The Non-Human Touch What Values Can Emerge from Ruined Landscape?

Cramond Island and Cramond causeway at low tide, Firth of Forth, Scotland.

Sonia Mehra Chawla

»In the Anthropocene, observing microbial worlds is more essential than ever. Human bodies can no longer be seen as fortresses to defend against microbial assault.« In this essay, Sonia Mehra Chawla advocates for livable collaborations and rethinking bacteria as partners in health and survival of all living species. The starting point is her visit to the ruins of Cramond Island, a Scottish defense site from World War II, where she explored the manifold life forms that inhabit tidal zones. The essay further investigates the potential of cohabitation and contamination for sustaining all life on Earth in an era in which we encounter many urgencies with accelerating rates of species extinctions – whereby here a sad parallel can be drawn to the violent history of the wartime site and the ongoing anthropogenic activities within the site, that slowly becomes invaded by bacteria that take back its space.

The Liminal Tide
Responding to Cramond

Cramond Island
Firth of Forth, Scotland
Field visit and exploration, April 24, 2019

Across a causeway, in the middle of the Firth of Forth,[1] lies the ghost island of Cramond. Cramond Island is a desolate tidal island about one mile out to sea, which is connected to the mainland at low tide across the Drum Sands. The island is made of microgabbro, formerly known as dolerite, a subvolcanic intrusive igneous rock. A paved path, exposed at low water, allows access.

This causeway runs at the foot of a row of concrete pylons on one side of the causeway, which were constructed as an anti-boat boom during World War II. At high tide the path is immersed by several feet of seawater which cuts the island off from the mainland.

The mile-long causeway itself is a spectacle. It is lined with colossal concrete teeth designed to stop boats sliding through at high tide. The row of identical concrete pylons evokes an imposing and arresting, (if accidental) piece of Brutalist architecture, characterized by their massive, monolithic and »blocky« appearance with a rigid geometric style and large-scale use of poured concrete. The pylons are fissured, wrecked, dismembered, and fragmented here and there where a pylon has collapsed, succumbed, and yielded to the waves. At high tide the concrete pillars are nearly submerged. The landscape is at once wild, dynamic, and vulnerable.

Scotland suffered more than 500 German air raids during the course of World War II. The country was a strategic interest point for Hitler due to its coast and many naval sites, one of these being Scapa Flow in Orkney, which was the main British naval base during World War II.[2] At the outbreak of World War II, Cramond Island, along with other islands in the Forth, was refortified and armed, designed specifically to tackle fast-moving torpedo boats.

An anti-submarine net and anti-boat boom was laid across the estuary from Cramond Island directly to Inchcolm, and then to the Charles Hill battery on the Fife coast. The barrier was to protect ships in the anchorage from attacks by torpedo boats, and stop submarines entering the anchorage to attack shipping or to damage the dock gate of Rosyth Dockyard. The line of concrete pylons was built from Cramond Island to the shore to complete the anti-boat barrier. The Island itself was used as part of the River Forth secondary defense line. The deserted island is dotted with wartime ruins.

Views of the anti-ship ping shipping barrier running from Cramond to Cramond Island, showing construction work in various phases, 1940. Copyright Royal Commission on the Ancient and Historical Monuments of Scotland/Crown Copyright, OER

World War II-era fortifications on Cramond Island.
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Cramond Causeway: A view of the causeway from the desolate tidal island

Rising into Ruin

The causeway is slick with seawater and the green of slippery, slimy, glossy, and gleaming algae, the tide recently having receded to a secure remoteness. The pylons place us under surveillance as we cross the causeway: are they sentinels on shore, custodians, or decomposing teeth of the sea? The crumbling, corroding, putrefying power of nature slowly creates entirely new, meaningful forms. Nature has now made it her own. The concrete ruin is consumed and engulfed; appropriate creatures revel.

