocentrism, and the privileging of the human as the sole or primary site of embodiment. Neimanis, *Bodies of Water*, 11.

I am Phytoplankton connects to this notion in a shared conception of 'us.' As simple and complex organisms, 'we' are and share water and through interdependence, 'we' species are and share the planet, our different bodies constituting the situated distinction between 'us'. Neimanis' inclusion of water in this formulation extends a *commoning* not only to other species, but to matter itself, as it flows in and out of life. In this notion, Neimanis offers a way of confronting and upholding our differences whilst embracing a profoundly ethical orientation, 'that if we do live as bodies 'in common,' this commonality needs to extend beyond the human, into a more expansive sense of 'we' (12).

The inclusion of matter into an earthly ontology is developed by political theorist Jane Bennett in a theory of vital materiality that is allied with the conceptual development underlying this installation. Agency is, in Bennett's conception, always a human / non-human work group. She suggests that it is not merely a matter of rendering non-humans as important as humans, but of understanding the political relations between them. As she explains: 'we are also non-human and… things, too, are vital players in the world' (4). My use of materials in this work aims to include multi-species beings and their material constituents into an embodied relationship with the viewer. Feathers, faux-fur, real leaves and human hair, forton MG and plastic are presented in a common field of absent presence.

Figure 13 Kassandra Bossell, I am Phytoplankton, 2017, installation detail.

The pivotal device of this installation uses the metaphor of the absent body. Generating being and non-being into the same arena, I present the dynamics of ephemerality as an ongoing becoming, rather than engaging the mutual exclusivity of a static dualistic conception. Absent bodies connote extinction as well as fossil remains, or the body as temporary vessel, located within and belonging to a specific ecosystem. A body may be absent because it is perpetually outside itself, caught up in a multitude of involvements with nature. These empty carapaces become a reflective tool to contemplate the shared plight of constant becoming, the prospect of co-agency, as well as a memorial to the living and the dead.

The title proposes a fictional displacement of agency, offering up a natural inclusion into diverse networks of connectivity and interdependence. Each different phytoplankton contains an absence whilst manifesting heterogenous lush hair growth. This flagrant display confirms the regenerative transformation of material nature. I intentionally used cavity-shaped biological structures that had an iconographic sexuality to convey the fecundity of the ocean. The viewer's own evolutionary sexuality is included in this immersive planetary connotation. I offer entry into this imaginary embodiment to facilitate a space of reciprocity that hopes to deliver the viewer into uncharted territory, a world in which we can imagine a mutual perspective.

I created the phytoplankton with consideration of their actual physical characteristics and augmented with materials selected for their connotative potential. I selected polymer gypsum as a material for the phytoplankton, as it visually and materially resembles the calcium carbonate structures of the real plankton called coccolithophores. To bring them into a tactile human scale, I replaced their fine cilia hairs with the hairy growth of more complex organisms visible to the human eye. I used soft exterior coatings to contrast hard inner surfaces and to generate a palpable sensorial impression of the three-dimensionality of the organisms.

As top predator, humans have evolved to adopt a commanding and supervisory role, which *forgets* our interdependent status in the web of life. I am Phytoplankton presents an embodied displacement of this power relation by offering a more-than-human vantage point. This shift allows us to jettison any directorial assumption about the planet and its life forms. Evolutionary biology suggests we are wired to commit The Tragedy of the Commons, a term coined by ecologist, Garrett Hardin , referring to the evolutionary self -interest of human reproduction, which benefits the individuals, but eventually becomes a tragedy for the species, as they all share the environmental costs of such a population explosion (1243-1248). The self-interest of the parent is in conflict with that which is best for society as a whole. We are entangled in this endgame scenario.

Do we wait for changing environmental conditions to command pressurized adaptation, or can we choose it consciously? Darwin's "adapt or die" theory described what he called a gradual process, if varying in rate and degree, between species, but paleontological studies have revealed that different rates of adaptation can depend on environmental conditions. In 1972, Steven Jay Gould and Niles Eldredge developed a theory that once a species appears in the fossil record, it becomes stable for most of its geological history. Then environmental changes cause extinctions and open ecological niches for their survivors, for which evolutionary change is a rare and rapid process (115-151). According to Gould and Eldredge, evolution proceeds in bursts, in events called *cladogenesis*, where a parent species splits into two distinct species, which disperse and reproduce and evolve to better suit their new environment. I propose that we are now in such a burst.

I contend collaboration is the human evolutionary trait that will be relied upon for success in any renewal of a human relationship *within* nature. Our skills in individual competition are matched by a remarkable capacity for collaboration and will also be 'selected for' in cases of relatedness and reciprocation (Brooks). In my short life, I have witnessed and been part of a wave of change that has taken on the protection of the environment, jettisoned it, from being an issue concerning few environmentalists, to being tabled at the G20 as a major critical

global issue. How do we personally begin to think differently, to envision ourselves and our co life-forms?

If I acknowledge that I am within nature, I escape the confines of oppositional thinking and enter a field. My egotism and selfishness are then not only essential to my levels of complexity and power, but tools at my disposal for my ongoing survival. As Howard Bloom proposed in The Lucifer Principle, 'For Lucifer is *almost* everything men like Milton imagined him to be. He is ambitious, an organizer, a force reaching out vigorously to master even the stars of heaven. But he is not a Demon separate from Nature's benevolence. He is a part of the creative force itself. Lucifer, in fact, is Mother Nature's alter ego. (4)'

I am Phytoplankton explores potential new relationships with non-humans by drawing upon understandings of our interconnections and interdependence within any ecological community. I aim to find starting points for finding alignment with other organisms by appealing to the human impulse to collaboration. My work addresses this initial shift to an empathetic approach from which to *remember* our interdependence *within* nature. I see this as a great opportunity threshold from which to shift our role in nature from top predator, to that of an aware and responsive custodianship of the planet. The work I introduce in this essay is linked to my ongoing practice in its aim to create a decentralized and reconnected approach for human outlook and interaction. By assembling biological, philosophical and artistic practice as a transdisciplinary experience, the viewer is offered a relational and multi-layered involvement impossible within strict disciplinary boundaries.

The intersection between the sciences and the creative arts is a complex one that is under negotiation across many interdisciplinary projects. To some extent, the methodologies of each field are incommensurable, but navigating this cross-disciplinary conversation can be a very productive process for research. In this current project, from a strictly scientific perspective it may be more appropriate to speak of/ describe [x, y,]. However, in the creative arts, metaphor has the potential to address these questions in a […] way, that opens engagement with the work on blah blah blah level /terms. Then a couple of sentences to articulate clearly why metaphor is so important to your project.

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