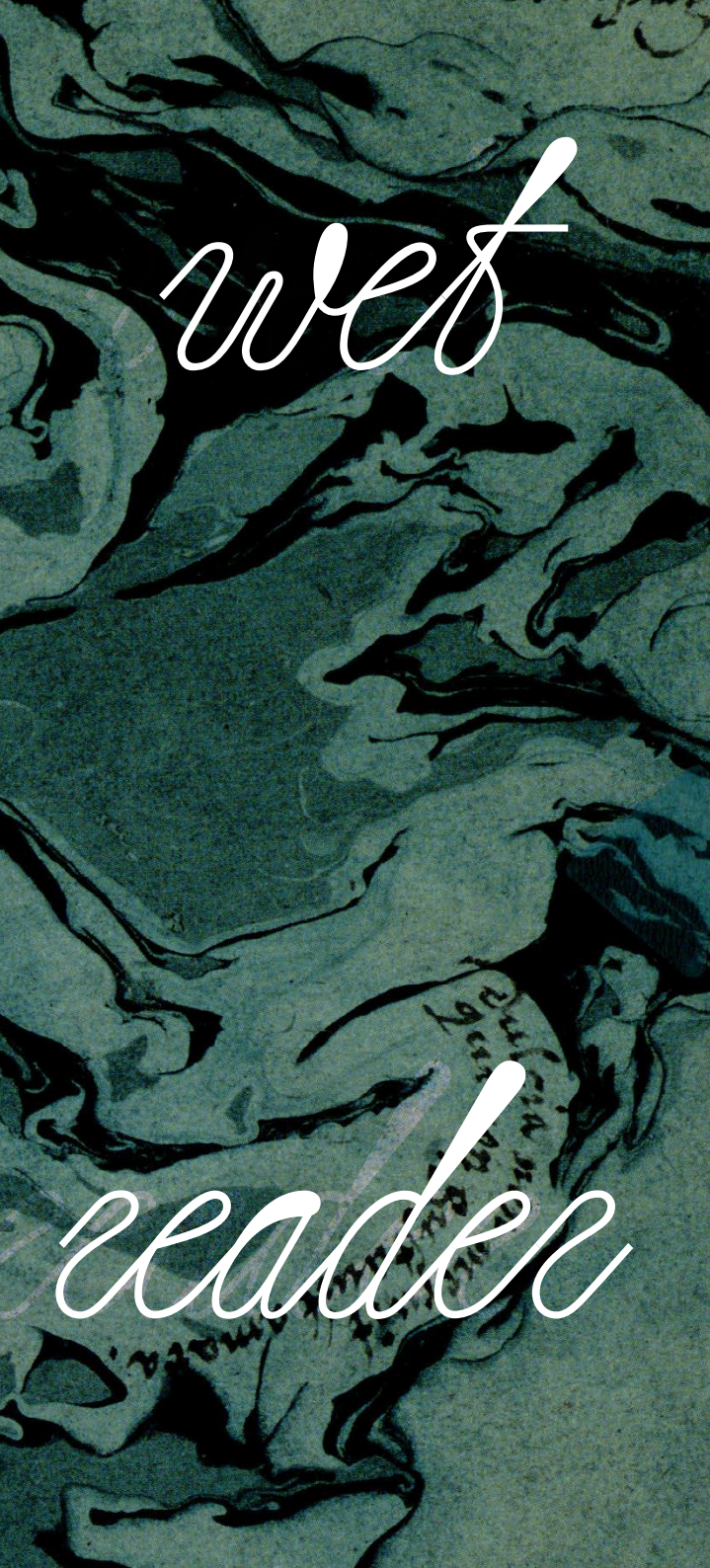
wet
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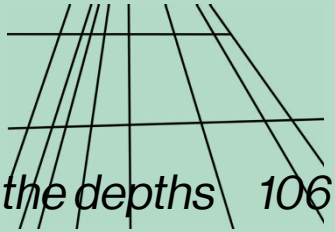
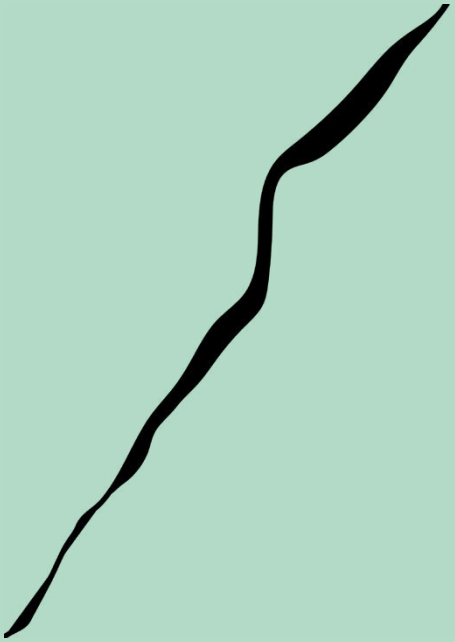
wet reader





float ~ swim ~ submerge

Juan Pablo Pacheco Bejarano ~
visual artist, writer, and educator

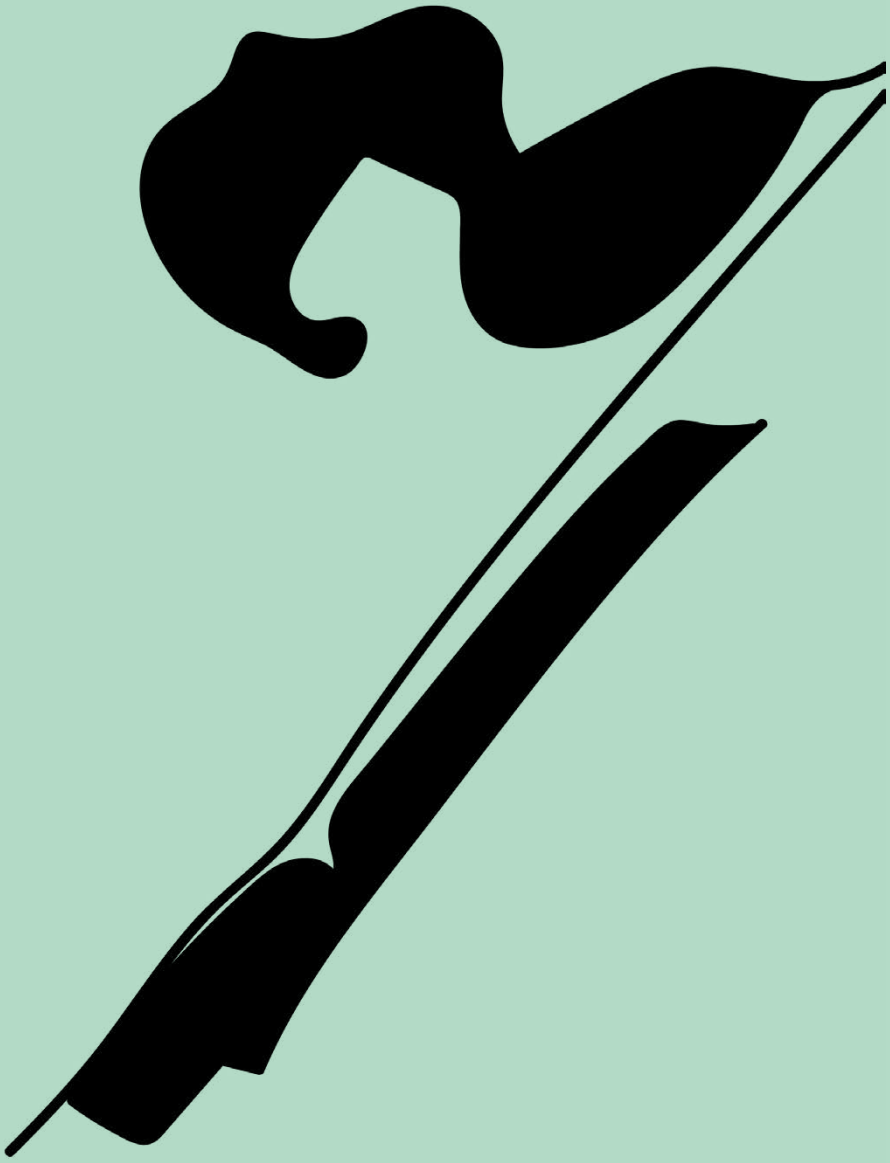
Bruno Alves de Almeida ~
curator and architect

Still from the video *Environmental identities at the ocean floor* (21'01") by Juan Pablo Pacheco Bejarano and Bruno Alves de Almeida, 2022.

Even though the seabed is deep within Earth and accounts for more space than dry land, its conditions and our lack of knowledge of it seem to make the ocean floor as foreign as deep-space. Nevertheless, resource extraction and other human disturbances are already deeply felt in these remote undersea areas. How can we better understand our relationship to the ocean floor, and what can it teach us about our chances for survival? Could a speculative *inhabiting* of the ocean floor open up new insights for the ways in which we relate with our surroundings?

In order to address these questions from a coastless city like Gießen, we came up with the idea of a wet workshop for our residency at the Panel on Planetary Thinking, as an open space to expand how we relate to the multiple bodies of water within and around us. What happens when transdisciplinary conversations unfold in water, where our spatial coordinates are shuffled? Through this workshop we will intra-act with a river, a lake, a pond, a pool, and an aquarium, through somatic reading and listening exercises and ask: how does water alter our conventional understanding of media, time, and space? The three days of this workshop engage with deep listening, swimming, phenomenological awareness, and fabulatory science, through which we can explore the multiple relations that bind us with the planet's waters from a relational perspective.

This reader will serve as a research tool throughout the three days of the workshop, enabling us to metaphorically and literally float, swim, and submerge in Gießen's waterscapes. The reader is designed to be read but also to be used as a writing, drawing, and sensing tool to engage with the unknown and unexpected.



a potential timeflow for the wet workshop

Thursday November 2nd

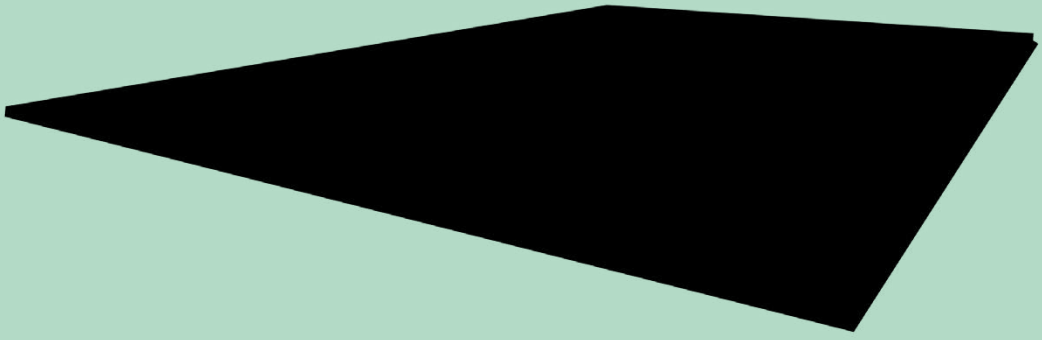
13:30 - 14:00 ~ Arrival and welcome at the Lahnfenster
14:00 - 15:00 ~ Introductions, expectations, reader handout
15:00 - 16:00 ~ English tour of the Lahnfenster
16:00 - 16:30 ~ Deep listening to planetary waters
16:30 - 18:00 ~ Somatic readings and deep listening in/with/by/on the Lahn river

Friday November 3rd

13:30 - 14:00 ~ Arrival at the aquarium Ocean2100
14:00 - 16:00 ~ Meeting with Dr. Patrick Schubert and tour of the aquarium Ocean2100
16:00 - 17:00 ~ Somatic readings at Bergwerkswald forest and bomb crater ponds
17:00 - 19:00 ~ "Water as a planetary space", lecture by Prof. Klement Tockner at Hermann-Levy-Saal, Berliner Platz 1

Saturday November 4th

09:00 - 09:30 ~ Arrival at the indoor swimming pool at Ringalle 12
09:30 - 12:00 ~ Somatic readings at/in/on indoor pool
12:00 - 12:30 ~ Walk through the Schwanenteich
12:30 - 14:00 ~ Lunch
14:00 - 14:30 ~ Walk to theater
14:30 - 16:30 ~ Closure with somatic deep listening exercise at theater
16:30 - 17:00 ~ Final comments and reflections



giessen waterscapes

Lahn river
Lahnfenster
Ocean 2100 aquarium
Schwanenteich
Betriebshof Kanal
Ponds at Bergwerkswald
Swimming pool at Ringalle

panel on planetary thinking

The planetary goes beyond the global and its concepts that range from globalization to global governance. Planetary thinking means to take Earth as a planet seriously in all matters. It is to acknowledge that human societies are deeply entangled with the life of an ever-changing planet while realizing that humans are also not at its center. Rather, it emphasizes that humans share the Earth with other living beings, non-living beings and forms of energy. Therefore, the extensions of planetary thinking are vast. Spatially, the planet extends from the Earth's core to the interplanetary space; temporally, the extensions are from nanoseconds to cosmic time scales; and materially, from elementary particles to the dark matter of the universe.

