Solitude Journal 3
Mutations

Solitude Journal 3 MUTATIONS

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Content

»Mutations«: A New Residency Program as a Form of Collective Knowledge Production

Elke aus dem Moore
Akademie Schloss Solitude

Mutations are processes with unpredictable consequences: transformation, loss of control and irreversibility, but also diversity, metamorphosis, and hybridity. The thematic timeliness of the new fellowship program at Akademie Schloss Solitude in collaboration with KfW Stiftung, which launched in 2020 with an initial focus on mutations, is significant. The topics addressed demonstrate art's forethought and how, based on a sensitive and profound engagement with social developments, this medium is capable of sensing social oscillations and transforming them into artistic research. With »Mutations,« we have launched a thematic program that brings art and society closer together for the first time in the Akademie's history.

The ecological crisis and social inequalities pose major structural challenges for all societies today. Mutations hold enormous potential for radical thinking and change. They contradict the dominant order and challenge hierarchies. What role do mutations play in the network of relationships shaping artistic, social, and planetary work?

A mutation is an abrupt, often necessary change in circumstances, a radical departure from the norm and an unpredictable transformation. What can we learn from mutations? Which mutations are necessary to guarantee evolutionary advancement? Can the concept of mutation also be transferred to the cultural and artistic sector, and even serve as a cultural practice? Residency programs serve as experimental spaces in which participants observe, analyze, and question mutating processes, and are thus an ideal space to pursue these questions.

With their critical attitude and intellectual curiosity, and with their artistic action, art and artists hold immeasurable potential for social advancement. The artistic imagination, which is capable of thinking outside prefabricated patterns and going beyond common techniques, is a fundamental necessity for innovation and social development. This requires protected and free spaces for artistic creation. Enabling this is the central concern of the international transdisciplinary residency program at Akademie Schloss Solitude.

With deep conviction and the desire to create a more prominent place for artistic research and action within society, and even to involve it in political decision-making processes, my initial reflections resulted in developing a fellowship program with a markedly transdisciplinary and thematic focus. Its structure, which promotes joint work, research, and experimentation on one topic, and thus collaborative knowledge production – while concomitantly exploring how to distribute the knowledge thus generated – is unique among residency programs. In this way, I am convinced that newly generated artistic knowledge can flow into social developments.

In the spirit of collaboration, I invited a core group consisting of Marie-Hélène Gutberlet, Fotini Lazaridou-Hatzigoga, Neo Muyanga, and Alya Sebti, who are members of the Solitude selection committee, to reflect together on the newly developed program and to decide on an initial thematic focus. Composer and musician Neo Muyanga proposed the theme of mutation: »Mutations, we feel, covers some of the conjectures we are bound to make during the course of practicing our various art forms in search of ways of living and sharing better with others.«[1]

The »Mutations« program focuses on transdisciplinarity and the collaborative approach of artistic research. Seven artists and scientists from different professional and sociocultural backgrounds were invited to exchange their knowledge in the context of concentrated cohorts and to use their respective expertise to create new knowledge. The first phase, which was dedicated to intensive development and professional exchange, lasted six months and was accompanied by discussions with other fellows as well as external guests.[2] The second phase included reflection and the opportunity to develop ways to dispense the emerging knowledge. These three months were filled with numerous forms of knowledge dissemination (a dedicated website, a lecture series, a call for applications for Web Residencies, an exhibition, and this journal).

Project coordinator and curator Rose Field provides more context in the editorial essay. I would like to take this opportunity to express my sincere thanks to her for her outstanding support, patience, care, and foresight in realizing the program. In the midst of a global pandemic, tremendous flexibility was and is still required in view of the constant, unpredictable changes.

Akademie Schloss Solitude has found an excellent partner in KfW Stiftung to establish this unique program in the field of artistic research. We are united by the Akademie's ethos and the conviction that the further

development of transdisciplinary work and its position in society are fundamentally important. Many thanks go to the entire KfW Stiftung team, especially to Daniela Leykam, for this joint constructive collaboration, which is particularly important as we shape the future together. Nicola Müllerschön also deserves particular thanks for the initial conceptual discussions.

I would also like to extend my sincere thanks to all jury members of the »Mutations« program as well as to the core group formed by the Akademie's general jury. I would like to express my deep gratitude to the entire team at Akademie Schloss Solitude for their efforts in implementing this new program. I would also like to thank all lecturers and authors for their important contributions both to the lecture series and to this journal. Finally, I would like to take this opportunity to thank the seven artists Ana María Gómez López, Angela Anderson, Clara Jo, Grayson Earle, Joana Quiroga, Maxwell Mutanda, and Sabina Hyoju Ahn for their willingness to engage in the experiment of collective work and for their groundbreaking artistic works on the theme of mutation.