The ruin is a constellation of meanings that moves between past, present, and future; the ruin is »a reminder of the universal reality of collapse and rot; a warning from the past about the destiny of our own or other civilizations; the symbol of a certain melancholic or maundering state of mind; an image of equilibrium between nature and culture; the very picture of economic hubris or industrial decline; a desolate playground in whose cracked and weed infested precincts we have space to imagine a future,«[3] a fetish or object of desire; a topography of insatiable greed and profit; easily forgotten in the midst of history's terrible repetitions; a monotonous inventory of »parts« that are crumbling; a silent witness; and most unsettlingly perhaps, the ruin conjures a future past, the memory of what might have been.

We ask a great deal of ruins, and divine a lot of sense and wisdom from their haunting silence. Everything comes to nothing, everything perishes, only time endures, no matter how fractured or dissolved at its edges. On Cramond Island, in the middle of the Firth of Forth, nature and culture, landscape and ruin, begin to bleed into one another. We can no longer precisely tell what is ruin and what its circumstances, what is memorial and what the dead thing it recalls.

The Zone

A region, area, stretch of land, or section characterized by some distinctive feature, purpose, or quality. An area subject to a particular political, military, or government function, use, or jurisdiction. A demilitarized zone. An area subject to particular restrictions. One of the divisions of the earth's surface. A distinctive layer or region of rock, characterized by particular fossils. An area, especially a belt of land, having a particular flora and fauna determined by the prevailing environmental conditions. A portion of a sphere between two

The concrete pylons on Cramond causeway are consumed by nature, and appropriate creatures revel.

parallel planes intersecting the sphere. A time zone. A girdle or belt. A sphere of thought, disagreement, argument.

Reactive Grounds
Shores of the Anthropocene

Living material is collected from various environments of »The Zone« including soil, water, air, and biofilms. With time against us, we decided to retrace our steps and head back to the mainland. The tide was approaching swiftly, the waters of the Firth of Forth rising steadily. I felt that the decrepit state of things precisely reflected my own state of mind. It was cold out on the causeway, with intermittent rain showers and a blustery wind. I remained there for a while, incapable of leaving, constricted like the water as it enters the drift of reeds, unhurriedly, thickening, transformed. I looked back at the mainland from the island. The edge of the sea is an enigmatic and extraordinary place. For no two consecutive days is the shoreline precisely the same. The tides progress and retreat in their timeless rhythms, the sea is not ever at rest, never at ease.

I think about the life forms that inhabit tidal zones, far beyond just the human ones. I start to wonder: What does cohabitation mean in an era of many urgencies with accelerating rates of species extinctions? What is the association between capitalist devastation and annihilation, and collaborative survival within multispecies landscape? What is the prerequisite for sustaining all life on Earth? What lies beneath the surface and the soil?

What enigmas and nightmares lie beneath the palpable?

Laboratory Life
Constructing Microcosms, Microbial Gardens

ASCUS Laboratory
Summerhall, Edinburgh
April 25, 2019

Back in the laboratory, we decided to construct devices for culturing a large diversity of microorganisms, unique miniature microbial ecosystems or microbial gardens, reusing the collected habitat.

In the 1880s, Russian microbiologist Sergei Winogradsky studied the complex interactions between environmental conditions and microbial activities using soil enrichment to isolate pure bacterial