The Panel on Planetary Thinking was founded in 2020 as a research-oriented think tank at Justus Liebig University Giessen, Germany (JLU). Initially funded by the German Research Foundation (DFG) until 2025, it received additional funding by the Hessian Ministry of Higher Education, Research, Science and the Arts from 2022-2025. Its mission is to promote holistic perspectives in sustainability-related research and teaching at the university and beyond. As an emerging advanced studies institute, it acts as a connecting hub for transdisciplinary research projects. Through a range of activities in transdisciplinary research and scientific outreach, it provides space for generative thought that understands the human condition as part of the planetary condition and to disperse this knowledge into science and society.

The international Planetary Scholars & Artists in Residence Fellowship Program (2022-2025) an integral part of the panel's activities. Every year, the fellowship provides four scholars and artists from different disciplines to conduct transdisciplinary research to explore how the academia and arts interact with the multiple relations between societies and the planet. The fellows are given the space to do collaborative and transdisciplinary "planetary projects" on the themes of planetary materials (2022), planetary spaces (2023), planetary times (2024), planetary agency (2025), and planetary politics (2025). The projects are realized in the form of workshop series that answer the questions of;

~ Retrospectively: How did planetary forces form us? How did diverse societies acquire planetary forces that are capable of transforming Earth?

~ *In the present: How can different societies deal with irregular-regular planetary changes that are beyond their influence? What does it mean to have such planetary power, how should it be deployed and when should it be withheld?*

~ *Prospectively: Which planetary forces beyond our influence can we anticipate? Which planetary dynamics can we ally or reunite with, and which alliances should we quit (if possible)?*

This Project emerges as part of this international fellowship program and in connection with the thematic focus on "Planetary Spaces" (2023). This "wet workshop" emerges from the fellowship awarded to Juan Pablo Pacheco Bejarano and Bruno Alves de Almeida, entitled "Environmental Identities at the Ocean Floor". This joint research project started through a research grant from PACT Zollverein in Essen, Germany in 2021. This allowed us to combine our two lines of work through the study of deep sea phenomena, from proprioceptive and spatial implications to geopolitical and biological shifts endured by the

ocean floor, processes enhanced by climate change and extractive technologies. At the Panel on Planetary Thinking, we seek to further our research into the visible and invisible forces that shape planetary waters, bearing in mind resource extraction and other human disturbances. Together we will continue exploring the forms of life and the flows of energy that thrive on the ocean floor, and their influence on our lives and identities on the planet's terrestrial surface.

environmental identities at the ocean floor

Juan Pablo Pacheco Bejarano and
Bruno Alves de Almeida

In 2020, we started a joint research project called "Environmental Identities at the Ocean Floor" with the support of PACT in Essen (Germany). The initial stages of this project allowed us to combine our two lines of work through the study of the deep sea and the ocean floor, from proprioceptive and spatial implications to geopolitical and biological shifts. processes enhanced by climate change and extractive technologies. We wrote the following script during this first part of the joint research, and it is the basis of a video work that you can watch here: https://vimeo.com/641872505/3da4318b56

Things and places carry the power of their names.
Names carry the power of history.
History carries the power of myth.

The mathematician Henri Poincaré said of Euclidean geometry: "It is not the truest, but it is the most convenient."
Why is it the most convenient?

Membranes create the very notion of an inside and an outside, spaces
where both difference and similarity emerge from.

The Euclidean conception of space as a stable surface provides unwelcomed constraints that separate spaces from the matter and meanings that occur within.

Membranes enabled the emergence of complex life on the ocean millions of years ago, propelling the intertwined dependence between information and media; the individual and the environment; between you and I. The ocean is the medium and container for the deep relations between the biological, the political, the ecological, and the technological.

From an Euclidean perspective, the foundational 'space' that remains after substance is stripped away, is empty, abstracted, and atemporal.
The Euclidean understanding of space is deeply connected to the control of place, through its transformation into property, and the communication and fortification of that property's limits through fences, boundaries and borders.

Membranes are also a sort of artificial intelligence designed to claim territorial power, and eventually alter and affect the networks of techno-biological relations in a given space. Even though the ocean is fluid, voluminous, and deep, governments and multinationals around the world are now seeking to extend their legal sovereignty into the seabed. This renewed form of colonial expansion imposes a logic of stability and atemporality to the ocean's depths.

The Ocean churns Euclidean logic.
In the ocean the configuration of surface and depth are in constant flux, with one becoming the other in continual intensity of motion. Depth rises to the surface only to be returned below once again. Surface is submerged, becoming depth.

We mistakenly understand depth as a foreign territory, a zone of otherness to be explored, chartered, and colonized. As the deep ocean is explored and mapped, the likelihood of its future

exploitation becomes more real. In the deep sea, extraction increasingly becomes three-dimensional, deeper, and expanded.

The ocean is a space of churning, where place is provisional and forever being reproduced.
The 'geo' in geology points to a material world of stable ontologies reliant on a linear trajectory of time that stabilizes history into material strata and immaterial epochs that can be neatly bordered, bounded, and contained.

The depth and volume of the ocean are not just flattened by geopolitical arrangements but also through digital imagery. "There are many terrestrial processes that can only be understood through high-resolution mapping of deep-ocean topography. These include small-scale features such as abyssal hills, small seamounts, fractures forming in the outer walls of deep ocean trenches, and erosional incisions in the seaward slopes of continental margins." What will our relationship to the ocean be when we can sense everything that lies underneath?

Implicit in the idea of 'geo' as 'Earth' and in concepts like the Anthropocene is the notion of a solid, grounded, earthly materiality that can be worked on, and with, by humans.
Water and the oceanic churning, provides a shifting field for rethinking the ways in which our political geographies emerge from—and impose themselves on—a dynamic, voluminous materiality.

At the beginning of 2020, scientists found a new species of amphipod, a small marine crustacean, which they named Eurythenus Plasticus. They were found scavenging plastic microfibers at the hadal zone of the Mariana Trench, the deepest region of the ocean, which is named after Hades, the ancient Greek god of the underworld. Perhaps Eurythenus Plasticus is an ancient geological goddess, guarding the liquid membrane between the living and the dead in the underworld of the anthropocene, a dark and humid place filled with plastic, where all souls go after death.

The labyrinths in our inner ears enclose a sensory system that defines our sense of balance and spatial orientation, defining also a basic Euclidean frame of reference that may be at the root of our geometric perception of space.
By its very structure, it provides a reference frame only for the movements of the body.
It is an egocentric system.

The hundreds of submarine fiber optic cables that sustain the digital world, are insulated from water by a protective membrane of metals and polyethylene, enabling light to speed through its fibers. Homo Sapiens, Eurythenes Plasticus, and Submarine Fibre Optic Cables are all membrane-beings, the result of tissues designed both to separate and communicate.

Nature bequeathed us another frame of reference connected to external space: gravity.
This omnipresent force is a constant of terrestrial space. It can be detected by specialized receptors in our ears, the otoliths.
It constitutes a reference point external to the body and consequently, "an external plumb line" related to bodily movements in a "geocentric" frame of reference.

Submarine cables organize the world as a vertical field. Above and below. Deep and high. Submarine cables can also be lines to other worlds. They are spatial and temporal connectors.

It is telling that the figure to which the origins of architectural practice refers back is Daedalus, who mythology notes as the inventor, among other things, of the plumb line and the compass; the compass is a device of progressive appropriation of space beginning from an indispensable center point to which we always return.
the plumb line is an instrument of rootedness to the terrain, of structural equilibrium, of verticality as living.

When submarine cables can't be fixed or reused anymore, they're typically turned off and left at the sea bed. When cables and other technological infrastructures become submarine ruins, they are refashioned by other forms of life as temporary homes. Anthropogenic debris is increasingly becoming a new geological layer at the ocean floor.
During late modernity, "there is a shift from the description of the ocean's depths as a wondrous and mystical space to a knowable, predictable, and scientifically manageable environment".

Pressure increases as one dives deeper. Light decreases.

Epipelagic zone: From Greek for before. From the surface to 200m. The light zone, photosynthesis and color. Where most animals and plants we know live.

Public distance used for public speaking
Close phase – 3.7 to 7.6 m
Far phase – 7.6m or more.

Mesopelagic zone: From Greek for middle. 200m to 1,000m. Bioluminescence. Heterotrophic bacteria.

Social distance for interactions among acquaintances
Close phase – 1.2 to 2.1 m
Far phase – 2.1 to 3.7 m

Bathypelagic zone: From Greek for deep. 1,000m to 4,000m. Pitch black. Few animals, which live on marine snow. No plants. Deep-sea giant animals.

Personal distance for interactions among good friends or family
Close phase – 46 to 76 cm
Far phase – 76 to 122 cm

Abyssopelagic zone: From Greek for bottomless. 4,000m to the ocean floor. The abyss. Species living here don't have eyes and are transparent.

Intimate distance for embracing, touching or whispering
Close phase – one to two cm
Far phase – 15 to 46 cm

Hadopelagic zone: From Greek for hades, the underworld. More than 6,500m Hadal zone. Usually trenches. The greatest ocean depth measured is in the Challenger Deep of the Mariana Trench, at a depth of 11,034m.

Perception is constrained by action; it is an internal simulation of action. It is judgment and decision making, and it is anticipation of the consequences of action. Perception is active exploration.

Memory is used primarily to predict the consequences of future action by recalling those of past action. Memory can be declarative, implicit, working, episodic, procedural, short-term, long-term, iconic, topographic, spatial, semantic, lexical, motor, topographic, etc.

Even muscular fibers have a memory.

Modern objectivity enlarges the artificial abyss between the knowing subject and the object of knowledge, a predisposition that favors militarism, capitalism, colonialism, and male supremacy. In contrast, feminist objectivity perceives the object of knowledge as an agent located within particular sets of relations, moving research away from the paradigm of discovery and explanation towards the paradigm of conversation. In this sense, the ocean and its critters are not passive nor neutral; they modify, frame, and enable particular kinds of social, spatial, and temporal relations.

Kinesthesia is the result of cooperation among several sensors, and it requires the brain to coherently reconstruct movement in the body and in the environment. When this coherence cannot be achieved, perceptual disturbances result in illusions, which are actually solutions the brain devises to deal with discrepancies between sensory information and its internal perceptions.

What ritual could allow us to cross the material and semiotic membranes between ourselves, our environments, and other species?

When sailors return to port, they have the impression that the ground is undulating in the same way as the sea. How is this memory of movement constructed? It isn't known for certain, but it is assumed that at sea the brain establishes a dynamic modulation in opposition to the undulations of the water. The result is a sensation of stability. And, in fact, when you are on the water for several days, you eventually forget the motion of the boat.

The colonial reason that engendered modern sciences rejects animism, demystifying the world and placing us "in a mute, blind, yet knowable world—one that is our task to appropriate". What if "culture or subject is the form of the universal, and nature or object is the particular"? We begin to sense the agency of other lifeworlds, and tune our radio waves to the multiple forces that shape our world that do not depend entirely on human will.

"subjectivity is plastic" - plasticity designates transformation within a system. A closed system, like the nervous system, is said to be plastic, because it moves and transforms itself from the inside, and when it receives something from the outside, it integrates it into its own internal processing.

When does the environment begin and the subject stop?
How can we become Euryhtenes Plasticus?
How can we move from the human to the arthropod, from the anthropocentric to the arthropocentric?
How can we become submarine cables?
How can we become healing vessels?

To discover other ways of accomplishing a given task, one must be able to envisage it while changing perspective.
Building an identity in a social context also relies on changing perspective
"de-center" oneself - being "oneself as another",
Changing perspective or points of view requires that the brain change "spatial reference frames."
the ocean, through its material reformation, mobile churning, and nonlinear temporality inaugurates connected, indebted, dispersed, relational understandings of embodiment

hydrocommons and the colonization of water

Irene J. Klaver

Here I argue for another way of taking water seriously: a relational way. This perspective acknowledges that water is always in relation; it is not the enemy, the Other. Water has become the enemy because of our own engineering designs for controlling it and separating it from us, from the land. To acknowledge water as intrinsically relational opens a different sense of water and a different water. It entails a shift from modern water to relational water. In this shift it is no longer water as such that causes floods and problems, but modern water that is at fault. I show how water, in engendering this move, has agency. I argue that water, therefore, is radical.

[...]

Modern water, homogenized and contained, is cut off from stories, from relations. It means other entities have also been cut off, contained, and homogenized. Swamps and wetlands are drained, aquifers pumped dry, rivers diverted—to be used for agriculture, for development. Water's isolation, water's separation from relation, makes water bodies measurable, static, determinate, facilitating domination, exploitation, commodification, and colonization of water and of everything with which it was in relation. Furthermore, by separating water from relation, making it modern, a line is drawn which makes water the Other; in crossing this line, modern water creates the notion of flood. Relationality, on the other hand, entails absence of hard boundaries; its intrinsic diversity displays fuzzy boundaries of indeterminacy and complexity and, therefore, is harder to control. There is unpredictability and uncertainty. Contained and restrained water becomes modern water, global water, a commodity, an asset performing increasingly well on stock markets.