»Mutationen«: Ein neues Residenzprogramm als kollektive Wissensproduktion

Elke aus dem Moore
Akademie Schloss Solitude

Mutationen sind Prozesse mit unvorhersehbaren Folgen: Transformation, Kontrollverlust und Irreversibilität, aber auch Vielfalt, Metamorphose und Hybridität. Die Aktualität des Themas, mit dem das neue Stipendienprogramm der Akademie Schloss Solitude im Jahr 2020 – in Kooperation mit der KfW Stiftung – erstmals mit dem Fokus Mutationen startete, ist enorm. Die Themensetzung zeigt uns, wie weit Kunst vorausdenkt und wie, basierend auf einer sensiblen und tiefgreifenden Auseinandersetzung mit gesellschaftlichen Entwicklungen, Kunst Schwingungen aufgreift und sie zum Gegenstand künstlerischer Forschung macht. Mit »Mutationen« wurde erstmals in der Geschichte der Akademie ein neues themenspezifisches Programm aufgelegt, das Kunst und Gesellschaft stärker zusammenführt.

Die ökologische Krise und soziale Ungleichheiten stellen alle Gesellschaften von heute vor große strukturelle Herausforderungen. Mutationen bergen ein enormes Potenzial für radikales Denken und Wandel. Sie widersprechen der bestehenden Ordnung und fordern Hierarchien heraus. Was bedeutet Mutation im Beziehungsgeflecht von künstlerischer, sozialer und planetarischer Arbeit?

Eine Mutation ist eine abrupte, oft notwendige Veränderung der Gegebenheiten, eine radikale Abweichung von der Norm und unvorhersehbare Transformation. Was können wir von Mutationen lernen? Welche Mutationen sind notwendig, um eine evolutionäre Weiterentwicklung zu garantieren? Kann der Begriff der Mutation auch auf den kulturellen, künstlerischen Sektor übertragen werden, gar als kulturelle Praxis dienen? Residenzprogramme dienen als Experimentierräume, in denen die Teilnehmer*innen mutierende Prozesse beobachten, analysieren und hinterfragen und somit als idealer Ort, diesen Fragen nachzugehen.

Kunst und Künstler*innen mit ihrer kritischen Haltung und intellektuellen Neugier, mit ihrem Handeln und Forschen stellen ein überaus großes Potential für gesellschaftliche Weiterentwicklung dar. Die künstlerische Imagination, die fähig ist, außerhalb von vorgefertigten Mustern und Stereotypen, jenseits von gängigen Vorgehensweisen und Techniken zu denken, ist eine grundlegende Notwendigkeit für Innovation und gesellschaftliche Weiterentwicklung. Dazu bedarf es Schutz- und Freiräume für künstlerisches Schaffen. Das zu ermöglichen, ist das zentrale Anliegen des internationalen transdisziplinären Residenzprogramms der Akademie Schloss Solitude.

Mit der tiefen Überzeugung dessen und dem Wunsch, künstlerisches Forschen und Handeln stärker in die Gesellschaft zu bringen, gar in politische Entscheidungsprozesse zu involvieren, führten meine ersten Überlegungen zu der Entwicklung eines neuen Stipendienprogramms. Grundlage dieses neuen Programms ist eine dezidiert transdisziplinäre und thematische Ausrichtung. Einzigartig in der Landschaft von Residenzprogrammen ist die Struktur des neuen Programms, die das gemeinsame Arbeiten, Forschen und Experimentieren an einem Thema und somit kollaborative Wissensproduktion fördert und gleichermaßen der Frage nach der Distribution des generierten Wissens nachgeht. Auf diese Weise, davon bin ich überzeugt, kann neu entstandenes künstlerisches Wissen in gesellschaftliche Entwicklungen einfließen.

Im Geiste der Kollaborationen lud ich eine Kerngruppe bestehend aus Marie-Hélène Gutberlet, Fotini Lazaridou-Hatzigoga, Neo Muyanga und Alya Sebti, die der Auswahljury der Akademie Schloss Solitude angehören, ein, das neu entwickelte Programm gemeinsam zu reflektieren und einen ersten thematischen Fokus zu setzen. Der Komponist und Musiker Neo Muyanga schlug das Thema der Mutation für das themenfokussierte Residenzprogramm vor: »Mutationen, so meinen wir, sind einige der Mutmaßungen, die wir im Laufe der Ausübung unserer verschiedenen Kunstformen auf der Suche nach Möglichkeiten, besser zu leben und mit anderen zu teilen, zwangsläufig anstellen.«[1]

Im Zentrum des Programms »Mutationen« steht die Transdisziplinarität sowie der kollaborative Ansatz der künstlerischen Forschung. Sieben Künstler*innen und Wissenschaftler*innen aus verschiedenen fachlichen und gesellschaftlich-kulturellen Hintergründen waren eingeladen, um in konzentrierten Zirkeln ihr Wissen auszutauschen und mit ihrer jeweiligen Expertise dazu beizutragen, dass neues Wissen entstehen kann. Die erste Phase, die der intensiven Entfaltung und des fachlichen Austauschs diente, dauerte sechs Monate und wurde begleitet von Gesprächen mit weiteren Fellows sowie externen Gästen.[2] Die zweite Phase beinhaltete die Reflektion und die Möglichkeit, Formen der Distribution des entstandenen Wissens zu entwickeln. Diese drei Monate waren ausgefüllt von zahlreichen Formen der Wissensvermittlung (einer eigenen Website, einer Vortragsreihe, einer Ausschreibung von Web Residencies, einer Ausstellung sowie dem vorliegenden Journal).

