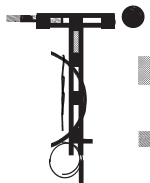
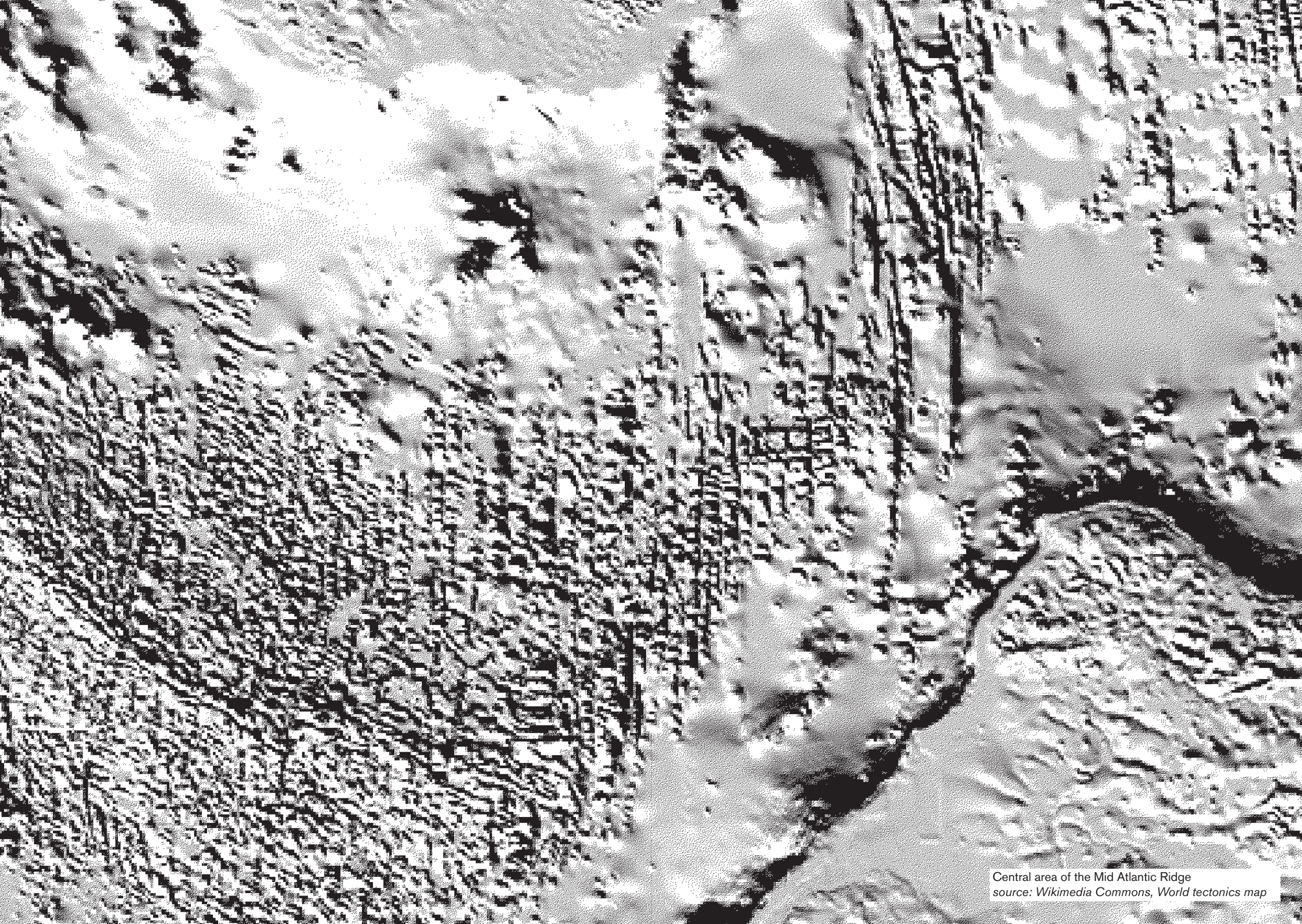


Geologic subjectivities

An archaeology of the unthought

Trienal de Arquitectura de Lisboa - A Poética da Razão
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Central area of the Mid Atlantic Ridge
source: [Wikimedia Commons](#), [World tectonics map](#)

Prologue

Lisbon, it is the 20th of May 2019. I am walking towards the Padrao dos Descobrimentos, making my way through flocks of tourists. Without giving too much attention at first, I realize I am stepping on a red and white limestone map. 14 meters wide. It represents the world, scattered with several names and dates. I pause and I see that my foot is right on the island of Madeira, but there is no date. There's just the name. Only later, when reading a leaflet distributed on the spot, I realize that the occupation of Madeira marks the beginning of Portugal's colonial expansion. It is 1418.