[...]

Fluid and ephemeral, water is the bedrock of the world. Water orients us, shows us how boundaries are interrelated, and not just hard walls; water shows us soft versus hard approaches. It teaches a shift in mentality, in modes of thought, in ways of operating; it teaches us how to live with water instead of conquering and dominating it. Underlying this mentality shift, in which water is taken seriously, is a radical incommensurability with the modern conceptualization of water, with how we think we can manage and control "it." Radical water demands a radical overhaul of our conceptualization of water, of our planning and managing water as a separate entity. The incommensurability is on the level of epistemology, ontology, ethics, and aesthetics. It changes what counts as progress, certainty, justice, efficiency. It affects how we conceive of boundaries, time, place, space, relations. Radical water is multiple. There is not just one way of water. There are many ways of water, and many ways of knowing and experiencing water. Multiplicity and complexity are intrinsic to water. Water is always in relation; it is relation. Therefore, it is multiple. Humid, wet, fluid, and frozen, it makes mountains crumble, trees stand straight, people fight and celebrate. Water rhizomes into relations, ramifications, and constellations. It is omnipresent, evanescent, liquescent, ephemeral, multidimensional, gestational, conceptual, virtual. Water engages

actively and passively; it drips, sits, sinks, mists, dissolves, melts, oozes, flows, freezes, rains, cascades, evaporates. Because of its relationality, it does not let "itself " be reduced to simplicity, to an incapacity to act. Its "self " is many. Its being is becoming. It embodies concepts, rituals, politics, ideas, and ideals. Embodied, it is in other bodies, in other environments, and provides environments for other bodies. Inside and outside, interior and exterior interchange; water is mist, rain, a terrain, mud, microbial, intestinal, virtual, and cyborgial. It gives life and takes lives; it can be abundant, scarce, present, absent. It challenges clear-cut divisions and oppositions, undermines categorizations, messes up lines of separation, laughs at institutions, builds and resists infrastructures. It leaks, overflows, erodes, spreads, disappears, dilutes, and pollutes. Being in relation, water is fundamentally indeterminate. Radical water undermines its own categorization as a clear-cut separate entity. It cannot be cut. When it gets cut, it bleeds. When it is confined, it snaps.

Water is complex in its ontological, sociological, political, hydrological, epistemological, religious, cultural, ethical, experiential ways. Water itself shows the above, as we will see below. Water engenders activism and advocacy. Water is prehuman, posthuman, nonhuman. We are not at its center. It is at our center. Water is radical.

[...]

I specify the concept of riverine atmosphere as riversphere, to examine rivers as places of multiscalar and multivector connectivity and complexity. My sense of riversphere resonates with Gernot Böhme's (1993) concept of atmospheres:

> *Atmospheres are indeterminate above all as regards their ontological status. We are not sure whether we should attribute them to the objects or environments from which they proceed or to the subjects who experience them. We are also unsure where they are. They seem to fill the space with a certain tone of feeling like a haze." (Böhme 1993, 114)*

Riversphere is a thick, profoundly relational concept. It negotiates and blurs separate spheres—such as hydrosphere, geosphere, atmosphere—and adds social, political, cultural, aesthetic, and affective dimensions to our water conceptualizations and praxes. It enriches the conceptualization of rivers in the cultural imagination, intertwining hydrological, biological, ecological knowledge and experience with lived experience, social-cultural and political activities, storytelling, and more. LeAnne Howe's piece on the founding of New Orleans by Filan-chi (Bienville) gives a rich example of the relationality of multiple spheres embedded in narrative. This spheric relationality can also pertain to hybrid waters, such as infrastructural waters. Nikhil Anand (2017) develops a notion of hydraulic citizenship predicated upon the deep intertwinement, the entanglement, of the dynamic of infrastructural water in pipes and pumps, with citizens, technicians, politicians, plumbers: a complex vibrant and relational mix of stories, theories, facts, and experiences. In "Accidental Wild," I describe how the hybrid water of a flood control detention pond becomes a place for multicultural and multispecies encounters (Klaver 2015). The precondition for this relationality to happen is to not overcontrol the area, but to leave it relatively wild, indeterminate. At the same time, such a hybrid model assures that the detention

pond has enough room to rise and fall in the case of intense rain events and the rise of the creek, and to prevent flooding in town, which is designed, as are most modern towns, with concrete channels and impervious surfaces of streets and parking lots.

Jamie Linton, who coined the term modern water, shows how in the reduction of water to modern water the hydrosphere has become a strictly separated domain from the socio-sphere: "the hydrological cycle conditions an understanding that keeps water and people in separate, externally related spheres" (106). Within a meander, mētis, and riversphere approach, geometrical and homogenizing models of water give way to models of complexity and indeterminacy (Klaver 2017), thereby giving room to multiple materialities and relationalities. Based upon their work in the Lower Mississippi River Valley in the 1990s, landscape architects Anuradha Mathur and Dilip da Cunha came to see the river as an invention of colonizing practices in which land and water have become strictly separated. Da Cunha convincingly elaborates this perception in his book The Invention of Rivers: Alexander's Eye and Ganga's Descent. He contrasts the line of the river Ganges with the ubiquity of the rain-driven wetness of the goddess Ganga's descent from heaven. It contrasts a thinking in terms of unity of rivers with that of the indeterminacy of rain. He invokes a new imagination anchored in rain, in Ganga's descent, "one that drives the design of new infrastructure and an alternate edifice of myths, facts, ideas, practices and frameworks of critique" (2019, 293). Da Cunha's analysis entails a radical relearning of looking at the world.

> *Ganga does not flow as the Ganges does, in a course to the sea; she is rather held in soils, aquifers, glaciers, living things, snowfields, agricultural fields, tanks, terraces, wells, cisterns, even the air, all for a multiplicity of durations that range from minutes and days to centuries and eons. She soaks, saturates, and fills before overflowing her way by a multiplicity of routes. . . . The only anchor she offers people is the time of her descent. It is celebrated each year at the coming of the monsoon. (40)*

Da Cunha contrasts Ganga's descent with the invention of the river Ganges, created by Alexander's eye, that is, the eye of the conqueror Alexander the Great of Macedon. In 334 BCE he set out eastwards, not only with his army of soldiers but with an expedition of scholars, scientists, zoologists, surveyors, artists, and historians, collecting "new cartographic data" (25–27).

> *His campaign gathered information for science, described places, and affirmed ideas. More seriously, however, it called out a ground—an earth's surface constituted of land and water to begin with—that . . . was 'unknown even to the Indi.' It was perhaps Alexander's most lasting legacy . . . It involved articulating things with a line that could be drawn on a map, more conveniently perhaps than on the ground. (27)*

That line was the river. Alexander did not reach the Ganges, but gave the river its name, drew it on a map, brought it into existence (29). Still today, two millennia later, the lines he drew, the rivers he created, are "an essential feature not just in maps of India but on the ground in riverbanks, riverfront

projects, regulations, and flood control schemes" (30).

With the dominant creation of water in the shape of a line—a river—a worldview of dualistic thinking developed, including the dualism of land versus water. Only when such a line is drawn do floods appear. Floods don't exist beyond the line. Da Cunha radicalizes Klaus Jacob's stance that Hurricane Katrina is not a natural disaster but a man-made social, political, and engineering disaster. For da Cunha there are no natural disasters, only design disasters. Jamie Linton argued a similar position: there are no crises of water per se, but only crises of modern water. Da Cunha is convincing in his presentation of the river as a colonial invention.

Klaver, I.J. (2022) 'Radical Water', in K. De Wolff, R.C. Faletti, and I. López-Calvo (eds) Hydrohumanities: Water Discourse and Environmental Futures. Oakland: University of California Press, pp. 64–88.

hydrofeminism

Astrida Neimanis

Blood, bile, intracellular fluid; a small ocean swallowed, a wild wetland in our gut; rivulets forsaken making their way from our insides to out, from watery womb to watery world:

we are bodies of water.

As such, we are not on the one hand embodied (with all of the cultural and metaphysical investments of this concept) while on the other hand primarily comprising water (with all of the attendant biological, chemical, and ecological implications). We are both of these things, inextricably and at once – made mostly of wet matter, but also aswim in the discursive flocculations of embodiment as an idea. We live at the site of exponential material meaning where embodiment meets water. Given the various interconnected and anthropogenically exacerbated water crises that our planet currently faces – from drought and freshwater shortage to wild weather, floods, and chronic contamination – this meaningful mattering of our bodies is also an urgent question of worldly survival. In this book I reimagine embodiment from the perspective of our bodies' wet constitution, as inseparable from these pressing ecological questions.

To rethink embodiment as watery stirs up considerable trouble for dominant Western and humanist understandings of embodiment, where bodies are figured as discrete and coherent individual subjects, and as fundamentally autonomous. Evidence of this dominant paradigm underpins many if not all of our social, political,

economic, and legal frameworks in the Western world. Despite small glimmers of innovation, regimes of human rights, citizenship, and property for the most part all depend upon individualized, stable, and sovereign bodies – those 'Enlightenment figures of coherent and masterful subjectivity' (Haraway 2004 [1992]: 48) – as both a norm and a goal. But as bodies of water we leak and seethe, our borders always vulnerable to rupture and renegotiation. With a drop of cliché, I could remind you that our human bodies are at least two-thirds water, but more interesting than these ontological maths is what this water does – where it comes from, where it goes, and what it means along the way. Our wet matters are in constant process of intake, transformation, and exchange – drinking, peeing, sweating, sponging, weeping. Discrete individualism is a rather dry, if convenient, myth.

For us humans, the flow and flush 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. Referring to the always hybrid assemblage of matters that constitutes watery embodiment, we might say that we have never been (only) human (Braidotti 2013: 1; Haraway 1985, 2008). This is not to forsake our inescapable humanness, but to suggest that the human is always also more-than-human. Our wateriness verifies this, both materially and conceptually.

[...]

Particularly in the Anthropocene, with its growing indices of stratification, we need to unpick and confront the slide into homogenization – of women, of humans, of objects in general. The waters that we comprise are never neutral; their flows are directed by intensities of power and empowerment. Currents of water are also currents of toxicity, queerness, coloniality, sexual difference, global capitalism, imagination, desire, and multispecies community. Water's transits are neither necessarily benevolent, nor are they necessarily dangerous. They are rather material maps of our multivalent forms of marginality and belonging. The idea of the Anthropocene, in its most useful sense, places some demands upon humans to account for past actions and recalibrate present ones; Bodies of Water offers some imaginative tools for rising to this challenge. Yet, while an ethical self-help quick-fix may seem appealing, I orient my work more in line with Haraway's (2007: 15) claim that 'outcomes' are never guaranteed: 'there is no teleological warrant here, no assured happy or unhappy ending, sociologically, ecologically, or scientifically. There is only the chance of getting on together with some grace'. In other words, this book does not seek a romantic vision of watery repair, nor does it imagine ecojustice through a naive invocation that 'we are all the same water' – even if our joint implication within a hydrocommons is one of its key themes. Living ecologically demands more attention to difference, and any theory on the relationality of bodies of water must readily answer this demand. Again, as bodies of water,

‘we’ are all in this together (Braidotti 2002), but ‘we’ are not all the same, nor are we all ‘in this’ in the same way.

Neimanis, A. (2017) Bodies of Water: Posthuman Feminist Phenomenology. London: Bloomsbury Academic.

the cost of water

Andrea Ballesteros

Because of its universal multiplicity and predisposition to vary its material and abstracted forms, water often confounds any attempt at fixity (Helmreich 2015; Linton 2010). Water’s significance for the sustenance of life makes its symbolic meaning multiple (Strang 2006). But its material form is also multiple, destabilizing any schematic rendering of what a water body is. For one, water’s defining trait is its tendency toward the formless, its obsession with gravity, its material inclination to change. The French modernist poet Francis Ponge describes this condition by saying that “water collapses all the time, constantly sacrifices all form, tends only to humble itself, flattens itself onto ground” (Ponge and Brombert 1972: 50). Alternatively, we could say that it is not its lack of form but water’s magnificent capacity to take a huge variety of forms, the infinite metamorphoses it is capable of — spouts, streams, pools, fast or slow flowing, whipped into turbulence, pulled by the moon, soaking things, and finding its level at rest — that creates the challenge of finding ways to engage its significance for life (Marilyn Strathern, personal communication, April 6, 2018). This characteristic tendency toward morphological reinvention (Ballestero 2019) — water’s proclivity to flow, freeze, and vaporize — confounds the institutional and organizational protocols we use for its scientific exploration and political organization.

This kind of unstable relation between knowledge and material bodies is not unfamiliar to us. Feminist scholars of science and technology studies (sts) have taught us to think about it in

terms of the material-semiotic and to consider how corporeality is, at once, a force that shapes knowledge and a substance that is shaped by it.6 Bodies, human or watery, are not preexisting entities, nor are they purely ideological. They "are effected in the interactions among material-semiotic actors, human and not" (Haraway 1992: 298). Matter, as concept and thing, "is itself culturally and historically specific and, as such, contested terrain" (Willey 2016: 3).