Mehr dazu beschreibt die Projektkoordinatorin und Kuratorin Rose Field im Editorial. Ihr möchte ich an dieser Stelle einen sehr großen Dank aussprechen für ihre hervorragende Begleitung, ihre Geduld, Sorgfalt und Weitsicht in der Realisierung des Programms. In Zeiten einer Pandemie war und ist angesichts der stetigen, unvorhersehbaren Veränderungen eine ungeheuer große Flexibilität erforderlich.

Die Akademie Schloss Solitude hat in der KfW Stiftung einen hervorragenden Partner gefunden, um das einzigartige Programm im Bereich der künstlerischen Forschung aufzusetzen. Das Selbstverständnis der Akademie und die Überzeugung, dass die Weiterentwicklung des transdisziplinären Arbeitens und dessen Verortung in der Gesellschaft grundlegend wichtig sind, führen uns zusammen. Sehr herzlichen Dank an das gesamte Team der KfW Stiftung, namentlich Daniela Leykam, für diese gemeinsame konstruktive Zusammenarbeit, die besonders wichtig ist, für die Gestaltung von Zukunft. Für die konzeptionellen Erstgespräche ist außerdem Nicola Müllerschön zu danken.

Mein großer Dank geht an alle Jurymitglieder des Mutationsprogramms sowie an die Kerngruppe der allgemeinen Jury der Akademie. Dem gesamten Team der Akademie Schloss Solitude gilt mein tiefer Dank für die Umsetzung dieses neuen Programms. Allen Vortragenden und Autor*innen danke ich für ihre wichtigen Beiträge sowohl in der Vortragsreihe wie auch in diesem Journal. Ich möchte an dieser Stelle den sieben Künstler*innen Ana María Gómez López, Angela Anderson, Clara Jo, Grayson Earle, Joana Quiroga, Maxwell Mutanda und Sabina Hyoju Ahn für ihre Bereitschaft danken, sich auf das Experiment des kollektiven Arbeitens einzulassen, sowie für ihre wegweisenden künstlerischen Arbeiten zum Thema Mutationen.

1 Articulated by Neo Muyanga in an exchange with Elke aus dem Moore.

2 The jury members of the »Mutations« program played an essential role in this process: Neo Muyanga, Nishant Shah, Sepake Angiama, Pinar Yoldas and Giovanni Galizia were invited to select a group of seven fellows for the program. They also served as »mentors,« counterparts and exchange and dialog partners.

Mutations as Diagnosis, Theme, and Method

Daniela Leykam
KfW Stiftung

Mutations are often understood as a process of change or transformation, but their scope exceeds the simple advancement or restructuring of a specific area. Mutations are interlocking processes with unpredictable consequences: Loss of control and irreversibility are essential aspects, yet also inscribed in them are spontaneity, diversity, and hybridity. The interplay of these properties is key: The challenges facing the world's population today, first and foremost rapid climate change, can be discussed with the help of the concept of mutations and their various mechanisms. Mutations have the potential to generate a simultaneous mix of unease and optimism, particularly in the context of concomitant social structural change.

In response to this ambivalence created by a sense of crisis and the euphoria of change, the KfW Stiftung and Akademie Schloss Solitude invited seven independent fellows to collaborate as a group for nine months under the guiding theme »Mutations,« tasked with addressing the contexts and questions raised by the ecological and social crisis experienced by globalized society. Their professional backgrounds range from the visual arts, music, architecture, and media to philosophy and life science. Through the implementation of a collaborative residency program with a specific thematic focus, strands of knowledge can be interlinked differently than in programs with an impact predominantly on the individual development. The group encounter produces a new network of ideas, with the combination of artistic and scientific research approaches as well as transdisciplinary methods constituting essential tools within this process. The visualization of data sets can result in a musical composition and represent a scientifically biological insight, while unexpected localities emerge during exchanges on the subject of methodological argumentation. In short, a deeper engagement between disciplines emerges. Unanticipated parallels can thus materialize via such a platform as represented by the »Mutations« program; new insights can be advanced and something constructively set against the sense of crisis within the present.

The program is co-designed by the group itself and thus continuously assumes new forms: A reading group, a public lecture series, an online platform, an exhibition. Thus, this publication is also only one module – a »transform« – and as such part of the program's mobile mosaic structure. It should be read in direct connection with it. »Mutations« acts as a kaleidoscopic lens: Contexts are constantly formed into new patterns. The goal of the program also lies in this movement itself, in the mechanism of mutation from which knowledge emerges.