I walk away from Madeira to embark on a sickening travel: Azores; 1427. Cabo Verde; 1444. Congo; 1483. Cabo de Boa Speranca; 1488. Terra Nova; 1500. Malacca; 1509. Each name, each date marks a "discovery". The knowledge of the world becomes world-making. One can remember that the Atlantic, until then, has been seen as beyond the end of the world, Finisterra. If reason is allowed into the ocean, through mapping efforts, bringing measures of this turbulent dark-blue mirror

1. "Wynter suggests that we should in fact consider 1452 as the beginning of the New World, as African slaves are put to work on the first plantations on the Portuguese island of Madeira initiating the "sugar slave" complex – a massive replantation of ecologies and forced relocation of people (existing ecologies were not immune to the ravages of the new invaders, from plants and domestic animals to microbiomes and new geomorphic regimes)." Yusoff K., *A Billion Black Anthropocene or None*, University of Minnesota Press, Minneapolis, 2019

and crafting watercolors of fantastic fish...If reason is allowed and helped into the ocean, it is because moving across it has become the crucial test for colonial expeditions hereon.

It is 1452. The slave trade first solidifies in Madeira, marking the beginning of the sugar-slavery complex [1]. I journey again through the globe, traversing the same spots as before. I step onto these once colonized lands, thinking of how the very physical materials extracted there were transformed to give Lisbon and European bodies their inner and outer shape. Gold mined in Brazil, the sugar harvested in Madeira, spices stolen from South East Asia. Colonialism was a metabolic process. It transformed European urban centres and European flesh into condensations of countless despoiled spaces.

The story that spills out from Madeira is that of the reduction of man to labour and nature to land. The figure of the human emerges as an exclusionary category: Human Vs nature, life vs. nonlife, whiteness vs. matter, energy and Europe's racial others. The ships, feminized and given Catholic names, are perhaps the only ones to escape the project of defacement. One that establishes equals in a world of mute matter. These separations, these images of otherness leak from ocean to land, from the "Indies" to the "metropolises."

The ocean follows a similar destiny: its waters were affective image that fed the colonial relationship with nature. Placed at the centre of European fantasies of capital growth and conquest, the ocean was made to speak the language of capital.

Act I *The Encounter*

To start, I am applying this UV protection cream on my skin, and I invite you to do the same.

Through this action our tissues encounter *Pyrolobus Fumarii*, a key ingredient of the cream. This bacteria digests the damaging UV rays, creating a protective layer around its cells. When we apply the cream, the interaction between our skin and the cells of the *Pyrolobus* is not simply one of "absorption". The bacteria transforms our skin for his own livability. He lays down his waste, he settles, and perhaps reproduces. I bet if you checked our DNA in a few years, you would find some transfections between us. At the micro scale, our encounter unfolds into what Lynn Margulis has called *symbiogenesis*. This is the impact of microbes in the emergence of new forms of life through symbiosis and cell fusion.

As the cream traverses the upper layers of our skin, a variant on life is produced that removes the separation between us and the *Pyrolobus*. [2] " Even though we are beginning to share our DNAs, we have different placements in the tree of beings. We inhabit not only different

2. Adaptation from *Notes of a Sport Writer's Daughter* in Haraway *The Companion Species Manifesto*, Prickly Paradigm Press, Chicago, 2003

"I bet if you checked our DNA, you'd find some potent transfections between us...How would we sort things out? Canid, hominid; pet, professor; bitch, woman; animal, human; athlete, handler...We make each other up, in the flesh."