Feminist sts scholarship has helped us see how the types of knowledge and tools doing the morphological work of defining material bodies are scientific. But we sometimes forget that they are also legal and economic and that all of these forms of knowing can work together to specify what water is. Regimes of exchange, for instance, accord certain materials with some values and properties but not others. The water in a bottle bought at a grocery store is a different substance from the water poured into a bottle from a well on public lands. It looks different, and often tastes different (Spackman and Burlingame 2018). Take the case of Ceará, where people in the rural areas install fences made of wire and dry wooden branches to create property lines. These fences often cut across water bodies, small or large ponds. When the dry season sets in, most water bodies dry out slowly, revealing to landowners that their carefully placed fences hang in the air, clinging to the shores of a pond that was, might again be, but has disappeared. These hanging fences now cut the air in two, as if mocking the figure of property, at once showing the violence and absolute fragility of the separations they produce. These appearing and disappearing water bodies, and the fences that cut them through, not only shape everyday household and agricultural routines by demarcating where water is accessible and for whom, they also reveal the seasonal specificities of legal and economic relations forged around the presumed stability of a property regime that allows landowners to sell water for profit, commodifying its life-granting properties. These cyclical transformations of sociomaterial forms marked by hanging fences capriciously activate and mute obligations, the movement of cattle, amity and dispute between neighbors, political relations of debt, and the power of the state to move water in cases of emergency. Property lines attempt to define water morphologically.

As this example reminds us, regimes of knowledge (science), obligation (law), and exchange (economy) constantly shape what we count as material. They determine the matter we enroll into relations of credit and debt, into the very definition of what a basic human need is, and into the categorization of nature as such. The point I wish to emphasize for us to keep in mind throughout this book is that in the making of matter, not only scientific word and measurement are entangled with substance (Barad 2003). Legal and economic forms of knowing also perform those kinds of material configurations and, more often than not, they do so from a distance.

From this point of view, apprehending water materially cannot be limited to a supposedly stable form of h2o from which we can infer cultural or political consequences of its presence or absence. Thinking about the materiality of water entails querying, first of all, what its corporeality might be, how something becomes a water body in a particular time and place, and how that body is always a technopolitical entity. It entails attending to how its contingent presence is brought about by much more than our scientific

capacity to comprehend bonds between hydrogen and oxygen (Sawyer 2017).7 As I will argue, we need to remain attentive to the capacity of technolegal devices to implode the supposed material certainty of the molecular. We need to trace water itself beyond pipes, dams, rivers, and oceans. Thus, in what follows, I focus less on watery scenes, fluid locations, and aquatic environments, and instead focus intentionally on water elsewhere, in places where we might not usually explore its material politics.

Diagnosing the existence of such entanglements between legal, economic, and scientific word and matter is not enough, though. Stopping at this diagnosis would leave us at the point where we should just be starting. One of my central interests is to think about what comes after material-semiotic entanglements have been diagnosed. What do people do when entanglements are part and parcel of their sense of the world? As I show, one of the things people do is to reflexively separate that which they encounter and understand as already knotted. They try to undo the entanglements they encounter. This returns us to the issue of how people create bifurcations amid the intense relationality of word and matter. The devices I study in this book help people transform fusions into momentary separations; they allow people to create separations to cut and redirect relations so that bifurcations can be effected. Furthermore, it is through their devices that people channel their efforts to theorize and organize the ethical responsibilities that emerge from the ontological surgeries they perform (Jasanoff 2011; Valverde 2009). Creating separations is sometimes the only ethical way out.

human rights, commodities, and the space between

During the first decade of the twenty-first century, the international establishment saw the idea that water should be a human right as contentious. All sorts of interpretations circulated about its implications. A water policy expert from the United Kingdom whom I met at the Stockholm Water Week in 2009 told me emphatically, "The problem is that those who want water to be a human right don't understand that somebody needs to pay to bring it to people's houses. They want water to be free. And that is just unviable." He was among the progressive proponents of universal access, yet he feared that such universalism could be made so profound that it would cause the financial collapse of the water sector. His worry was universal, totalizing. I was surprised by his argument, in part because none of the Latin American activists with whom I had worked for years had ever suggested that water should be completely free. They had a nuanced understanding of the financial and physical challenges of moving liquids across vast open landscapes or packed urban conglomerates — the difficulties of controlling pressure, flow, and leakage, and the monitoring toil of keeping water molecules as pure as possible. Yet the message that "activists" wanted water to be free carried a lot of weight and was mobilized by many to discredit the aspirations of those demanding more democratic access (see also Schmidt 2017).

By 2015, only six years after my conversation at the Stockholm Water Week, the terms of the debate had changed drastically. The international establishment seemed much more accepting of using human rights language to make the politics of water speakable. Perhaps this was

due to the fact that in 2010 the UN General Assembly officially recognized the existence of a human right to water and sanitation through resolution 64/292, which cited multiple preceding declarations, events, and projects showing that this was a decision long in the making (see figure i.3). Or maybe it was because eleven Latin American countries, among others around the world, had modified their constitutions or passed new water laws to formally recognize the human right to water (Mora Portuguez and Dubois Cisneros 2015). News about the passing of each law or constitutional reform circulated through the activist and water policy circles I was part of as evidence of a better future that would soon arrive. Human rights offered something of a counterweight to both the privatizing efforts that had swept the region during the 1990s and the hype for public – private partnerships to modernize water management of the 2000s.

A YouTube video of Nestlé's CEO, watched by thousands globally, provides more evidence of how quickly things had changed. The video showed a 2005 interview conducted in German with, depending on the version of the video you saw, a slightly different translation of the CEO's words. In all versions, however, he claimed that water should be managed through markets, like any other commodity, and should not be treated as a special right. A few years later, Nestlé's CEO reversed his position. Explaining that his former comments were taken out of context, he began presenting himself in venues such as the World Economic Forum as an avid supporter of the human right to water. Reversals like this have led people to regard human rights as weak anticapitalist tools. If, during the 1990s and early 2000s, activists and some water policy experts had trust in what the recognition of the human right to water could accomplish, today, their commitment is more nuanced. The boundary between a human right and a commodity is blurrier than ever. Nevertheless, they continue to push for the human right to water but with much more modest expectations.

The widespread worry over the commodification of water among the activists and experts I worked with is far from unwarranted, despite the slowing down of the privatizing fad of the 1990s. In the early 2000s, for instance, Fortune magazine reported that only 5 percent of the global water industry was in private hands, leaving a great potential for untapped business opportunities for the expansion of private enterprise. Global banks such as hsbc advertised their services by posing questions about the financial value of water, narrowing its existence to a luxury or a commodity (see figure i.4). Supplying water to people and industry was at the beginning of the twenty-first century a $400 billion-per-year business, equivalent to 40 percent of the oil sector (Tully 2000). More recently, RobecoSAM (2015), a financial company based in Switzerland that focuses on environmental and sustainability financial investments, considered water "the market of the future" and described its current financial landscape in the following terms: "Recent estimates put the size of the global water market at about USD591 billion in 2014. This includes USD203 billion from municipal capital expenditure, USD317 billion from municipal operating expenditure, USD1 billion from industrial capital expenditure, USD 37 billion from industrial operating expenditure, USD12 billion from point of use treatment and USD3.7 billion from irrigation. Market opportunities related to the water sector are expected to reach USD1 trillion by 2025" (20).

It is striking that of those US$591 billion that they calculated in 2015, US$500 billion are invested, allocated, or directly managed by municipal or public entities. While environmental analyses emphasize that most of the world's water, between 70 and 85 percent, is used for irrigation, the overwhelming majority of the "market share" RobecoSAM is interested in is public or municipal provision for human consumption and industrial use. In other words, the distribution and structure of the financial universe does not match the hydraulic universe. Tracing where most H2O flows to and from does not necessarily take us to the areas where most financial attention is put. This means that the way water prices are set, the legal categories countries adopt, and the quantity and types of subjects they recognize as users entitled to the human right to water are all decisions that directly shape desires for financial returns, international investments, and the global relation of water to capitalist wealth and profits. Financialization affects the routes, pressures, and qualities of the flow of water as well as the global accumulation and distribution of "market" opportunities to increase returns.

Ballesteros, A. (2019) A Future History of Water. Durham: Duke University Press.

wet ontology

Kimberly Peters and Philip Steinberg

Each wave, shaped by the wind, marks the water's surface and gives the sea not only (ever shifting) depth but also form—calm or angry, placid or brooding. These are variants on Serres's 'nautical murmur' that are both event and atmosphere, foreground and background. The sea presents us with a space that is emergent through a particular composition of matter and forces. In turn, this hydroelemental assemblage allows us to rethink motion and matter and how it shapes the world as we know it (Anderson, 2012; Lehman, 2013a; Peters, 2012; Steinberg, 2013).

Raban's designation of the sea as 'lumpy' alludes to a sense of three-dimensional form. As he describes, waves are "bulging, heaping ... an unruly brew of shifting planes and collapsing hillocks" (Raban, 1999, page 165). The sea here is both planar—horizontal, 'shifting' laterally—but likewise, it is vertical: moving upwards and downwards, rising and subsiding with height and depth. In the sea multiple mobilities engage each other in reciprocity (Adey, 2010), opening attention to unrecognised volumes of hydrospace (see Elden, 2013a); a mosaic of vertical, horizontal, and angular shapes that provisionally coalesce into a spherical voluminous realm of matter (Sloterdijk, 2011).

This construction of maritime assemblages is ripe with affective resonances and haptic engagements, as is exemplified by Anderson in his discussion of 'convergences' with the surfed wave:

"Surfers express their involvement with the place of the surfed wave in terms of being 'at one' with the amalgam of sea and swell, of 'merging' with this 'medium', of being 'intimately connected' to it. These affects do not refer to the execution of skills or to displaying the intense concentration that is associated with flow experiences; rather, they refer to a sense of union with the component parts of the surfed wave" (Anderson, 2012, page 580).

Whilst rationalists "turn away from the waves to admire the wave-born" (Serres, 1996, page 25) and romantics revel in the ocean's alterity (see Mack, 2011), those who actually engage the ocean, like sailors and, perhaps even more profoundly, surfers and swimmers, become one with the waves as the waves become one with them, in a blend of complementarity and opposition.

[...]

Water is simultaneously encountered as a depth and as a surface, as a set of fixed locations but also as an ungraspable space that is continually being reproduced by mobile molecules; water has a taken-for-granted materiality (liquidity, or wetness), but it is also just one of three physical states that exist in continual interchange (the other two being ice and vapour). Each of these properties can be ascribed to land as well (land too has depth, underlying mobility, and transformation across physical states), but in water these properties are distinct in the speed and rhythm of mobility, the persistent ease of transformation, and the enclosing materiality of depth. Thus, it would seem that water provides a fertile environment for rethinking the ways in which our political geographies emerge from—and impose themselves on—a dynamic, voluminous materiality.

Thinking of the sea as a space of volume, through a wet ontology, enables us to recognise that the form of water opens new territories of control and conflict. Whilst the legal control over seas and oceans has been much attended to in historical and contemporary contexts (notably, see Benton, 2010; Nyman, 2013; Steinberg, 2001), apprehending its territory as volume presents new discussions. No longer are struggles for space and resources fought on a planar level, relating to the protection of coasts through the security of flat, surface-level sea territory. Rather contestation has depth. The source of conflict is ever moving and impacted by the movement surrounding it (be it fish, oil, silt, or water molecules themselves). As Bear and Eden (2008) explore in their discussion of fishery certification schemes, the liquidity of the sea complicates control. Fishery certification zones are mapped, rendering the sea a flat space of areal dimensions. Yet these divisions fail to capture the mobility of either the water or the fish, and they reflect our inability to fully comprehend either in its essential mobility. Even attempts at mapping vertically fail. The drawing of lines through water in an attempt to constitute levels of legal authority fails to account for the dynamic fluidity of the various elements that constitute the marine assemblage.

[...]

To be sure, as Stefan Helmreich (2009; 2011) reminds us, there are dangers in employing the ocean as a 'theory machine'. Through focusing on the ocean as a fluvial, dynamic space that exists in opposition to the static categories of land, we may end up fetishising the ocean as a space of

'pure' natural processes, seamless transport, or romantic escape, or we may forget the ongoing connections between land and sea that make the sea much of what it is (Martin, 2013; Spence, 2014; Steinberg, 2008; 2015; forthcoming). It is not the liquidity of flows, in the material sense, that allows us to overcome land-based thinking. Indeed, as we have noted, seawater is not always liquid. Rather, our theoretical insights emerge from being attentive to how this materiality has itself been discursively placed within (and outside) terrestrial ontologies. The ocean's value as a 'theory machine' lies not in its existence as an object of alterity (whether real or imagined) but in the ways in which its materiality intersects with global political economies and territories, constructing a 'world interior of capital' that both facilitates and disrupts the flows that constitute expansive capitalism (Sloterdijk, 2013; see also Steinberg, 2009).