The globalized present always demands a global perspective. It follows that, for the collaborative platform, the diversity of inquiring and questioning perspectives is key. The seven fellows thus contribute different regional and academic knowledge systems which exceed those predominating in the globe's westernized North. At the same time, the knowledge network created by the group collaboration is constantly expanding via mentors and their varied expertise as well as the numerous external guests who continuously enrich and kaleidoscopically develop the program with input and ideas. Consequently, »Mutations« constitutes a diagnosis of the present and a theme, but also a method.

A program that is as comprehensive as it is process-oriented is created by the people who implement and form it: Particular thanks go to the group of fellows, who have shaped so many forms of encounter in times marked by distance. The support of the selection committee and mentors enhanced the process immensely, as did the contributions of all the co-participants from different parts of the world. Neo Muyanga deserves particular thanks for his foresight in terms of the topics covered. The program was facilitated and fundamentally shaped by Elke aus dem Moore. We thus extend a special thanks for her valuable collaboration, as well as to Rose Field, who steered this dialog and contributed important content. Louisa Schmitt and the entire team at Akademie Schloss Solitude ensured the success of this project in many different ways. Denise Sumi also provided significant support in the creation of this publication. We would like to express our sincere and heartfelt thanks to all of them for their efforts.

Mutationen als Diagnose, Fragestellung und Methode

Daniela Leykam
KfW Stiftung

Mutationen werden häufig als Veränderung oder Transformation verstanden – doch beschreibt die einfache Weiterentwicklung oder Umgestaltung eines Bereichs noch keine Mutation. Mutationen sind ineinandergreifende Prozesse mit unvorhersehbaren Folgen: Kontrollverlust und Irreversibilität sind wesentliche Aspekte, aber auch Spontaneität, Vielfalt und Hybridität sind ihnen eingeschrieben. Das Zusammenspiel dieser Eigenschaften ist zentral: Die Herausforderungen, vor denen die Weltbevölkerung heute steht, allen voran der rasante Klimawandel, lassen sich mit Hilfe des Begriffs Mutationen und dessen Mechanismen diskutieren. Gerade vor dem Hintergrund des damit einhergehenden gesellschaftlichen Strukturwandels erzeugen Mutationen Unbehagen und Optimismus zugleich.

In Reaktion auf diese Ambivalenz zwischen Krisenempfinden und Aufbruchseuphorie hat die KfW Stiftung gemeinsam mit der Akademie Schloss Solitude sieben unabhängige Stipendiat*innen eingeladen, für neun Monate als Gruppe im Rahmen des Leitthemas »Mutationen« den Zusammenhängen und Fragestellungen der ökologischen und sozialen Krise der globalisierten Gesellschaft zu begegnen. Die fachlichen Hintergründe reichen von Bildender Kunst, Musik, Architektur und Medien über Philosophie bis zu Life Science. Durch die thematische Setzung eines solchen kollaborativen Residenzprogramms werden Wissensstränge anders verknüpft als in Individualförderprogrammen. Aus der Gruppenbegegnung wächst ein neues Ideengeflecht.

Das Aufeinandertreffen von künstlerischen und wissenschaftlichen Forschungsansätzen sowie transdisziplinären Methoden sind dafür wesentliche Werkzeuge: Die Visualisierung von Datenmengen kann in einer musikalischen Komposition münden und eine wissenschaftliche Erkenntnis im Bereich der Biologie darstellen – im Austausch über methodische Abwägungen entstehen inhaltlich unerwartete Nachbarschaften. Es entsteht eine tiefergehende Auseinandersetzung zwischen den Disziplinen. Über die Plattform, wie sie das Programm »Mutationen« darstellt, kann auf diese Weise unvorhersehbares Wissen entstehen, neue Erkenntnisse befördert und dem Krisenempfinden der Gegenwart konstruktiv etwas entgegengesetzt werden.

Das Programm wird dabei von der Gruppe selbst mitgestaltet und nimmt so immer wieder neue Formen an: Ein Lesezirkel, eine öffentliche Vortragsreihe, eine Online-Plattform, eine Ausstellung. So ist auch diese Publikation nur ein Modul – eine »Trans-Form« – und als solche Teil der beweglichen Mosaikstruktur des Programms. Sie muss in unmittelbarer Verbundenheit dazu gelesen werden. »Mutationen« agiert als kaleidoskopische Linse: Zusammenhänge werden stetig zu neuen Mustern geformt. Das Ziel des Programms liegt auch in dieser Bewegung selbst, im Mechanismus der Mutation, aus der Wissen entsteht.

Die globalisierte Gegenwart fordert immer auch eine globale Perspektive. Für die Kollaborationsplattform ist deshalb die Diversität der forschend nachfragenden Perspektiven zentral. So bringen die sieben Stipendiat*innen verschiedene regionale und akademische Wissenssysteme ein, die über den westlich geprägten Norden des Globus hinausgehen. Gleichzeitig erweitert sich das Wissensnetz der Gruppenkollaboration stetig: durch Mentor*innen und ihre diversen Expertisen sowie die zahlreichen externen Gäste, die das Programm mit Input und Ideen kontinuierlich bereichern und kaleidoskopisch weiterentwickeln. »Mutationen«, das ist also Gegenwartsdiagnose, Thema und Methode zugleich.