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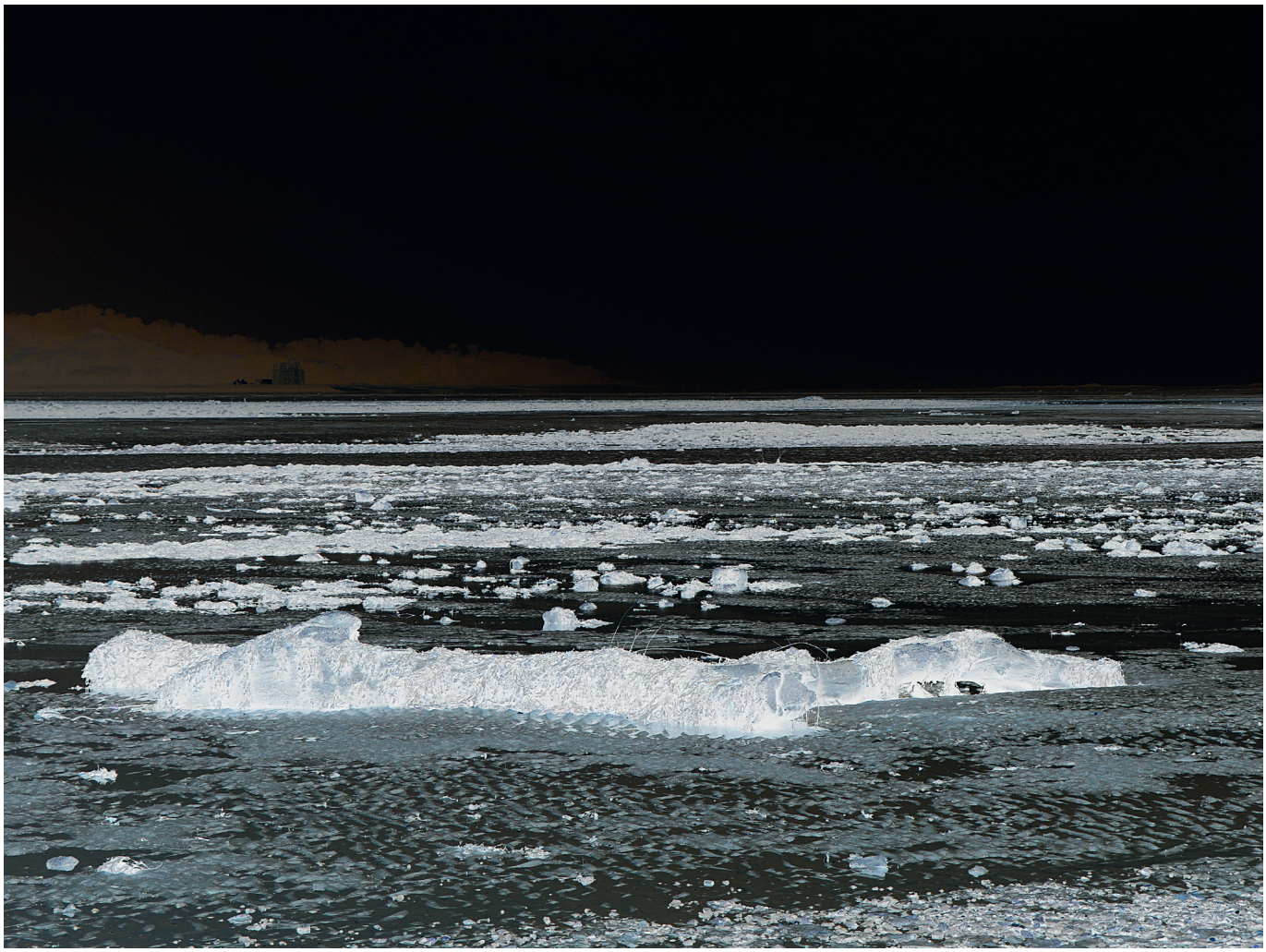

Shores of the Anthropocene.

cultures within laboratory glass column to gain an understanding of how microorganisms occur in nature. The structure of a microbial community is the result of environmental factors, evolutionary processes, and neutral or stochastic processes. Once prepared, the column is a self-sustaining, enclosed ecosystem dependent only on input of light as an exogenous energy source. Much like a gardener tending to his plants, providing the finest conditions for a plant species to grow, a column provides a rich environment for microbes to grow, or bloom, as a thriving population. One column provides a whole range of environments in one small setting, a microcosm enabling many types of organisms with different requirements to grow in different sections of the column. The prepared columns were observed over several months for development of layers, smell, colors, and zones.

Observation after five months...

ASCUS Laboratory
Summerhall, Edinburgh
September 29, 2019

As the microbes in the soil photosynthesize pigments, we are exposed to the processes of growth and decomposition of various species of bacteria within this ecosystem, with variations in populations observed through waves of color. Incubating the column in available light for several months results in an aerobic/anaerobic[4] gradient as well as a sulfide gradient.