[...]

We suggest, in a similar vein, that attentiveness to the sea as a space of politics can upend received understandings of political possibilities and limitations. The ocean, as we have argued— through its material reformation, mobile churning, and nonlinear temporality— creates the need for new understandings of mapping and representing; living and knowing; governing and resisting. Like the ocean itself, maritime subjects and objects can move across, fold into, and emerge out of water in unrecognised and unanticipated ways.

It is in this context that we advocate thinking from the ocean as a means toward unearthing a material perspective that acknowledges the volumes within which territory is practised: a world of fluidities where place is forever in formation and where power is simultaneously projected on, through, in, and about space. A wet ontology can bring geographic theory to the sea, and bring the sea to geographic theory.

On the waves there may indeed be 'nothing but waves'. But if waves are understood in all their complexity—as forces, as vectors, as assemblages of molecules and meanings, as spaces of periodicity, randomness, instability and transformation, and as volumes (depths) and areas (surfaces)—then waves, and the wet ontology they exemplify, may be exceptionally well suited for understanding the politics of our watery planet.

Steinberg, P. and Peters, K. (2015) 'Wet Ontologies, Fluid Spaces: Giving Depth to Volume through Oceanic Thinking', Environment and Planning D: Society and Space, 33(2), pp. 247–264. Available at: https://doi.org/10.1068/d14148p.

holobionts

Donna Haraway

Sympoiesis is a simple word; it means "making-with." Nothing makes itself; nothing is really autopoietic or self-organizing. In the words of the Inupiat computer "world game," earthlings are never alone.1 That is the radical implication of sympoiesis. Sympoiesis is a word proper to complex, dynamic, responsive, situated, historical systems. It is a word for worlding-with, in company. Sympoiesis enfolds autopoiesis and generatively unfurls and extends it.

The vivid four-by-six-foot painting called Endosymbiosis hangs in the hallway joining the Departments of Geosciences and Biology at UMass Amherst, near the Life and Earth Café, surely a spatial clue to how critters become-with each other.2 Perhaps as sensual molecular curiosity and definitely as insatiable hunger, irresistible attraction toward enfolding each other is the vital motor of living and dying on earth. Critters interpenetrate one another, loop around and through one another, eat each another, 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. Another word for these sympoietic entities is holobionts, or, etymologically, "entire beings" or "safe and sound beings."

That is decidedly not the same thing as One and Individual. Rather, in polytemporal, polyspatial knottings, holobionts hold together contingently and dynamically, engaging other holobionts in complex patternings. Critters do not precede their relatings; they make each other through semiotic material involution, out of the beings of previous such entanglements. Lynn Margulis knew a great deal about "the intimacy of strangers," a phrase she proposed to describe the most fundamental practices of critters becoming-with each other at every node of intraaction in earth history. I propose holoents as a general term to replace "units" or "beings."

Like Margulis, I use holobiont to mean symbiotic assemblages, at whatever scale of space or time, which are more like knots of diverse intra-active relatings in dynamic complex systems, than like the entities of a biology made up of preexisting bounded units (genes, cells, organisms, etc.) in interactions that can only be conceived as competitive or cooperative. Like hers, my use of holobiont does not designate host + symbionts because all of the players are symbionts to each other, in diverse kinds of relationalities and with varying degrees of openness to attachments and assemblages with other holobionts. Symbiosis is not a synonym for "mutually beneficial." The array of names needed to designate the heterogeneous webbed patterns and processes of situated and dynamic dilemmas and advantages for the symbionts/holobionts is only beginning to surface as biologists let go of the dictates of possessive individualism and zero-sum games as the template for explanation.

Haraway, D.J. (2016) Staying With the Trouble: Making Kin in the Chthulucene. Durham: Duke University Press.

microplastics and corals

Ocean2100 team — Marvin Rades, Patrick Schubert, Thomas Wilke and Jessica Reichert

Microplastics are omnipresent in the oceans and threaten marine animals through physical contact or ingestion. Short-term studies have already shown that reef-building stony corals respond differently to microplastics than natural food. However, it remains unknown whether corals exhibit acclimation mechanisms to combat the effects of microplastic exposure. Specifically, the long-term effects of microplastics on the feeding and defense behavior of reef-building corals remain unexplored. Therefore, the goal of this study was to infer potential acclimation mechanisms in the behavior of the corals. For this, four reef-building species (Acropora muricata, Porites lutea, Pocillopora verrucosa, and Heliopora coerulea) were exposed in a long-term experiment to microplastics for 15 months. Subsequently, coral feeding rates on microplastics and natural food (Artemia sp. cysts), feeding discrimination, and reactions to both were assessed in a 24 h pulse exposure experiment. The results showed that corals' feeding rates did not decrease after long-term exposure to microplastics. Similarly, the feeding discrimination (i.e., ratio of feeding on microplastics and natural food) did not differ after long-term exposure to microplastics. Moreover, corals showed no changes in defense behavior (i.e., mucus production or extrusion of mesenterial filaments) against microplastics. These findings suggest that symbiotic, reef-building corals do not develop mechanisms to adapt to long-term microplastic exposure. Thus, microplastic pollution might constitute a constant stressor for coral organisms, likely leading to sustained energy expenditures and impaired health.

[...]

Corals Do Not Adapt Feeding Mechanisms to Decrease Microplastic Uptake

Our results indicate that corals do not exhibit heterotrophic plasticity in response to long-term microplastic exposure as feeding rates remained unaltered after long-term microplastic exposure (research question I). To avoid stress potentially caused by long-term microplastic exposure, corals would need to either reduce their feeding rates in general or increase their feeding selectivity. However, unchanged feeding rates suggest that the corals studied do not possess or do not activate mechanisms of heterotrophic plasticity to reduce microplastic uptake in response to long-term exposure to microplastics.

Heterotrophic feeding activity has been found to shift (Hughes and Grottoli, 2013; Fox et al., 2019) under certain environmental stresses (e.g., heat stress, turbidity, or ocean acidification; Anthony and Fabricius, 2000; Bessell-Browne et al., 2014; Towle et al., 2015; Pupier et al., 2021). However, microplastics apparently do not trigger mechanisms of heterotrophic plasticity to reduce microplastic uptake. This suggestion is in line with Axworthy and Padilla-Gamiño (2019), who showed that microplastic feeding rates did not change in response to temperature stress. Furthermore, the findings of the short-term study by Chapron et al. (2018), in which Artemia capture rates remained unchanged after microplastic exposure conditions, are

confirmed by our findings. A lack of adaptation to changing environmental conditions suggests that as concentrations increase, microplastic particle uptake might also increase linearly, possibly as seen for suspended particulate matter (Anthony, 1999; Anthony and Fabricius, 2000) or suspended sediments (Anthony, 2000).

After offering both types of particles independently, we found that the corals ingested the natural food at a higher rate than microplastics. In general, these findings are consistent with previous studies (Axworthy and Padilla-Gamiño, 2019; Savinelli et al., 2020), although there is also a counterexample (Rotjan et al., 2019). Yet, particle numbers deviated (SD) in average by 38 microplastic particles and 141 Artemia sp. cysts in the pulse exposures. Thus, the sometimes even negative feeding rates are a result of the mathematical approach used to quantify the feeding rates, and indicate low or no the feeding during the pulse exposure.

Long-Term Exposure Does Not Lead to Better Discrimination Between Microplastics and Natural Food

Our results also suggest that corals do not better discriminate between microplastics and natural food (research question II). The number of microplastics fed per Artemia cyst remained unchanged for all species. This result indicates that corals were not more effective in avoiding microplastic ingestion after longterm exposure. Although corals generally fed fewer microplastics than natural food, discriminatory ability did not improve further. The basic discriminatory ability of corals leading to higher feeding rates on natural food has been previously shown for reef-building corals (Hall et al., 2015; Martin et al., 2019) but seems to be species-specific as indicated by other studies (Allen et al., 2017; Rotjan et al., 2019). Chemical stimuli might mediate the discrimination process (Houlbrèque and Ferrier-Pagès, 2009). Microplastic feeding may be triggered by both biofilm or plastic-related stimulants (Allen et al., 2017; Diana et al., 2020). It can be assumed that the biofilm on the particle mainly drives microplastic uptake, as most studies indicate that particles covered with a biofilm are more likely to be ingested than pristine particles (Corona et al., 2020; Weideman et al., 2020). A comparison with sediments supports this concept: particles that are perceived as a source of nutrients due to microbiota colonization are more likely to be taken up by corals than sediments that are poor in nutrients (Mills et al., 2004).

Rades, M. et al. (2022) 'Reef-Building Corals Do Not Develop Adaptive Mechanisms to Better Cope With Microplastics', Front. Mar. Sci., 9(863187). Available at: https://doi.org/doi: 10.3389/fmars.2022.863187.

eurythenes plasticus

Johanna N. J. Weston, Priscilla Carrillo-Barragan, Thomas D. Linley, William D. K. Reid and Alan J. Jamieson

Eurythenes (S. I. Smith in Scudder, 1882) are one of the largest scavenging deep-sea amphipods (max. 154 mm) and are found in every ocean across an extensive bathymetric range from the shallow polar waters to hadal depths. Recent systematic studies of the genus have illuminated a cryptic species complex and highlighted the benefits of using a combination of morphological and molecular identification approaches. In this study, we present the ninth species, Eurythenes plasticus sp. nov., which was recovered using baited traps between the depths 6010 and 6949 m in the Mariana Trench (Northwest Pacific Ocean) in 2014. This new Eurythenes species was found to have distinct morphological characteristics and be a well-supported clade based on sequence variation at two mitochondrial regions (16S rDNA and COI). While this species is new to science and lives in the remote hadal zone, it is not exempt from the impacts of anthropogenic pollution. Indeed, one individual was found to have a microplastic fibre, 83.74% similar to polyethylene terephthalate (PET), in its hindgut. As this species has a bathymetric range spanning from abyssal to hadal depths in the Central Pacific Ocean basin, it offers further insights into the biogeography of Eurythenes.

[...]

The finding of a microplastic fibre in the hindgut of a juvenile was not unexpected. Deep-sea scavenging am-phipods, as an adaption to their food limited environment, indiscriminately consume carrion (Blankenship & Levin 2007) and are known to inadvertently ingest microfibres present in the carrion and sediment (Jamieson et al. 2019). The detection of a microplastic adds to the number of hadal scavenging amphipods, including adult specimens of H. gigas from the Mariana Trench and Eurythenes sp. 'hadal' the Peru-Chile Trench (Jamieson et al. 2019), which have been found to have consumed plastic microfibers. Microplastic consumption by a juvenile indicates that scav-enging amphipods are potentially ingesting microplastics throughout their life, which could pose acute and chronic health effects. While the ecotoxicological impacts of microplastic exposure has yet to be investigated on deep-sea amphipods, early work on other Malacostraca indicates that the ingestion of polypropylene fibres by the sand crab, Emerita analoga, increases adult mortality and decreases in retention of egg clutches (Horn et al. 2019).

This study adds to the growing body of literature on marine organisms ingesting plastic and microfibers (Bes-seling et al. 2015; Lusher et al. 2015; Bellas et al. 2016; Alomar & Deudero 2017). The microplastic found in the hindgut of E. plasticus sp. nov. was most similar to PET, which is one of the top five most prevalent synthetic plastic polymers produced and discarded globally (Geyer et al. 2017). Without substantial global changes to the life cycle of plastic, from reducing the rate of plastic production to improving waste management (Forrest et al. 2019), plastics and microfibres will continue to be transported to the deep sea and be ubiquitous in the hadal food chain for the foreseeable future.

Weston, J.N.J. et al. (2020) 'New species of Eurythenes from hadal depths of the Mariana Trench, Pacific Ocean (Crustacea: Amphipoda)', Zootaxa, 4748(1), pp. 163–181. Available at: https://doi.org/10.11646/zootaxa.4748.1.9.

queer futurity of plastics

Heather Davis

Plastic is a curious substance. The first fully synthetic polymer was made in 1907 by Leo Bakeland and patented in 1909. Made to replace other materials that were becoming increasingly scarce, it fueled an era of mass consumerism and the cheap replication and distribution of goods. Plastic is a generic category that describes about twenty different types of polymers. The five families of commodity plastics that make up about seventy-five percent "of the roughly one hundred billion pounds of plastic produced and sold annually in the United States . . . date from the golden age of polymer innovation, the years bookending World War II" (Freinkel 2011, 62). These families are: polyethylene (PET, HDPE, LDPE), which is primarily used for plastic bags, films, and bottles; polyvinyl chloride (PVC), which comes in a rigid form that is used for pipes, doors, windows, and bottles, and in its flexible form appears as inflatable objects, toys, and imitation leather; polypropylene, which is used in a range of materials, often in textiles; polystyrene, most commonly associated with Styrofoam but which is also found in CD cases and "clamshell" containers; and polycarbonate, which is used in electronics, phones, as building materials, and in automotive and airplane construction. In the process of manufacturing these various polymers, other chemicals, called plasticizers, are added to make plastic heat resistant, or pliable, or, in the case of the dildo, orange. These chemicals, because they are not a part of the incredibly stable polymer bond that define plastics, often leach or off-gas into the

wider environment. I will return to this problem later on.