Ein so umfassendes wie prozessorientiertes Programm entsteht durch die Menschen, die es umsetzen und formen: Ein besonders großer Dank gilt der Gruppe der Stipendiat*innen, die in von Distanz geprägten Zeiten so zahlreiche Formen der Begegnung gestaltet hat. Die Unterstützung durch die Auswahlkommission und Mentor*innen war dafür eine herausragende Bereicherung, ebenso wie die Beiträge aller Mitdiskutant*innen aus verschiedenen Teilen der Welt. Neo Muyanga ist für die Weitsicht der Themensetzung zu danken. Ermöglicht und wesentlich gestaltet wurde das Programm durch Elke aus dem Moore. Für die wertvolle Zusammenarbeit ist ihr zu danken, ebenso wie Rose Field, die diesen Dialog gesteuert und inhaltlich begleitet hat. Louisa Schmitt und das ganze Team der Akademie Schloss Solitude haben in vielen Schritten zum Gelingen beigetragen. Denise Sumi hat die Entstehung dieser Publikation maßgeblich unterstützt. Ihnen allen gilt ein besonders großer und herzlicher Dank für die Zusammenarbeit.

Editorial

A Permeation of All Living Things

Rose Field

Until recently, the term »mutation« was, at least for the general public, reserved for the colorful world of comic books and Marvel movies. Yet, since the first mention of the B.1.1.7 coronavirus variant in the fall of 2020, it has become impossible to read the news without seeing some form of the word splayed across headlines as the global Covid-19 pandemic continues to hold our attention. With this newfound dominance comes new misunderstandings.

Donna Haraway wrote that »the detached eye of objective science is an ideological fiction, and a powerful one. But it is a fiction that hides – and is designed to hide – how the powerful discourses of the natural sciences really work.«[1] The existence of this fiction has dominated the discussion within the »Mutations« thematic residency group of seven fellows, consisting of Sabina Hyoju Ahn, Angela Anderson, Grayson Earle, Ana María Gómez López, Clara Jo, Maxwell Mutanda, and Joana Quiroga, since their first meeting in October 2020. Haraway's conclusion that science is anything but objective has informed the fellows' understanding of the theme of mutations; the definition of which has been expanded through their individual artistic practice and research to include sociopolitical discourse and structures.

Quite early in the program, the idea was put forth that by accepting mutation as an important concept, one accepts a western understanding or paradigm.[2] According to the National Human Genome Research Institute's website, »a mutation is a change in a DNA sequence. Mutations can result from DNA copying mistakes made during cell division, exposure to ionizing radiation, exposure to chemicals called mutagens, or infection by viruses.«[3] This definition relies on the acceptance that the cell is the basic form of life; a western scientific understanding that is not without contention. With Haraway in mind, how does one reconcile with this subjectivity and transparent favoritism of one view of the world to work outside of ideas projected from western ideals?

The need is great to create new platforms that are anti-imperialistic and inclusive of other understandings of the world and its natural, political, and social structures – platforms that invite and even favor non-western and Indigenous experience and knowledge. But how can redefining mutations help to do this? To define something, one has to create a hierarchy, and hierarchy creates blind spots that could inadvertently diminish the intention to include. In an effort to expand the western scientific based definition of mutations, the focus of the fellows goes beyond logical systems and seeks to utilize the potential of an inter- and transdisciplinary approach to artistic research in order to critically rethink the concept of mutations and, consequently, life.

For this third edition of the Solitude Journal, the »Mutations« thematic residency fellows acted as editors, offering a place and space for different approaches to the mutations theme. Each fellow invited artists, collectives, researchers, and creative thinkers to contribute texts and artworks that expand and deepen the aforementioned ideas. Grouping the contributions initiated by each fellow into chapters facilitates a multifaceted approach to the theme, while also allowing for commonalities across sections to become apparent.

In her section, Ana María Gómez López concentrates on the word »mutation,« the origin of which comes from the word »mutual,« as the starting point for her investigation. By locating the communal as the basis from which to effect change at conceptual and applied levels, she invites collectives to contribute. Her interview with Luis Campos underscores a biological understanding of the theme. But here in particular, we see that the phenomena of mutation cannot be separated from the sociological conditions.

Pushing a digital understanding and expanding the sociopolitical approach above, Grayson Earle's section irrevocably intertwines the computer with politics. Through it we are tracked and controlled, informed and empowered. He delves into the question of how one can view and understand the omnipresence of the digital.