3."I think of bodies as multiply constituted things, as blendings of companion species and inorganic material, containing multiple

genera and divergent families, but different orders altogether. Prokaryotichominid; bacteria, actress; chemolitropic, woman; healer, fragile. One of us is a patented organism; the other has her fingerprint registered on a European passport, but equally has 25% of her DNA being patented. One of us is the result of DNA's experiments and is called "product C2901". One of us, equally product of a vast mixture of DNA, is called "white"."

Layers of history, layers of biology imprint on our body. The production of this cream originates on the soil and mud from the ocean bottom. If in the past it was the sugar or the spices that were imprinted into our flesh architecture, now these have been replaced by the DNA molecules stolen from marine bacteria.

Our skin cells, like a Turriss Babel replete with endless voices, contain a multitude of species, histories, and places. Today, seeing and listening from the place of the *Pyrolobus* and the other characters we will encounter along allow us to move "from ... embodiment to the space of global capital." [3]

forms of agency and bearing the traces of multiple forms of power. Haraway writes that "organisms are ecosystems of genomes, consortia, communities, partly digested dinners, mortal boundary formations," urging us to pay attention to the agentive workings of parts of the body and not just to the body on the whole. If the body is a product of social relations, as queer disability rights activist Edward Ndopu has argued, it is also a product of assemblage: a melding together of blood, bones, flesh, chemicals, chromosomes, cells, and spirit." Agard-Jones, *Bodies in the System*

Act II Islands

Part I

The bacteria *Pyrolobus fumarii* starts its existence at the hydrothermal vents field called Lucky Strike. There, 21 hydrothermal vents proliferate in an area of over 150 square kilometres.

Lucky Strike was the first field discovered off the coast of the Azores archipelago. It was 1992. A result of its offshore territories, Portugal's territorial waters extend halfway to the shores of the Americas. [4] In the years that followed another three fields were found inside Portuguese waters: Menez Gwen, Rainbow and Mount Saldanha.

Reaching temperatures over 300°C, acid and high in salinity, hydrothermal vents are considered to be one of the most extreme environments on Earth. The one we are looking at is located in the mid Atlantic Ridge, an underwater mountain range that crosses the Atlantic ocean. It is formed at the converging boundaries of four moving plate tectonics: European, North American, South American and African. Connected to the movements of such plates and to the energy flowing

4. International conventions, such as the 1982 UN Convention on the Law of the Sea, ensure that Portugal retains exclusive rights to all resources that inhabit that space, from the fish floating near the surface to the microbes, minerals, and bacteria dwelling in its depths.

underneath the Earth's crust, hydrothermal vents are boiling springs of precious chemical compounds. In reacting with cold water, the minerals released by the vents deposit on the deep-sea floor and layer as valuable materials: manganese nodules, cobalt, nickel, copper and gold.

In the deep-sea floor, it is impossible to draw the border between the mineral and the organic. There, the life mechanisms of vent organisms are chemically inseparable from geologic life. Minerals stratify the inner space of these living beings, becoming layers in their genetic code and molecules. In this metabolic choreography, gold deposits on the sea-floor and on the cells of the *Pyrolobus Fumarii* are similar geologic formations.

To access the life emerging at the vents, is a possibility that lives on the legacies of colonial land grabs, and it perpetuates the images of hidden gold, vast expanse, and savage wealth that marked the age of the discoveries.

Part II

I was in one of the 36 samples collected by the submersible VICTOR 6000. From there, I was brought with the others in the water sample into a Lab, where I received my new name: LS WA 070 to 081. Through cell culturing I was made to grow and tested with UV-A, UV- B and UV-C radiations. Light was reaching me for the first time, subtle pulsations that seemed to touch me, and I reacted to them in the only way I knew: digesting. They must have liked it, because they said I was between the selected bacteria isolates whose industrial scale production would be economically viable: I have low salt concentrations, regular growth temperature and effective growth in the presence of oxygen. I adapt to the standard of a desired relationship with the human body and environment. Maybe because of this, they

always use the word bank around me: they move me to a cell bank, I am ready to make bank, a guy who comes every day says he's banking his career on me. To explore mine and other isolates' economic potential, some of us, named "a sub-set of the collection," were selected for commercial exploitation and technology and transferred far from academic research institutes where our travels began.