Plastic can be understood as a magical substance, seemingly without essence. It can morph and shift into nearly any shape, become or replace almost any object. Its form and substance are one. It is all surface, all the way through. As Roland Barthes says in his short essay on plastic: "Its reality is a negative one: neither hard nor deep, it must be content with a 'substantial' attribute which is neutral in spite of its utilitarian advantages: resistance, a state which merely means an absence of yielding" (1972, 98). And this, I argue, is the trick of plastic. Through its seductive surface, its alchemical qualities, its mutability, we treat plastics as if they are ephemeral, somehow vanishing into the ether after they have been discarded. This notion of plastic is reflected in its etymology, which refers to the ability to be molded, shaped, or formed. Further, the common metaphorical associations of plastic with plasticity seem to reinforce its alchemical quality of endless transformation. We speak of the plasticity of culture, and use plastic as a metaphor to describe the adaptability of an organism to its environment, or the neural connections in our brains. But this notion of plasticity, and the appearance of plastic in virtually any form, serves to obfuscate the fact that plastic is actually incredibly durable, incredibly resistant. Plastic engages in brief, and sometimes quite spectacular, transformations at the beginning of its life cycle, but then is discarded, left with a molecular structure that holds onto its stability at all costs. It may influence its environment greatly, but remains immune to that environment's influence. Where other materials are subject to decomposition, plastic exists outside of the proper logics of decay and transformation, in its own category of creation, where microbes and bacteria have not yet widely evolved to use its incredible energy sources.

Plastics, their smooth surfaces begging to be touched, caressed, squeezed, and bent, operate within what Tom Cohen has called the "Ponzi scheme logics of twenty-first century earthscapes [which] portray an array of time-bubbles, catastrophic deferrals, telecratic capture, and a voracious present that seems to practice a sort of tempophagy on itself corresponding with its structural premise of hyper-consumption and perpetual 'growth'" (2012, 14). Plastic is the ultimate material of tempophagy, or time-eating, one that consumes the compressed bodies of ancient plants and animals, a process that took thousands of years, only to be transformed into a single-use take-out container. But as we know, the debts that we accumulate always demand to be repaid, with interest, and in this case the payment will be of the flesh. Rob Nixon (2011) has called this same paradigm one of slow violence, where violence is displaced and extended over time. Slow violence is difficult to represent as violence because the relationship between cause and effect often appears much later, or, as is the case with the bioaccumulation of persistent organic pollutants, in completely different organisms. Slow violence permeates national borders, exporting the deleterious effects, such as sorting of plastic waste, across the globe, while manufacturing plastic in the poorest areas of the United States. The difficulty of naming plastic pollution as a form of violence is the dispersed relationship of cause and effect: a particular illness or sensitivity induced by chemical exposure is hard, if not impossible, to trace back to a specific product, company, or even a specific chemical, given the fact that we are never exposed to just one chemical at a time. But this slow, attritional violence is precisely that which

plastic, and plastic pollution, enacts: one that is not concentrated in a spectacular mediatized image, but rather distends over the surface of the planet, slowly accumulating.

Although plastics appear as mere surface, designed to be discarded, and are associated metaphorically with change and malleability, plastics are actually extremely obdurate materials, persisting, in the best estimates, for up to one hundred thousand years. In fact, the presence of plastic is one of the proposed markers of what is (unofficially) being called the Anthropocene. If the Anthropocene designates an era where human activity, under specific economic and political conditions (an era that scholars such as Jason Moore, Andreas Malm, and Donna Haraway have suggested would more properly be called the Capitalocene), has become the predominant factor in the chemical and geological makeup of the earth, then plastic is certainly a part of this. Among the possible markers for the beginning of the Anthropocene are the radionuclides that appeared with the first explosion of a nuclear bomb, the polyaromatic hydrocarbons from burning fossil fuels, lead contamination from petroleum, and plastic, all of which have left marks on the earth (Sample 2014). And, if part of what the Anthropocene asks of us, in its structural logic, is an imaginative enterprise to project into the future a geologist, archaeologist, or other interested person who will then examine the geologic record, plastic will definitely be a part of the embedded constitution of the earth, recording its arrival at the beginning of the twentieth century and its incredible ascension and proliferation from that point on.

In fact, a new form of rock has already been designated under the term "plastiglomerate."

Plastiglomerate refers to an "indurated, multi-composite material made hard by agglutination of rock and molten plastic. This material is subdivided into an in situ type, in which plastic is adhered to rock outcrops, and a clastic type, in which combinations of basalt, coral, shells, and local woody debris are cemented with grains of sand in a plastic matrix" (Corocan, Moore, and Jazvac 2013, 6). In addition to the ways in which plastic participates in the chemical transformation and composition of the soil, air, and water, through its manufacture and waste cycles, plastic here is literally etched into the rock, becoming rock. This type of matter is emblematic of an era where it is impossible to disentangle the "natural" from sociopolitical and economic formations. But despite the dramatic visibility of plastic literally becoming part of geology, it is in water that plastic really becomes a problem.

And here we come back to the fish. An object of pleasure becomes an object of slow starvation, lodged in the fish's stomach. Most plastic waste, as the dildo illustrates, ends up in the oceans. This happens through a variety of mechanisms: plastic gets inadvertently blown from garbage trucks into lakes and rivers, where it then follows streams and sewage pipes out to the ocean, eventually ending up in one of the five gyres that are now known colloquially as the "garbage patches"; it can also enter the water supply directly by way of microbeads found in cosmetics and by washing synthetic clothes, where up to two thousand plastic fibers come off per wash and go down the drain (Youngsteadt 2011). Most of the plastics that end up in the ocean, unlike the perfectly intact dildo, are incredibly small. For although plastic doesn't biodegrade, it does photodegrade (exposure to the sun causes it to break down) and it cracks, breaks, and tears with use. These

fragments get smaller and smaller but they do not go away. "Microplastics"—plastics that are less than five millimeters—are becoming rafts of biodiverse ecologies for bacteria and viruses. Dubbed the "plastisphere," more than a thousand different species were found to be living on a single piece of microplastic (Zettler, Mincer, and Amaral-Zettler 2013). It is unknown whether these bacteria and viruses were eating the plastic, or merely found it a perfect milieu. But in time, it is quite likely that these vibrant attached communities may develop complex bacterial societies, flourishing on their synthetic surfaces, eating each other and the vast sources of unlocked carbon energy, mutating and evolving. While it might not immediately appear to be startling to create new forms of microbial communities, microbiologist Ed DeLong asserts that, "Microbes are responsible for the health of the oceans. They shape the chemistry of the sea and the atmosphere. These organisms that we can't even see are extremely important. These little guys control the biogeochemistry of our world. They are the stewards of our planet" (quoted in Helmreich 2009, 1–2). Given this, the fact that plastic is radically reshaping the ecological communities of the oceans will have significant impact on the rest of the oceanic ecosystem, and the earth as a whole. "Microbial oceanographers argue that marine microbes are central to life on Earth, that the lowly microbe constitutes a force of leviathan significance" (Helmreich 2009, 5). It is impossible to say what impact microplastics will have, but it is certain that that impact, given the amount of plastic in the oceans currently and its projected increase, will be quite drastic.

In the proliferation of the plastisphere, the worlds of the megafauna, our world, may disappear. There is a strange way in which the future that we are inadvertently heralding may turn out to be much like the deep past. The incredible amount of plastic in the oceans may act not so dissimilarly from the runoff from agricultural production, as their chemical composition is closely related: causing massive algae blooms and consequent dead zones. As paleontologist Jeremy Jackson notes: "dead zones reverse the achievements of more than half a billion years of evolution to take us back to the Precambrian Era before the rise of animals" (quoted in Helmreich 2009, 13). The proliferation of complex bacterial societies may bring about all kinds of changes, but it seems unlikely that the continued accumulation of plastics in the oceans will be beneficial for humans or many other species. Plastic, as it becomes a part of the ocean, with its own ecologies, makes it impossible to clearly distinguish between the "natural" and "cultural." As Stefan Helmreich notes: "Human biocultural practices flow into the putatively natural zone of the ocean, scrambling nature and culture, life forms and forms of life" (2009, 13). For this reason, Nancy Tuana (2007) insists on an epistemological resistance to the cleavage of the natural from the cultural, instead offering a feminist "interactionism" of viscous porosity, one where the rearranged molecules that are created in factories drastically reshape human and other-than-human worlds alike.

Davis, H. (2015) 'Toxic Progeny: The Plastisphere and Other Queer Futures', philoSOPHIA, 5(2), pp. 231–250. Available at: https://doi.org/10.1353/phi.2015.a608469.

neuroplasticity

Catherine Malabou and Hans Ulrich Obrist

Hans Ulrich Obrist (HUO): Now, to address the theme of this interview and AI, I was curious what gave you the epiphany to go into this idea of 'plasticity'. I hear that actually Goethe was quite important for you on this trajectory, the German writer Johann Wolfgang von Goethe.

Catherine Malabou (CM): The 'inventors' of plasticity are Goethe and Hegel. Before Goethe, the two words plastisch and Plastik existed, but not Plastizität: Goethe coined the term. Plasticity meant the suppleness of the child to be formed through education. But the first thinker to confer this term a philosophical value was Hegel in the Phänomenologie des Geistes, where he says that subjectivity is plastic.

I wrote my PhD on the importance of plasticity in Hegel, because it seemed to me that this dimension of his philosophy had been totally under-perceived. Then just afterwards, I discovered that plasticity was a central term in neurobiology. At the time, I didn't know anything about that, so I started reading, asking, 'What does that mean, that the brain is plastic? Is there a link between Hegel and neurology?' and I discovered that there were lots of connectors.

The main connection is that plasticity designates transformation within a system. That is, if you take a closed system, like the nervous system, it is said to be plastic because it moves and transforms itself from the inside, and when it receives something from the outside, it integrates it into its own internal processing. I wanted to know more about neurology, so I read more and more. Then I concluded that there was no reason why we should separate the brain from spirit or the mind, so this is how it started. For me, it was quite a revolution.

[...]

HUO: Now, this is interesting, because it brings us to art. Whenever I talk to an artist, whether they do a painting or a sculpture or a film or whatever is the outcome, they basically say that the work transforms them, Now, this means it has to do with plasticity, and you coined this sentence, 'No to flexibility, and yes to plasticity!' Can you explain that to me?

CM: In management literature, one can clearly see that the vocabulary of the brain is now used to designate the new modalities of the market, and the new business organisation as a descentralised architecture. The boss is never present, everybody can work from home—and the new metaphor for this new type of organisation is a big brain. I noticed that the adjective often used was 'flexible'. Flexibility means the capacity to be bent in all directions, to be obedient, without resisting. In physics of materials, there is a great difference between flexibility and plasticity: the flexible material can be twisted in all directions without breaking; rather, a plastic material is a material that cannot find its first form, once deformed. Plasticity includes resistance to deformation.

For example, if you take clay, you can form a statue. But once its formed, the statue cannot go back to its initial shape. If you take something flexible, like plasticine, you can do whatever you want, and you erase the first form. So, when management uses this term 'flexible', it means that we are supposed

to transform ourselves into all sorts of beings, without resisting, and we can be formed again and again, without resistance. I think flexibility is the ideological mask of plasticity.

Malabou, C. and Obrist, H.U. (2021) 'Plasticity, Intelligence and Mind', in B. Vickers and K. Allado-McDowell (eds) Atlas of Anomalous AI. London: Ignota Books.

our own inner abyss

Vilém Flusser

More expeditions will also need to be undertaken into our own inner abyss, into the insufficiently studied ocean of our social and biological origins. Regarding such expeditions, we have only recently come to appreciate that the specific port of departure is more or less irrelevant. Whether manned by psychologists, cultural critical, geneticists, molecular biologists, or neurophysiologists, each of these differently equipped vessels will begin to encounter one another soon after they have submerged below the surface. Down below, all superficial categories converge and intertwine, to the extent that it seems pointless to insist upon clear disciplinary boundaries. Sooner or later—alone or with others—each of these expeditions will encounter the depths of the ocean, indistinguishable from the depths within ourselves.