The contributions in the following three sections deal with mutations as inherently sociopolitical agents,

needed in order to enact change in a postcolonial world. Angela Anderson focuses on environmental and ecological forms of mutations. She invites activists directly affected by the Bakken shale oil extraction happening in western North Dakota to share their stories, highlighting how the significant ecological impact of fossil-fuel extraction is matched only by the disregard shown to the residents on the Fort Berthold Reservation of the Mandan, Hidatsa, and Arikara nations. Joana Quiroga provides space to reflect on the colonial model in contemporary Brazil and counter-coloniality theory. Continuing her research on the social influence of bread, she questions her own perspective and privilege in her essay »Between Avarice and Sharing.« Maxwell Mutanda speaks to the remnants of colonialism present on the African continent through the voices of those he has invited and through his own research on the inadvertent creation of urban landscape through human inhabitation.

Sabina Hyoju Ahn follows a more physical approach to the theme and explores, with Yussef Agbo-Ola, the physiological effects of sound through architecture, medicinal sonic traditions, and molecular research from a diverse range of cultures. In the poetic essay, they experiment with different ways of writing; combining poetry, conversation, and theory. Lastly, Clara Jo offers a cross-section of approaches to the theme. Artistic contributions bring in abstraction, digitally and psychologically mutating the theme of mutations to create new definitions and points of research.

The print edition of the Solitude Journal 3 *Mutations* is complemented by a digital version which offers sound works, translations, and more. Available at both mutations.akademie-solitude.de and akademie-solitude.de, the combination of the print and digital versions seeks to expand the two-dimensional limitations of publishing while incorporating the different genres that the fellows work within and between.

The commonalities between all sections are found in their differences, in the multifaceted viewpoints and analyses of mutations. Between the lines is where the red thread weaves its way. In the constant rethinking of a concept that, unlike any other, permeates all living things.

View mutations.akademie-solitude.de*. This site is an artistic work within the interdisciplinary residency program* »Mutations«:

View akademie-solitude.de/de/project/online-publications/ *to access the digital version of this issue:*

Rose Field is an art historian and curator. She works in the mediation of contemporary art, focusing on the promotion of up-and-coming artists. From October 2020 – June 2021 she was responsible for the realization of the »Mutations« thematic residency.

Eine Durchdringung
aller lebenden Dinge

Rose Field

Bis vor Kurzem war der Begriff »Mutationen«, zumindest für eine breite Öffentlichkeit, der farbenfrohen Welt der Comicbücher und Marvel-Filme vorbehalten. Seit der ersten Erwähnung der B.1.1.7 Coronavirus-Variante im Herbst 2020 jedoch, ist es geradezu unmöglich geworden, die Nachrichten zu lesen, ohne dass einem der Begriff »Mutation« auf die eine oder andere Weise aus den Schlagzeilen entgegenspringt. Mit dieser neuen Vormachtstellung gehen aber auch neue Missverständnisse einher.

In ihrem Buch *Primate Visions* schrieb Donna Haraway »der distanzierte Blick der objektiven Wissenschaft ist eine ideologische Fiktion, und zwar eine mächtige. Aber es ist eine Fiktion, die verbirgt – und darauf ausgelegt ist, zu verbergen – wie die mächtigen Diskurse der Naturwissenschaften wirklich funktionieren.«[1] Seit dem ersten Treffen der Stipendiatinnen und Stipendiaten des thematischen Residenzprogramms »Mutationen« im Oktober 2020, hat diese Fiktion die Diskussionen maßgeblich bestimmt.

Die siebenköpfige Gruppe bestehend aus Sabina Hyoju Ahn, Angela Anderson, Grayson Earle, Ana María Gómez López, Clara Jo, Maxwell Mutanda und Joana Quiroga wurde in ihrer Auseinandersetzung mit dem Thema »Mutationen« von Haraways Schlussfolgerung, dass die Wissenschaft alles andere als objektiv sei, wesentlich beeinflusst. Mit ihren individuellen künstlerischen Praktiken und Recherchen sowie durch Einbeziehung soziopolitischer Diskurse und Strukturen trugen sie zur Erweiterung des Begriffs »Mutation« bei.

Bereits früh kam die Überlegung innerhalb der Gruppe auf, dass man mit dem Akzeptieren des Begriffs »Mutation« als einem wichtigen Konzept auch ein westliches Verständnis oder Paradigma einhergeht.[2] Laut dem National Human Genome Research Institute »ist eine ›Mutation‹ eine Veränderung in einer DNA-Sequenz. ›Mutationen‹ können durch Fehler beim Kopieren der DNA während der Zellteilung, durch ionisierende Strahlungen oder Chemikalien – sogenannte Mutagene –, oder durch Vireninfektionen hervorgerufen werden.«[3] Diese Definition basiert auf der Annahme, dass die Zelle die Grundlage des Lebens sei; ein westliches Wissenschaftsverständnis, das nicht unumstritten ist. Wie lässt sich, mit Blick auf Haraway, diese Subjektivität und offensichtliche Bevorzugung eines bestimmten Weltbildes, mit dem Wunsch vereinbaren, außerhalb der von westlichen Idealen projizierten Vorstellungen zu arbeiten?