This ability of ours, deep-sea inhabitants, to survive in extreme environments makes our DNA into a mining site for molecules. Components that could potentially help humans to survive the growing toxic conditions of climate change: UV rays protection, collagen development, cancer treatment. In this vision, my DNA map is a piece of land that can be mapped and privatised. In the past the emerging peaks of the Mid Atlantic Ridge, like the Azores archipelago, were occupied by seafaring nations and transformed into station points for the global movement of wealth. Now genetic formations endow the territory with a new occupation that builds on the genes of organisms like me. If once the caravel was the means for navigation and occupation of offshores land, now the ocean is sailed through microscopes. Where water is increasingly understood as a "gene pool", a chemical compound, molecules are the archipelagos that repurpose the privatization of the ocean.

Part III

We are now far from the pool of bacteria, salt, minerals, and burning emissions that characterize the hydrothermal vents. Here, H₂O emerges as a modern invention. In 1783, Water is described for the first time as a chemically composed element by Antoine Lavoisier. In a lab, he builds equipment to break water down into two components: hydrogen and oxygen. After his discovery, he declares that water is not a unique substance, but a "colourless transparent tasteless

compound of oxygen and hydrogen". On the base of this inner separation John Dalton renders the first visual representation of the water molecule. And finally, in 1836 Louis Jacques Thenard renders the familiar H₂O shape in his *Traite' de Chimie*.

The notion of water as a molecule marks a fundamental change in the way it is perceived in the West. Before, water had multiple geographic and spiritual meanings. Now H₂O enables the shift from many waters to one, making it into a neutral and timeless singular material. There is a sympathy between the emergence of H₂O and the political recognition of global empires: both have been understood as inevitable universals. Colonialism drew its inevitability as a global architecture from rationalized concepts of the natural: race, matter, geology, chemistry. Nature's inner space was the instrument of colonial worldling.

With its 4th wall imagined to be in Brasil, Praca do Comercio performed a large scale version of the chemical enclosure of water.[5] It became the symbol of the urbanization of the ocean. Built in 1755 to represent the global power of Lisbon, the square was thought to extend the capital's architecture to the other shore of the ocean. The Baixa Pombalina extends in the seascape, making it the site for commerce, wealth extraction and exchange.

5. "As a consequence lost the capacity to experience water as stuff, as a tangible element. To be conquered water was first besieged by science and technology." Linton, *What is Water*; UBC Press. 2010

All waves led to the centre of the Empire, because no matter how far from Lisbon they emerged and toward what unknown territory, they were forced to compose a continuous monument, an infinite global square where value floated in only one direction. Who knows if Eugenio dos Santos, the architect who designed the square, believed in a future where architecture was recovered. Where reason could claim back control on the natural world after the Sismo de Lisboa?

“Between the binomial *natura naturans* and *natura naturata* I choose the latter. By eradicating mirages and fairies of spontaneous architectures, architectures of sensibility, architectures without architects, biologic and fantastic architectures, I move towards a continuous monument. An architecture that equally emerges in all its parts from one continuous environment: the Earth, made uniform by technology, culture and all other imperialisms.” [6]

6. Supertudio, *Un Modello Architettonico di Urbanizzazione Totale*, 1969

Act III Currents

Part I

“Designing Nature” is the motto I read on the home-page of SilicoLife. This is a Portuguese corporation that creates new microorganisms to produce commercial compounds such as chemicals and food ingredients.[7] In the labs of SilicoLife the inner space of living beings, their cells and genes are isolated and rearranged. Scientists analyse the living processes of cells, their metabolism, their reproduction and their symbiosis, and then engineer them to be useful for commercial projects.[8]

I scroll through the website, and I discover that the in vitro cell culturing of SilicoLife is part of the constellation of labs of Shikifactory100. Biotech businesses, pharmaceutical and chemical companies, institutes and universities, gather under this umbrella. They collaborate in the production of “a universe of more than 100 high-added value compounds” [9] made from bacteria. Bacteria are broken down into discrete varieties: “progeny, replications, derivatives or parts” with biological, legal, and commercial meanings. In 5 years, the

7. www.silicolife.com

8. “Understood as a biodiversity-become-capital, the feature that deep-sea vents microbes and their inner space might have most in common with gold is their status as fetish, an entity thought to have its own life force apart from the relations in which it becomes socially and organically active. Like gold, biodiversity is imagined to be both symbol and reality value.” Helmreich, *Alien Ocean*, 2009

9. www.shikifactory100.eu

extracting of 100 compounds is thought to be associated with a multi-million euro global market pool.