Vilém Flusser and Louis Bec (2012) Vampyroteuthis Infernalis: A Treatise, with a Report by the Institut Scientifique de Recherche Paranaturaliste (1987). Translated by Valentine A. Pakis. Minneapolis: University of Minnesota Press.

humid telepathy

Juan Pablo Pacheco Bejarano

When I mention the word telepathy to those close to me, the most common image that springs to mind is that of one person transmitting precise information to another—usually a word or a number—without the need for language. Telepathy seems to involve direct communication that does not depend on the translation processes of common mediation. This understanding of telepathy is closely related to a long-standing ambition of modern technoscience: to eliminate the apparent limitations of distance and increase the speed of transmission. The common use of the preposition tele, which accompanies almost all inventions of electronic communication, seeks to emphasize this distance eliminated by technical devices: television, telematics, telephone, telegraph, and recently, due to the pandemic of COVID-19, teleshopping, teleworking, telemedicine or tele-education. Rather than reminding us of the time and space that our information traverses as it travels through the network, the common use of the preposition highlights our ability to eliminate distance in seeing, speaking, writing, shopping, and working. The modern imagination understands telepathy—the ability to sense the other and the world at a distance—from the elimination of that distance between the bodies sending and receiving a message. In this way, the extraction and transmission of information is maximized and the illusion that capital can be detached from the material world, floating from cloud to cloud, from abstraction to abstraction, is strengthened.

However, the electronic revolution relies on a series of material infrastructures interconnected

at a planetary level. Between millions of devices, thousands of data centers, and hundreds of undersea cables, the digital cloud is more like a colossal kraken on the seabed extending its tentacles over land. The term infrastructure is commonly understood as a stable, material background on which social relationships develop. Yet, infrastructure is a relational concept that allows us to sense the hidden processes that we usually take for granted. Even more, it refers to the network of symbolic and material systems that give meaning to reality (Star and Bowker, 2006). Although modern infrastructures aspire to the homogenization of procedures by concealing their presence from our visual and narrative spaces, technology and its tangible systems are an active agent of the material and symbolic relations of the spaces and times they occupy. In this sense, reflecting on technological infrastructures allows us to see the relations that occur in the spaces in between, and to invoke the kraken-machine on which the digital revolution depends.

[...]

In his phenomenological study on the gestures of modernity, Vilém Flusser suggests that the prefix tele implies our approach to distance, an intersubjective dimension of relating (Flusser, 2014). The distant always implies the near, the possibility of understanding what concerns and affects us, what binds us with that which we cannot see and do not experience up close. Thus, when we know something that is different or distant, we are, at the same time, knowing what is familiar and close. Flusser's words ripple the lands of this first port, inviting me to think of telepathy from a more complex dimension of communication, beyond the suppression of distance and time between the nodes of a network. In a more voluminous and profound sense, telepathy refers to our relationship with otherness and the capacity we have to engage in relationships with what is different and distant to us, both in the material and immaterial dimensions. Unlike the obsession of modern technoscience with optimizing the transfer of discernible information, the telepathy that interests me refers to the capacity of bodies to sense at a distance; in other words, by pathos as the center of communication. I will return later to the question of the body in relation to telepathic communication.

Although the electronic telepathy that we perform with our computers seems to eliminate what is in-between, distance always implies a spatial and temporal interstice that we cross, both at high and low speeds, between us and that which interests us, that which affects us. In the space between the visible and the invisible, conceiving telepathy from a relational and material perspective allows us to imagine beyond the division between subjects, objects, and their material environments, a logic that characterizes both coloniality and modernity (Mignolo, 2011). Technology constantly dialogues with the biological and geological substrates it traverses and which, to a large extent, sustain it. Energy and matter are inseparable. In order to reformulate our relationship with technology it is imperative to make this shift toward the connections between digitality and materiality. In other words, my interest lies in understanding what sustains the possibility of telepathy, from servers and undersea cables, to the water, minerals, and plants that allow us to store and care for our shared memories. Human beings participate in this web of energetic transference, that surpasses us and at the same time embraces us, from where knowledge is generated and transmitted on a

planetary level.

[...]

To humidify telepathy is, then, to see what is in-between rather than ignoring it and trying to eliminate it. Electrical impulses, one of the many forms in which planetary consciousness manifests, cannot be separated from particular territories and their material infrastructures. Submarine cables, data centers, windmills, and hydroelectric plants are bodies linked to the body of the earth and to our own bodies. Downey reminds us that "electromagnetic energy is a river of undulating material. This radiant nature is shared by thoughts, artificial intelligence and video, and explains the very life of the Universe we inhabit" (2013a, p. 265). My proposal is that we immerse ourselves and swim in this consciousness, in its multiple volumes. This way of approaching water allows us to reimagine how we contain it and how it contains us, and thus rescue the possibility of caring for what is distant and different from us.

Deep and expanded reflection with water is essential to reimagine and reshape our relationship with technology. In principle, because water is essential: it is the substance that keeps life in constant movement and transmutation. Water allows us to feel the interconnectedness between every organic and inorganic body as wet matter. From the osmosis that permits the exchange of solvents between cells to the water cycle that connects distant territories, water sets in motion the metabolisms of energetic and material exchange that make up the planetary biosphere. The wet relations of amniotic, salivary, rainy, tropical, and stagnant liquids are part of this telepathic dimension of water, a technology of connection with otherness at a distance.

Water—be it liquid, solid or gaseous—is an archive of life, an intercontinental, interplanetary, and intertemporal telepathic communication system. Water is an intelligent network, a constantly transforming source of knowledge, transforming geological formations from the highest mountains to the deepest trenches at the bottom of the ocean.

Water also organizes the world as a voluminous field: up and down, surface and depth, back and forth, right and left, inside and outside. In the ocean, the configuration of surface and depth are in constant flux. The one becomes the other in a continuous intensity of motion. Depth rises to the surface only to descend again; surface submerges and becomes depth. In this sense, water connects us to other geological layers and to the passage of time: a spatial and temporal connector. The wet ontology proposed by Phillip Steinberg and Kimberly Peters rightly invites us to embrace the depth and volume of the ocean as crucial elements to destabilize fixed and solid categories, from the ways in which we are implicated with multiple bodies and systems (Steinberg and Peters, 2015).

More than wet, humid refers to that in-between space between solid and liquid. Although the artist Roy Ascott spoke in the 1990s about moist media to refer to biotechnology, the humidity I speak of is closer to that felt in the tropics; that sticky sensation on the skin when we are in tropical forests that invites us to engage with our surroundings. Tropicalizing technology is, then, recognizing the sticky and humid encounter between bodies at a distance, a sensation that goes beyond the desire to understand. Humid telepathy is that encounter of love that does not apprehend, that appreciates but does not dominate. It is the listening to the sensory noise

of our environment. When we allow ourselves to enter into contact with water in a conscious and present way, an inexhaustible source of information is activated.

Pacheco Bejarano, J.P. (2024, upcoming) 'Humid Telepathy', in C. Bernard (ed.) Digging Earth. Cambridge (UK): Ethics Press.

the new atlantis

Coming back from my Wilderness Week I sat by an odd sort of man in the bus. For a long time we didn't talk; I was mending stockings and he was reading. Then the bus broke down a few miles outside Gresham. Boiler trouble, the way it generally is when the driver insists on trying to go over thirty. It was a Supersonic Superscenic Deluxe Longdistance coal-burner, with Home Comfort, that means a toilet, and the seats were pretty comfortable, at least those that hadn't yet worked loose from their bolts, so everybody waited inside the bus; besides, it was raining. We began talking, the way people do when there's a breakdown and a wait. He held up his pamphlet and tapped it — he was a dry-looking man with a schoolteacherish way of using his hands — and said, "This is interesting. I've been reading that a new continent is rising from the depths of the sea."

The blue stockings were hopeless. You have to have something besides holes to darn onto.

"Which sea?"

"They're not sure yet. Most specialists think the Atlantic. But there's evidence it may be happening in the Pacific, too."

"Won't the oceans get a little crowded?" I said, not taking it seriously. I was a bit snappish, because of the breakdown and "because those blue stockings had been good warm ones.

He tapped the pamphlet again and shook his head, quite serious. "No," he said. "The old continents are sinking, to make room for the new. You can see that that is happening."

You certainly can. Manhattan Island is now under eleven feet of water at low tide, and there are oyster beds in Ghirardelli Square.

"I thought that was because the oceans are rising from polar melt."

He shook his head again. “That is a factor. Due to the greenhouse effect of pollution, indeed Antarctica may become habitable. But climatic factors will not explain the emergence of the new — or, possibly, very old — continents in the Atlantic and Pacific.” He went on explaining about continental drift, but I liked the idea of inhabiting Antarctica and daydreamed about it for a while. I thought of it as very empty, very quiet, all white and blue, with a faint golden glow northward from the unrising sun behind the long peak of Mount Erebus. There were a few people there; they were very quiet, too, and wore white tie and tails. Some of them carried oboes and violas. Southward the white land went up in a long silence toward the Pole.

[...]

I used to go out to the dark sea, often, as a child, falling asleep. I had almost forgotten it with my waking mind. As a child all I had to do was stretch out and think, “the dark sea . . . the dark sea . . .” and soon enough I’d be there, in the great depths, rocking. But after I grew up it only happened rarely, as a great gift. To know the abyss of the darkness and not to fear it, to entrust oneself to it and whatever may arise from it — what greater gift?

~

We watched the tiny lights come and go around us, and doing so, we gained a sense of space and of direction — near and far, at least, and higher and lower. It was that sense of space that allowed us to became aware of the currents. Space was no longer entirely still around us, suppressed by the enormous pressure of its own weight. Very dimly we were aware that the cold darkness moved, slowly, softly, pressing against us a little for a long time, then ceasing, in a vast oscillation. The empty darkness flowed slowly along our unmoving unseen bodies; along them, past them; perhaps through them; we could not tell.
Where did they come from, those dim, slow, vast tides? What pressure or attraction stirred the deeps to these slow drifting movements? We could not understand that; we could only feel their touch against us, but in straining our sense to guess their origin or end, we became aware of something else: something out there in the darkness of the great currents: sounds. We listened. We heard.

So our sense of space sharpened and localized to a sense of place. For sound is local, as sight is not. Sound is delimited by silence; and it does not rise out of the silence unless it is fairly close, both in space and in time. Though we stand where once the singer stood we cannot hear the voice singing; the years have carried it off on their tides, submerged it. Sound is a fragile thing, a tremor, as delicate as life itself. We may see the stars, but we cannot hear them. Even were the hollowness of outer space an atmosphere, an ether that transmitted the waves of sound, we could not hear the stars; they are too far away. At most if we listened we might hear our own sun, all the mighty, roiling, exploding storm of its burning, as a whisper at the edge of hearing.

A sea wave laps one’s feet. It is the shock wave of a volcanic eruption on the far side of the world. But one hears nothing.

A red light flickers on the horizon. It is the reflection in smoke of a city on the distant mainland, burning. But one hears “nothing.

Only on the slopes of the volcano, in the suburbs of

the city, does one begin to hear the deep thunder, and the high voices crying.

Thus, when we became aware that we were hearing, we were sure that the sounds we heard were fairly close to us. And yet we may have been quite wrong. For we were in a strange place, a deep place. Sound travels fast and far in the deep places, and the silence there is perfect, letting the least noise be heard for hundreds of miles.

And these were not small noises. The lights were tiny, but the sounds were vast: not loud, but very large. Often they were below the range of hearing, long slow vibrations rather than sounds, The first we heard seemed to us to rise up through the currents from beneath us immense groans, sighs felt along the bone, a rumbling, a deep uneasy whispering.
Later, certain sounds came down to us from above, or borne along the endless levels of the darkness, and these were stranger yet, for they were music. A huge, calling, yearning music from far away in the darkness, calling not to us. Where are you? I am here.

Not to us.

They were the voices of the great souls, the great lives, the lonely ones, the voyagers. Calling. Not often answered. Where are you? Where have you gone?

But the bones, the keels and girders of white bones on icy isles of the South, the shores of bones did not reply.

Nor could we reply. But we listened, and the tears rose in our eyes, salt, not so salt as the oceans, the world-girdling deep bereaved currents, the abandoned roadways of the great lives; not so salt, but warmer.

I am here. Where have you gone?

No answer.

Only the whispering thunder from below.

But we knew now, though we could not answer, we knew because we heard, because we felt, because we wept, we knew that we were; and we remembered other voices.

Le Guin, U.K. (1975) 'The New Atlantis', in R. Silverberg (ed.) The New Atlantis and Other Novellas of Science Fiction. New York: Hawthorn Books.

undersea transductions

Stefan Helmreich

As we drop down to the ocean floor, amidst a wash of submarine sounds, some questions surface: How did the do- main that Jacques Cousteau (with Dumas 1953) once named "the silent world" become so sonorous? How did the under- water realm, this zone to which humans cannot have ex- tended, unmediated access (without drowning, that is), be- come imaginable and accessible as a space of sound? What kinds of technical work have been necessary to bring this field into audibility for human ears? And what have been the cultural effects-for people in submarines, for example-of such work? Learning the answers requires dipping into some submarine history, tuning into the technical specifics of underwater listening, considering cybernetic networks of communication and control, and querying the multiple modes through which people imagine immersion: as a descent into liquid, as an absorption of mind and body in some activity or interest (such as music), and-in a meaning of relevance to anthropologists-as the all-encompassing entry of a person into an unfamiliar cultural milieu.