Neue Plattformen sind dringend nötig, welche anti-imperialistischen und nicht-westlichen Weltbildern mit ihren natürlichen, politischen und sozialen Strukturen Raum geben, Plattformen, die nicht-westliche und indigene Praktiken und Wissenssysteme willkommen heißen und fördern. Wie kann nun die Neudefinition von »Mutationen« dazu beitragen? Um etwas zu definieren, muss man eine Hierarchie erstellen, Hierarchien wiederum schaffen blinde Flecken, welche ungewollt dem Wunsch nach Inklusion entgegenwirken können. In dem Bestreben, die westlich-wissenschaftliche Definition von »Mutationen« zu erweitern, verlagern die Stipendiat*innen ihren Fokus über rein logische Systeme hinaus und versuchen das Potential des inter- und transdisziplinären Ansatzes künstlerischer Forschung kritisch zu nutzen, um das Konzept von »Mutationen«, und damit das Konzept von Leben, neu zu denken.

Für die dritte Ausgabe des Solitude Journals betätigen sich die Stipendiat*innen des thematischen Residenzprogramms »Mutationen« als Herausgeber*innen, um Raum für unterschiedliche Herangehensweisen an das Thema »Mutationen« zu schaffen. Jede*r Stipendiat*in hat Künstler*innen, Kollektive, Forscher*innen und kreative Denker*innen eingeladen, Texte und Kunstwerke beizutragen, welche die zuvor erwähnten Überlegungen vertiefen. Die Einteilung der Beiträge in Kapitel ermöglicht eine facettenreiche Annäherung an das Thema, lässt aber auch Gemeinsamkeiten zwischen den Sektionen deutlich werden.

In ihrem Beitrag konzentriert sich Ana María Gómez López auf die Verwandtschaft des Begriffs »Mutation«, mit dem Wort »mutual« (gemeinsam/wechselseitig). Da López das Gemeinschaftliche als Grundlage für Veränderungen auf konzeptuellen und angewandten Ebenen annimmt, lädt sie Kollektive zu Beiträgen ein. Ihr Interview mit Luis Campos untermauert ein biologisches Verständnis der Thematik. Aber gerade hier zeigt sich, dass das Phänomen der »Mutation« nicht von soziologischen Bedingungen getrennt werden kann.

In Grayson Earles Beitrag werden Computer und Politik in einen unmittelbaren Zusammenhang gebracht, indem er das Verständnis für die Digitalisierung fördert und den oben genannten soziopolitischen Ansatz erweitert. In der digitalisierten Welt werden wir beobachtet und kontrolliert, informiert und mit Befugnissen ausgestattet. Earle und die von ihm eingeladenen Autor*innen befassen sich eingehend mit Fragen, wie man die Omnipräsenz des Digitalen sehen und verstehen kann.

Die Beiträge der darauffolgenden drei Kapitel beschäftigen sich mit »Mutationen« als inhärent soziopolitischen Akteuren, die notwendig sind, um Veränderungen in der post-kolonialen Welt anzustoßen. Angela Anderson konzentriert sich auf umweltbezogene und ökologische Formen von »Mutationen«. Sie lässt Aktivist*innen, die direkt von der Ölförderung im Bakken-Gebiet im westlichen North Dakota betroffen sind, ihre Geschichten erzählen. So werden die erheblichen ökologischen Auswirkungen der Förderung fossiler Brennstoffe aufgezeigt, deren Drastik nur von der Missachtung der Bewohner*innen des Fort Berthold Reservats, den Mandan-, Hidatsa- und Arikara- Nationen übertroffen wird. Joana Quiroga lässt einen Autor zu Sprache kommen, der das koloniale Modell im zeitgenössischen Brasilien sowie anti-koloniale Theorien reflektiert. Ihre eigene Recherche über die sozialen Faktoren von Brot als Grundnahrungsmittel weiterführend, hinterfragt sie in ihrem Essay »Between Avarice and Sharing« die eigenen Perspektiven und Privilegien. Die von Maxwell Mutanda eingeladenen Gäste sprechen über die Überreste des Kolonialismus, die auf dem afrikanischen Kontinent gegenwärtig sind. Anhand seiner eigenen Forschung zeigt er, wie urbane Räume ganz unbeabsichtigt überall dort entstehen, wo Menschen wohnen.

Sabina Hyoju Ahn verfolgt einen physischeren Ansatz und erforscht gemeinsam mit Yussef Agbo-Ola die physiologischen Effekte von Klang mittels Architektur, medizinisch-akustischen Traditionen sowie molekularer Erforschung diverser mikrobiologischer Kulturen. In ihrem poetischen Essay experimentieren die beiden mit unterschiedlichen Schreibstilen, kombinieren Poesie, Gespräch und Theorie. Schließlich bietet Clara Jo einen Querschnitt der Ansätze zu diesem Thema. Die künstlerischen Beiträge führen auf eine Ebene der Abstraktion, verändern mit ihren digitalen oder psychologischen Ansätzen das Thema der »Mutationen« und eröffnen neue Definitionen und Forschungsweisen.