The question is, the question that I ask is, who owns this? That is, who owns what goes through me, maybe within, is it, the sequence that I am made into? Or so I see, once I am made into proprietary text, flattened to a sequence larger in size than I could have ever been, maddeningly long, I must contain so many molecules. So I am still looking out from the lab and from the patent book, living outside my earth which was so liquid, and I see that other letters now own my DNA sequence and the compounds derived from it. Maybe this means I am a bacteria pregnant with hypertext. Not that I thought I owned my secretions in time or space: but how did the order of my selves (my DNA, they say) become owned by B.A.S.F., “the largest chemical producer in the world”? This German company, I overheard from the computer screen where I am being sequenced and where I live now, has acquired nearly half of the 13,000 patents derived from 862 marine species like me.[10] In most countries, though, I, as a bacteria, am unownable: it is impossible to patent “a product of nature.” [11] But as soon as they put me to use, read me down, sequence me, companies and research institutions can patent a novel application of me or my genes. So they not only lie my down and spread my

10. *What 13,000 Patents Involving the DNA of Sea Life Tell Us About the Future*, Murphy, The New York Times, 2018

11. “In Japan, the E.U., the U.K. and Canada, isolated genomic sequences can still be associated with patents (56). The European Union directive 98/44/EC (the Biotech Directive) allows for the patenting of natural biological products (57), as long as they are “isolated from [their] natural environment or produced by means of a technical process.” (Rule 23e (2) EPC and 23c(a) EPC). Thus, under the European Patent

habits into a sequence, but they also multiply me. My DNA sequence is analysed, mapped, and potential commercial useful genes are isolated from the rest.

Did the ocean flows, and the currents that traverse it, become mirrored in a hypertext database?

Part II

It is not the first time that wealth is prospected and extracted from oceanic flows. Looking for resources to settle its war debt, Germany endowed the Meteor oceanographic expedition between 1925 and 1927. Set out from Saxony, scientists and oceanographers onboard the vessel traversed the South Atlantic Ocean in an attempt to determine if gold particles could be extracted from seawater. Their path retraced the routes that connected European colonial outposts on the shores of West Africa and South America. Hands and instruments submerged, they collected pieces of the ocean to bring with them: water, soundings, and bottom samples. Gold was to be mined not only from beneath the sea surface, but from the very substance of the water. If wealth existed and remains in the potentiality of these heavy waters, its buried molecules and oceanic hills, what memories are made awake when one disturbs the waters to make gold?[12]

Convention and individual contracting states, companies may patent naturally occurring gene sequences, without having had to first modify them (Rule 23c(a)).” *Corporate control and global governance of marine genetic resources*, Supplementary Materials, Science Advance, 2018

12. “But even if those Africans who were in the holds, who left something of their prior selves in those rooms as a trace to be discovered, and who passed through the doors of no return did not survive the holding and the sea, they, like us, are

Act IV *Luso-Tectonics*

Once engine and infrastructure of the movement of wealth from colonies to European cities, Atlantic currents and winds were being repurposed. The Meteor saw them as geologic matter replete with precious minerals and metals. Shale crests of turbulence, resting matter atop the blue, digested rocks, wet dirt and bones, whatever Nature was, the scientists of the Meteor tried to enclose it through samples and taxonomic codes. This rational categorization, or so went their plan, would fulfill a watery permutation of the alchemic dream: turning bare matter into gold. Land made liquid, liquid made land. How many times can the Atlantic be turned towards, attuned to the languages of capital? Where was the water going as it moved?