The aerobic as well as the anaerobic gradients along with the additive nutrients allow for the growth and flourishing of various microorganisms such as Chlorobium, Chromatium, Beggiatoa, Desulfovibrio as well as Rhodomicrobium. In addition to the aforementioned organisms, we can also see the growth of several more species of bacteria, along with algae and cyanobacteria. The water rapidly becomes anoxic towards the interface of the mud and water. We can still find anaerobic phototrophs in the mud phase, and there is a capacity for the creation of biofilms as well as colony expansion. We see a prominent green growth in the upper sections of some of the columns, and this denotes the presence of algae and other types of aerobic phototrophs.

Laboratory Life
Culturing Microbes

ASCUS Laboratory
Summerhall, Edinburgh
April 27, 2019

Bacteria are a type of biological cell. They constitute a large domain of prokaryotic[5] microorganisms. Bacteria were among the first life forms to appear on Earth, and are present in most of its habitats. Bacteria also live in symbiotic and parasitic relationships with plants and animals. Most bacteria have not been characterized, and only about twenty-seven percent of the bacterial phyla have species that can be grown in the laboratory. Bacteria were first observed by Anton van Leeuwenhoek in the late seventeenth century, but didn't become the objects of significant scientific study until the nineteenth century, when it became apparent that some species caused human diseases. The methodologies devised by Robert Koch, Louis Pasteur, and their associates during the »Golden Age of Microbiology,« which spanned from 1850 to the early 1900s, are still extensively used today.

During the middle of the twentieth century, bacteria became widely accepted subjects of empirical study in fields such as genetics, genetic engineering, and biochemistry. With the evolution of antibiotic-resistant strains and our augmented understanding of bacterial stealth attack strategies such as biofilms and intracellular growth, medical scholars have focused more sharply on disease-causing bacteria.

Bacteria grow on solid media as colonies. A colony is defined as a visible mass of microorganisms all originating from a single mother cell, therefore a colony constitutes a clone of bacteria all genetically alike.[6] As the bacteria consume the nutrients, they begin to grow and multiply. This generates thousands to millions to billions of cells that begin to pile up, becoming visible to the naked eye. This pile of cells originates from one cell and is called a bacterial colony.

Although some environmental microbiologists pointed out the constructive role of bacteria in ecological processes, their insights and perceptions did not influence other branches and applications of microbiology where bacteria continued to be classified predominantly as a threat. Today, biologists face the conceptual challenge of rethinking bacteria as partners in health.

»When does contamination become collaboration?« Details from Speculative Harbouring: Living Landscapes by Sonia Mehra Chawla. Living systems; air, soil (sand/mud), seawater, biofilms, glass, additive nutrients and supplementation including carbon and sulfur sources, various microbes in phases of growth and decay (including cyanobacteria and algae), sugars and oxygen. In collaboration with ASCUS Art & Science, Edinburgh. The ›living objects‹ will be presented as part of Edinburgh International Science Festival 2021.

In the Anthropocene, observing and perceiving microbial worlds is more essential than ever. Sustaining all life necessitates sustaining symbiosis and perceiving those symbioses is a crucial way forward. According to animal physiologist and biochemist Prof. Margaret McFall Ngai, human bodies can no longer be seen as fortresses to defend against microbial assault, but must be re-envisioned as »nested ecosystems.« While elaborating on recent advances in evolutionary and developmental biology, she says, »The field of biology has reached an inflection point, enabled by advances in nucleic-acid sequencing technology. New knowledge of the diversity and centrality of the microbial world promises to change the face of this discipline, shaking its very foundations. As a result of these advances, one area of intense and growing interest in recent years has been the association of microbes with animals, particularly humans. Our continuing goal is to define conserved processes governing symbiotic associations, with the hope that we will provide fruitful directions for the study of more complex systems.«[7]

Living Materials and Life Processes as »Medium«

Working with biological processes and structures can be both challenging and provocative; scientists and artists often collaborate in what become teeming innovative spaces of co-creation. However, creating and working with lively material in the laboratory brings with it a range of ethical, social, cultural, technical, and aesthetic inquiries.