Key to thinking through how the sensation of auditory immersion is produced is the concept of a "soundscape." Ecologically minded musician R. Murray Schafer advanced the term in 1977 to call attention to his worry that natural sonic environments were being polluted by industrial noise. Historian Emily Thompson, in a more formal register, defines the soundscape as "an auditory or aural landscape ... simultaneously a physical environment and a way of perceiving that environment; it is both a world and a culture constructed to make sense of that world" (2002:1). A soundscape includes what Feld calls an "acoustemology," a "sonic way of knowing and being" (Feld and Brenneis 2004:462; see also Feld 1996).

There are, of course, many genres of such knowing and being, "diverse meanings of the auditory" (Mody 2005:193), and, although it may seem to go without saying, three-dimensional space has been central to the conception-the acoustemology-of the soundscape (Schafer's composition of soundwalks, in which sonic landscapes are experienced via movement through space, makes spatiality explicit). In Village Bells (1998), a lush history of sound in 19th-century rural France, Alain Corbin argues that the ringing and reverberation of church bells served to define the auditory circumference of village communities, rooting people in local territories by placing them in a soundscape that symbolically reinforced their social proximity to town centers. In "Sound- ing the Makassar Strait," Charles Zerner describes how Mandar fishermen off the southwestern coast of Indone- sia's island of Sulawesi employ spells and calls-"prayers, exhortations, and instrumental performances" (2003:62)- to summon flying fish into floating traps they fasten to their small outrigger sailboats. The soundscape that fishers create across this stretch of water-made of their whispered speech, shouted songs to spirit guardians, and Koranic recitations-responds to and demarcates local maritime territories. Thompson's The Soundscape of Modernity (2002) tells yet another tale of space and sound; in the early 20th century, she reports, the rise of electroacoustic devices redescribed

sounds as signals, which allowed for the measurement and standardization of soundscapes. In that ma- chine age, the spatialization of sound came ideally to be dictated not by the acoustics of places (like concert halls) but by techniques of sound reproduction, aimed at making di- verse places-from public auditoriums to private homes-all sound the same.

Corbin, Zerner, and Thompson describe sounds organized and perceived through air. But what about sound underwater? Technologically constructed transductive apparatuses are essential for the submarine medium to be rendered into a soundscape for humans. I attempt below to map out the phenomenologies that result from attending to-as well as from forgetting-such transductions. In aid of that inquiry, I develop the figure of the submarine cyborg-the cyborg in a deep-sea soundscape-to make explicit the material transformations across media that have to unfold for the seemingly seamless transfer of information in cybernetic systems to be accomplished. I argue that a transductive ethnography provides tools for making audible the conditions that produce what many people have come to think of as the self-evident experience of watery and auditory immersion.

[...]

Transducing a submarine soundscape for humans
How have underwater soundscapes come into audibility for humans? Devices that permit listening across different media-from water over into air environments (like the in- side of the sub)-are key. Alvin, maintained at one atmosphere of pressure in its interior (i.e., at everyday, sea-level pressure), can only deliver to passengers a sense of an exterior soundscape because of such transducers.5

What might be less obvious is why the underwater realm is not a soundscape for people unless such prosthetic technologies are made available to our naked ears.

Consider a skin diver. The sensation of floating in a three-dimensional net of sound is not immediately avail- able to people swimming submerged in water. This is in part because it is nearly impossible for humans to use underwater acoustic vibration to locate themselves in space. For one thing, sound waves travel four times faster in water than in air. For another, human eardrums are too similar in density to water to provide the resistance that can interrupt many underwater vibrations so that they might be translated into tympanic movement-sound-in the ears; lots of vibrations pass right through our bodies. For humans, underwater sound is largely registered by bones in the skull, which allow enough resistance-impedance, to use the technical term- for vibrational motion to be rendered into resonances in the body. Moreover, conduction of sound by bone directly to the inner ear confounds any difference in signals received by left and right ears, making it impossible to compose what audiophiles call a "stereo image." Unaided human ears perceive underwater sound as omniphonic: coming from all directions at once (and, indeed, because of sound's seemingly instantaneous arrival, often as emanating from within one's own body). In this (transductively phrased) framing, the underwater world is not immediately a soundscape for humans because it does not have the textured spatiality of a landscape; one might, rather, think of it as a zone of sonic immanence and intensity: a soundstate. A couple of acoustemologies can be imagined that cor- respond to this phenomenology. One acoustemology might have the auditor feeling the immediate compressing power of an alien medium,

perhaps experiencing a shock akin to that felt by 18th-century European cure seekers who traveled to the seashore to be suddenly immersed in cold water. Another acoustemology might posit a oneness, a sensory communion, with the medium, what Don Ihde in his "Auditory Imagination" calls a " 'dissolution' of self-presence" (2003:62). Such a sensibility might regard the immediacy of sound as a sign that one is "merging with the elemental forces"- a phrase Corbin (1988:164) uses to describe the sensation desired by those Romantic poets who sought through swimming to achieve sublime union with the sea.

Neither of these two acoustemologies opens out into the dimensional topography of a soundscape. It takes technical and cultural translation to carve a soundscape for humans out of the subaqueous milieu, to endow submarine space with sonic distance and depth, to create immersive space. Equipment must first be constructed that can capture submarine vibrations in the audio register-hydrophones, for example, like the ones manufactured by the International Transducer Corporation in Santa Barbara, Califodevices that can get hold of underwater vibrations, usually using a microphone fashioned of ceramic or another material sufficiently denser than water to allow propagating waves to be impeded (see International Transducer Corporation n.d.). Once sound has been received by a hydrophone, signals must then be transported into an airy medium for apprehension by human ears. Such sound can be rendered into stereo using devices that transform signals arriving at separate underwater receivers into "binaurally centered" impressions in headphones or from speakers, translating captured submarine sound into spatial relations dimensionally meaningful to hearing humans (Höhler 2003).

With hydrophones and speakers, even such items as submerged bells might be assessed for their underwater reverberation: In 1901, the Submarine Signal Company of Boston sought robust methods for submarine communication, imagining "a network of underwater bells whose sonorous gongs would carry through the water at great distances" (Schlee 1973:246). The company, seeking an alternative to foghorns and responding to growing densities of ship traffic, built receivers to capture the resulting resonances for listeners onboard ships, although it must be said that the system envisioned never came into focus; plans to use bells to send Morse code were swamped by the turbulent, scattering character of the submarine medium.

Bringing underwater sound into human-occupied air pockets like Alvin requires and entails transduction. Indeed, the possibility of imagining oneself immersed in a submarine soundscape depends on transduction-as, indeed, in its own way, does the sense of feeling omniphonically at one with a soundstate summoned forth by a skull-enveloping fluid. The ear itself, it is crucial to note, has for the last century or so been understood as a transducing device, translating vibrations in air into corresponding motions in the eardrum (Sterne 2003), a description that, as I have already suggested, folds an engineering formulation into scientific understandings of the sense of hearing as such. If, as Thompson suggests, the soundscape of modernity is patterned by sounds "increasingly the result of technological mediation" (2002:2), underwater soundscapes do not exist at all for humans without such mediation all the way down-or, more exactly, all the way across (and, in the case of Alvin's pinging sonarscape, without first becoming soundedscapes-which, because sonar sounding depends on knowing the speed of sound

in water, demonstrates that subs use “sound to map time into space” [Evens 2005:54].

[...]

Transduction can be used as a device for recognizing the hidden conditions of immersion. The metaphor of transduction can tune one in to textures of disjuncture, to the corporeal character of transferring signals, particularly in cyborgian settings. If the information sciences have it that information is an abstract property that can be transferred across boundaries and substrates-the transcoding dream of the cyborg-the concept of “transduction” recalls the physical, material dimension of such transfers and summons up questions of resistance and distortion, complicating a rhetoric of flow with one of turbulence (see Sarai Editorial Collective 2006). Silverstein’s (2003:83) example of the hydroelectric generator as the kind of transducer one might think of when translating between languages is perfect for my purposes, because it adds turbulence to conceptions of water as always a figure of immersion.

[...]

Rather than thinking immersively or reflexively, then, what about thinking transductively? In Transductions: Bodies and Machines at Speed, Adrian Mackenzie, building on Simondon, writes, “To think transductively is to mediate be- tween different orders, to place heterogeneous realities in contact, and to become something different” (2002:18).36 To think transductively is to attend to the earache, to imbalance, to all the embodied capacitances of the ethnographer-and to the work necessary to place oneself in particular networks, machinic and social. To think transductively is to pay attention to impedance and resistance in cyborg circuits, to the work that needs to be done so that signals can link machines and people together, at a range of scales, from the private to the public. To think transductively is to think from inside the infrastructure that supports the transmission of information across media. To think transductively is not only to listen to the changing qualities of signals as they propagate across media but also to inquire into the idea of the signal itself (which then leads back to the fluid metaphors that suffuse discussions of electricity, with its flows and currents).37 Indeed, to think transductively demands inquiry into the very histories and languages that organize conceptions of sensing-and is, therefore, an endeavor in dialogue with the anthropology of sensing more generally (see Classen 1993; Desjarlais 2003; Stoller 1997; Sutton 2001). To think transductively is thereby also to consider ethnography itself as transduction-and the ethnographer as a kind of transducer.

Helmreich, S. (2007) ‘An Anthropologist Underwater: Immersive Soundscapes, Submarine Cyborgs, and Transductive Ethnography’, American Ethnologist, 34(4), pp. 621–641.

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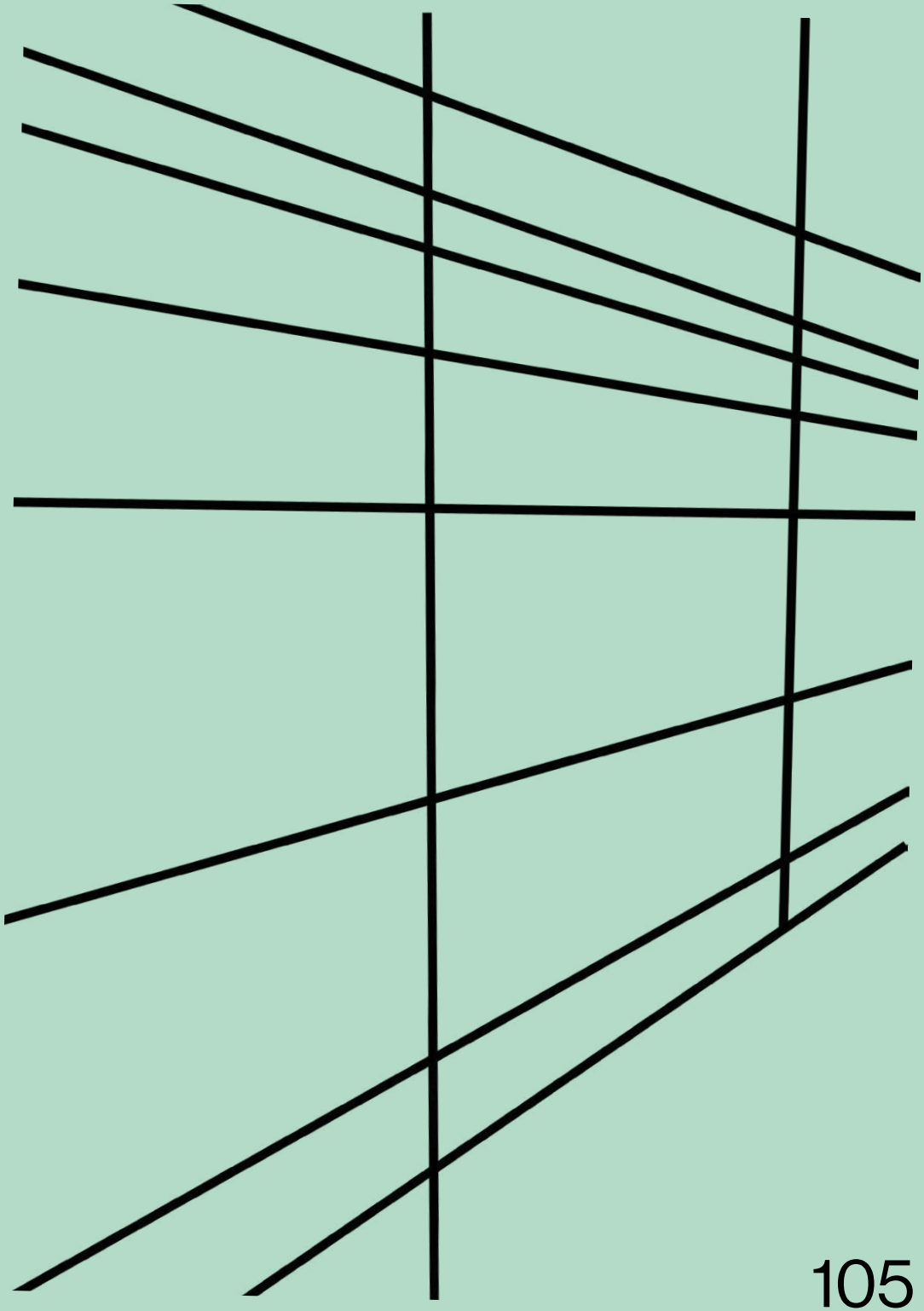

listening to the depths
of our inner ocean

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