Parallel 40°S (degrees south): we leave Buenos Aires on June 4th, 1925. We resume the task in the midst of wintry winds, bound for the opposing coast, embroidering the ocean with our zigzag. [13]

alive in hydrogen, in oxygen; in carbon, in phosphorous, and iron; in sodium and chlorine. This is what we know about those Africans thrown, jumped, dumped overboard In Middle Passage; they are with us still, in the time of the wake, known as residence time.” Sharpe, *In The Wake, Duke University Press*, 2016

13. Mill, H. (1926). *Merz and the “Meteor” Expedition*. The Geographical Journal, 68(1), 73-77

Part I

It's July of 2017. In the Tower of Belem, three figures accompany each other on stage. Each of them, flag in mouth, represents a territory: European Union, Brazil, South Africa. Their union is the coming together of Atlantic shores, which, as the european representative, Carlos Moedas, reminds us, used to touch. In fact, they seem to say, our countries' shores have touched repeatedly. This interconnection baptized many times: pangea, colonialism, scientific exploration, climate change. The European looks out and romantically says:

“ Alexander von Humboldt is my hero. As a child, stood right here, on these walls, with my dad. I stood here and we dreamed of the ocean.”[14]

Blue waves flicker inside his eyes. Scientist and politician smile in agreement. Doesn't liberalism originate from the sea, just like earthly life?

The event where we find these figures marks the beginning of a three day conference where

14. “My first memories as a child are overlooking the ocean with my father hand in hand. My father used to tell me stories about the oceans, scientists and philosophers. Today the story of Alexander Von Humboldt comes to mind. In the 19th century, he discarded a life of privilege and spent his inheritance on a five year exploration of Latin America. When he returned, his suitcases were filled with thousands of astronomical and geological observations; he had hundreds of sketches, dozens upon dozens of notebooks, and more than 60,000 plant specimens.

the Belem Statement on Atlantic Research and Innovation is signed. It launches a program too: The European Union, Brazil, and South Africa Atlantic Ocean Research and Innovation Program. The name of the conference? *A New Era of Blue Enlightenment*.

This time we won't fill the ships with sketches and plant specimens from the other side, like Humboldt did. Instead we'll fill them with “*floating universities*”, marine science internships, and plurinational gene banks. We can all share this blueness, it's three trillion euro worth of microbes per year and a couple million tonnes of plastic trash, they boast.

Part II

In 1960 the same site hosted the celebration of the 500th anniversary of the death of Henry the Navigator. Back then, Salazar decided to rebuild the Padrao dos Descobrimentos and invited representatives from South Africa and Brazil to join. In that occasion, the South African Union, that is, apartheid South Africa, gifted Portugal with the Wind Rose square and Mapa Mundi we walked on at the beginning of our journey. The gift was meant to honor Portugal's discovery of Cabo de Boa Speranca. With the celebrations of 1960, Portugal promoted its role as a connector rather than as an Empire, depicting its efforts to maintain control over its colonies as infrastructural advances rather than as

Humboldt is famous for many things. But one of the most striking is that he was one of the first people to state that all lands bordering the Atlantic Ocean were once connected. For me, when I think of Humboldt the word that most often comes to mind is connectivity.”
https://europa.eu/rapid/press-release_SPEECH-17-2008_en.htm

occupation. Today, the Belem Agreement set the guidelines for the cooperation between the Global North and the Global South on economic development. This trans-continental collaboration will produce yet another map of the South Atlantic, this time of its marine genetic resources and the deep-seabed.

And so symbols and celebrations pile up. This ocean of connectivity, let's say trade, brings Europeans good things. One blue enlightenment after another.

Does Lisbon not stretch through the Atlantic, the fourth wall of the Praca de Comercio standing on the far end of our sight? Does the Padrao dos Descobrimentos not point its bow towards the shores Moedas describes? Sometimes the ocean brings gold not because the waves wash it ashore, but because Europe itself extends, west and south, above and below, and with it, so it extends its capacity to sack and dispossess.

Act V Tremor

I wonder what Europe thinks it'll find in the ocean this time. It is not the gold-making alchemy of the Meteor expedition. And yet, once again, the potential of the Atlantic is very much in all it carries that it is not mere water. The ocean, it turns out, is full of rare earth and rare life. And rare means wealth.

But doesn't this marine strategy refigure a familiar alliance between spectrality and privatization?[15]
The frontier investor always needs an ocean of opportunity. And investments happen as much in the city as in marine space. Every corner of life that doesn't have a title, every corner of space that is yet to be traded, they make into a market. On each side of economic breakdown, they find me, a bacteria, captured in a scoop of mud by submarine technology; and homes, packaged in decades-long investment plans and mortgages.