What constitutes life? Who gets to determine what lives are created and grown, which are saved, exploited, or destroyed? What do we think about using Living material such as live tissues, bacteria, living organisms, and life processes as a »Medium«? What does it mean to have agency and ownership over another's life? Do we think of this lively material as a carrier, holder, vessel, receptacle, or repository that is populated by our own thoughts and ideas? What is the role of human beings as »makers«? What do we think about the disposal of these lively objects that soon become infectious laboratory waste? What does it mean to be at risk with each other? What are the possibilities and limitations of working with other-than-human lives? What do we think of contamination?

A Symbiotic View of Life

Contamination is the action or state of making or being made impure by polluting or poisoning. Contamination is the presence of a constituent, impurity, or some other undesirable element that soils, corrupts, infects, makes unfit, or makes inferior a material, physical body, or natural environment. Contamination is the fear of being endangered or changed by direct or indirect contact with certain types of people, ideas, or situations.

»The Contaminant« is a substance that makes something less pure or makes it poisonous. A contaminant may even be more abstract as in the case of an unwanted energy source that interferes with a process.

When does contamination become collaboration?

The Anthropologist Anna Lowenhaupt Tsing says, »The evolution of our ›selves‹ is already polluted by histories of encounter; they change who we are and make way for others. As contamination changes world-making projects, mutual worlds, and new directions may emerge. We all carry a history of contamination; purity is not an option. Staying alive for every species requires liveable collaborations. Collaboration means working across difference, which leads to contamination.«[8]

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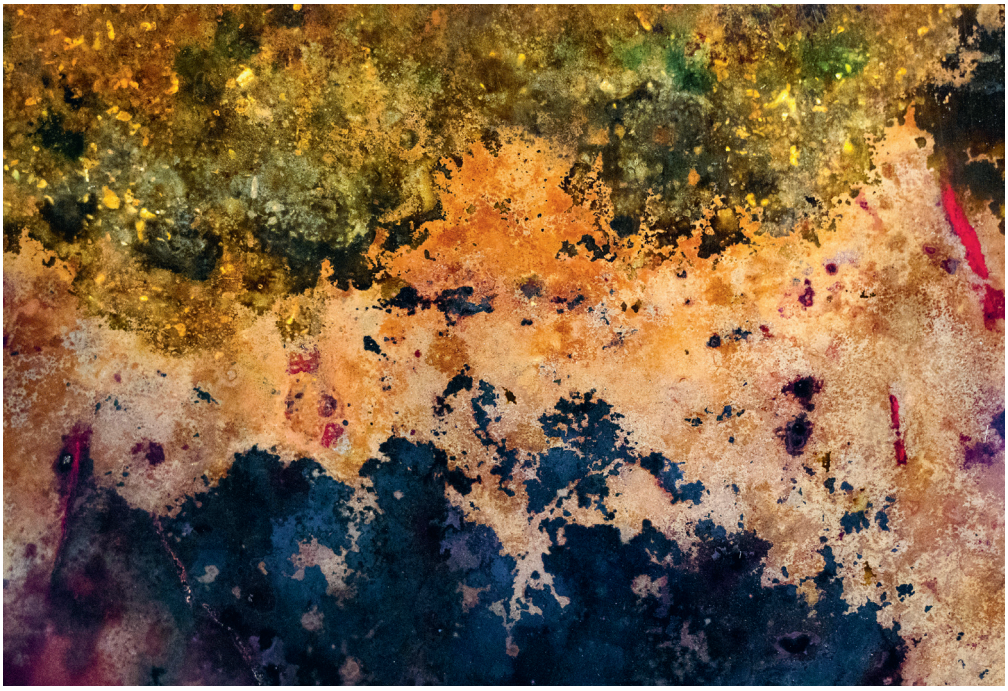
Entanglement is a fundamental aspect of all life. Yet we have more often than not been in common denial of these critical interrelations. It is imperative to ask who »We« are, and what is »Ours«? The »I« within us contains Multitudes. The human microbiota is the aggregate of microorganisms that resides on or within any of a number of human tissues and biofluids. Our gut microbiota contains tens of trillions of microorganisms, including at least a thousand different species of



»Contaminated diversity is complicated, unpleasant and humbling.« Details from Speculative Harbouring: Living Landscapes by Sonia Mehra Chawla. Living systems; air, soil (sand/mud), sea-water, biofilms, additive nutrients and supplementation including carbon and sulfur sources, various microbes in phases of growth and decay (including cyanobacteria and algae), sugars and oxygen. In collaboration with ASCUS Art & Science, Edinburgh. The ›living objects‹ will be presented as part of Edinburgh International Science Festival 2021.

known bacteria with more than three million genes. Humans are colonized by many microorganisms. Our immune systems do not develop accurately without bacteria. Even reproduction appears to be bacteria enabled. Those that live within us, the microbiome, are invaluable and irreplaceable parts of our lives.