Somehow, in a long and perhaps subtending process, numbers begin to appear: a kin of deep-sea bacteria become a future resource, with the sector estimated at 5 billions of US

15. "To speak of spectrality in Bombay's housing scene moves us beyond the empirics of inequality into the experience of shortage, speculation, crowding and public improvisation. It makes the space of speculation and specularities, empty scenes of dissolved industry, fantasies of urban planning, rumors of real estate transfers, consumption patterns that violate their spatial preconditions, and bodies that are their own housing."

Spectral Housing and Urban Cleansing: Notes on Millennial Mumbai, Public Culture 12.3 [2001]: 635

dollars by 2020. The Lisbon real estate market, appraisals say, will continue to expand. Lisbon shows promise, say business magazines.

2017 inaugurates *A New Era of Blue Enlightenment*. In 1998, the Expo in Lisbon understood *The Ocean as the heritage of our future*.

From colonialism to post-troika austerity and revitalization, from the ship to tourist flats or golden visas, DNA and the house are directed towards parallel purposes. They become instruments for speculation.

The zone of dispossession and extraction coincides with the area of investment. What parts of the city are regenerated, deemed derelict, vacant, or unlivable? Which parts of the city are, like the deep sea, seen to be in need of a new era of enlightenment?

Every earthquake births a rim: fires and insurance, quakes and seismographs, financial collapse and new forms of bondage, debt and colonial monopoly. Every rim, too, brings forth an earthquake.[16][17]

It's a digital excretion. Sweatlike. Our skin has absorbed finance, but it smells like a bacterial purchase too. Rancid trade, though it impulses us. In the city, I walk at the pace my skin

16. "There is a concatenation of all events in the best of possible worlds; for, in short, had you not been kicked out of a fine castle for the love of Miss Cunegund; had you not been put into the Inquisition; had you not traveled over America on foot; had you not run the Baron through the body; and had you not lost all your sheep, which you brought from the good country of El Dorado, you would not have been here to eat preserved citrons and pistachio nuts."

"Excellently observed," answered Candide; "but let us cultivate our garden." Voltaire, *Candide*

devolves. I walk at the speed of appropriation. The buildings, meanwhile, sweat too.

Tourist flats in the city form like cysts. City membranes full of capital residue about to pop. A layer of financialization on the pavement. And today on your skin, my skin, our skin. Metabolisms packed with cellular transformations that absorb and produce liquidity for others to speculate on. The subject splits into currents of investment. It runs from the bacteria cracked into a million screens recording its genetic signature, to our molecular experience, to the way we inhabit the continuous monuments of our streets.

The Sismo de Lisboa, centuries ago, began at tectonic encounter that I call my home. A story spills out from that tremor, one which began, just like us today, in Madeira. This story, which now inhabits you and me, shows no separation between the physical and the financial, the inert and the live, your porous body or our shared flows of consciousness, histories, and genes.

17. "If we acknowledge this energetic subsidy from slavery and mineralogical deposits as having lent not just geologic materials but also capacities for force within human life (and who or what gets to count as human within the biopolitics of life), then we can also shift our understanding of the location of agentic power to focus on these human and geologic materials and the capacities that they incite as the affective materials of social formations."

Yusoff, *A Billion Black Anthropocene or None*

Epilogue

"A defined us is not possible without a counteraction of an "out there". We are configured by otherness." [18]