We are more Microbial than Human! »We« are less »individual« and more interconnected, interdependent multitudes. But do we acknowledge the significance of these symbiotic makings? Contamination makes multiplicity and diversity. Contaminated diversity is convoluted, often abysmal, and humbling. All entanglements and all symbioses are vulnerable, and relations with others must be continually re-energized and negotiated within life's frameworks. When environs, times, and circumstances change, these very life-sustaining equations and balances become increasingly convoluted. There is a frightening collision, then, between the potentials and confines of human and nonhuman life, caught between webs of nightmares and dreams.

Tsing continues, »If a rush of troubled stories is the best way to tell about contaminated diversity, then it is time to make that rush part of our knowledge practices.«

What values can emerge from ruined landscape?

We are at risk with each other. Our »Becoming« is a porous endeavour, an entangled world of (un)foreseen flows. It is in the wisdom of caring, in acts of mindfulness, and in careful consideration of the discordance of disturbed stories, that we may encounter our best optimisms for precarious and perilous survival.

The Non-Human Touch has been realized in the framework of »Entanglements of Time & Tide,« an ongoing research based art-science engagement project by Sonia Mehra Chawla that explores the North Sea and its tidal zones in their ecological, cultural, political, economic, and poetic capacity. The artist's related ongoing project in the UK, *Entanglements of Time & Tide*, is supported by Edinburgh printmakers, Creative Scotland, Marine Scotland, Marine Laboratory of the Scottish Government in Aberdeen & ASCUS Art & Science, Edinburgh.

Sonia Mehra Chawla is an artist based in New Delhi, India. Chawla has an interdisciplinary practice as an artist, photographer, and researcher. Her artistic practice explores notions of selfhood, nature, ecology, sustainability, and conservation, with a focus on specific locations and microhistories. Through her projects, Mehra Chawla dissects, re-examines and re-envisions spaces that exist at the intersections of art and science, nature and society, self and the other, focusing on the critical dimensions of human engagement with and within nature, ranging from the built-environment to the »wilderness,« and human and non-human narratives and entanglements in the Anthropocene. Sonia Mehra Chawla was an Akademie Schloss Solitude fellow, in the field of Social Sciences.

If not stated otherwise, all images courtesy of Sonia Mehra Chawla.

1 The Firth of Forth is the estuary or firth of Scotland's River Forth, where it flows into the North Sea.

2 See https://www.warhistoryonline.com/world-war-ii/forgotten-blitz-scotland-left-thousands-dead-x.html.

3 Brian Dillon, *Ruin Lust*. London 2014.

4 An aerobic organism or aerobe is an organism that can survive and grow in an oxygenated environment. In contrast, an anaerobic organism or anaerobe is any organism that does not require oxygen for growth. Some anaerobes react negatively or even die if oxygen is present. (en.wikipedia.org)

5 Definition of prokaryotic: of, relating to, or being a typically unicellular organism (as of the domains Bacteria and Archaea) lacking a distinct nucleus and membrane-bound organelles: being or characteristic of a prokaryote. (www.merriam-webster.com)

6 See https://bio.libretexts.org/Bookshelves/Ancillary_Materials/Laboratory_Experiments/Microbiology_Labs/Microbiology_Labs_I/08%3A_Bacterial_Colony_Morphology.

7 Margaret McFall-Ngai, *Divining the Essence of Symbiosis: Insights from the Squid-Vibrio Model*. PLoS Biol 12(2): e1001783, 2014.

8 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World. On the Possibility of Life in Capitalist Ruins*. Princeton 2017.