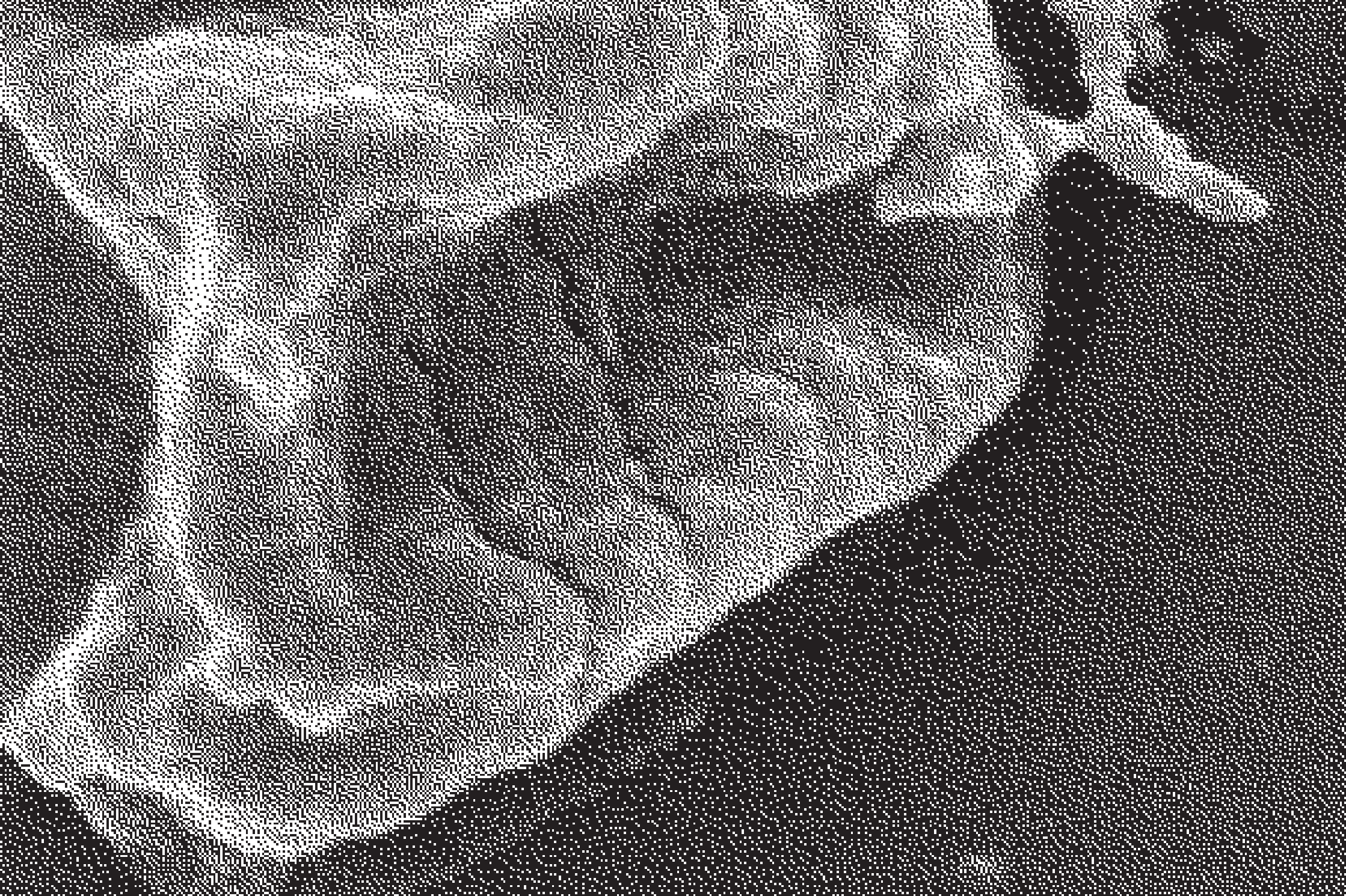
What we thought as distant - the earthquake, the submarine mountains, the bacteria, the conflicts, the bodies crossing the Atlantic - is in proximity, against and with us.

Praca do Comercio, the H2O molecule, the labs of SilicoLife, the Golden Visa programme do not design a superior urbanism. But simplified and uniform ecosystems that are only possible once the problematic, the despoiled, have been made unthinkable. [19]

Architectural practices perform political visions. We can use them to trace a line between what is "us" and what is out there. To consolidate a frame of exclusion. Or we can use architecture to venture in an unthinkable model of inhabiting different voices. Rather than a failed architecture, we can look at the Turris Babel as a space that holds infinite possibilities. The species, people, arguments and polemics inhabiting it suggest multispecies urbanisms that are more desirable than a fourth wall imagined on the opposite shores of the Atlantic.

18. *Superpowers of Ten*, Andres Jaque and The Office for Political Innovation

19. "If the Anthropocene's built environment is not actually about the buildings per se but resides in the processual material context of all the ruins that surround and anticipate it (human, nonhuman and inhuman) must be thought as a process of ruination or the reverse of agency. In Robert Smithson's terms, architecture is a ruin in reverse, an entropic exercise." Yusoff, *A Billion Black Anthropocene or None*



Scanning electron micrograph of *P. fumarii*

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