Die Print-Ausgabe des Solitude Journals 3, *Mutations*, wird durch eine digitale Version komplementiert, welche Soundarbeiten, Übersetzungen und vieles mehr anbietet. Sie kann sowohl über die Links mutations.akademie-solitude.de als auch über akademie-solitude.de abgerufen werden. Die Kombination aus Print-Ausgabe und digitaler Version versucht die Grenzen des Publizierens zu erweitern und die unterschiedlichen Genres, mit denen die Stipendiat*innen selbst und untereinander arbeiten zu integrieren.

Die Gemeinsamkeiten aller Sektionen finden sich gerade in ihren Unterschieden, in den vielschichtigen Standpunkten und Analysen von »Mutationen«. Zwischen den Zeilen schlängelt sich der rote Faden. In dem ständigen Neudenken eines Konzeptes, das wie kein anderes alles Lebende durchdringt.

Rose Field ist Kunsthistorikerin und Kuratorin. Sie arbeitet in der Vermittlung von zeitgenössischer Kunst und konzentriert sich dabei auf die Förderung von Nachwuchskünstler*innen. Von Oktober 2020 bis Juni 2021 war sie für die Realisierung des thematischen Residenzprogramms »Mutationen« verantwortlich.

1 Donna Haraway: *Primate Visions*, London 1989. http://sciencepolicy.colorado.edu/students/envs_5110/primatevision.pdf (accessed May 14, 2021).

2 Articulated by Ana María Gómez López during a meeting on November 2, 2020, and reinforced by the input of jurors Neo Muyanga, Nishant Shah, and Giovanni Galizia.

3 »Mutation« (2014): Online Glossary of the National Human Genome Research Institute. https://www.genome.gov/genetics-glossary/Mutation (accessed May 14, 2021).

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Edited by Ana María Gómez López

Mutant Strains, Mutant Rays, and Mutant States
An interview with Luis Campos by
Ana María Gómez López

From the Series
Wet Lands (2020 – ongoing)
SSEA

Mutational streams | Flujos mutacionales | Correntes mutacionais | Flux de mutation | Mutatiestromen
Órbitat

Excerpt of Annotations (text and print work, 2020)
Matter in Flux / The World in Which We Occur

Mutant Strains, Mutant Rays, and Mutant States

Rosalind Franklin, X-ray crystallographic photo of sodium thymonucleate, type B, otherwise known as »Photo 51«. This image, which was taken on May 6, 1952 with the assistance of Raymond Godling, provided indispensable information regarding the structure of DNA. Franklin's work was later used by Francis Crick and James Watson, who won the Nobel Prize in 1962 in Medicine for determining the chemical model of the DNA molecule. Despite her crucial contributions, the Nobel Prize was not extended to Franklin who passed away in 1958. Image courtesy from the Ava Helen and Linus Pauling papers, at the Oregon State University Special Collections and Archives.

Access Spanish version online:

An interview with Luis Campos and Ana María Gómez López

At the time of this interview, news of viral mutations – P.1, B1.17, B1.351, 501.V2 – dominate global headlines about the ongoing SARS-CoV-2 pandemic. Had 2020 and 2021 been different years, Luis Campos, associate professor in history of science at the University of New Mexico, would have overlapped with Ana María Gómez López and the other fellows of the »Mutations« interdisciplinary thematic residency at Akademie Schloss Solitude. True to the theme of the residency and the remote format of its realization, the following interview contains reflections that, in lieu of conversations in the outskirts of Stuttgart, have taken place through online platforms and e-mail correspondence as SARS-CoV-2 gains new forms and continues to shape public health policies, social restriction measures, and vaccine campaigns worldwide.

Trained as a biologist and historian, Luis Campos has researched the various framings and formulations of »mutation« from the early history of heredity and the very emergence of genetics as a field to the parallel speculative mutational futures envisioned by synthetic biology and astrobiology. In 2016–17 he served as the Baruch S. Blumberg NASA/Library of Congress Chair in Astrobiology at the John W. Kluge Center at the Library of Congress in Washington, DC. He is currently the Secretary of the History of Science Society and associate professor of the history of science at the University of New Mexico. His most recent publication is the co-edited volume *Nature Remade: Engineering Life, Envisioning Worlds*, which will be published by University of Chicago Press in July 2021. His upcoming book is about the history of the intersections between synthetic biology and astrobiology, two fields exploring the ultimate futures of mutation, and the nature of »life as it could be.«

Ana María Gómez López: *I would like to start our conversation with »the mutant gaze,« a phrase you use in your article »Mutant Sexuality: The Private Life of a Plant« on the Dutch botanist Hugo de Vries. I was excited to read your historic account of mutations in which the unit of analysis was not solely the gene or the organism, but the very corporeality of the scientist. This is second nature to you of course, but I read this back when I was still relatively new to the history of science and STS. I was enormously struck by the idea that one cannot divorce the physical body of the scientist from their body of work and that one's subjective embodiment is the starting point for understanding how one produces science (or creates artwork for that matter, in my case).*

Luis Campos: I see two themes you've highlighted – one is vision and the basic ability to recognize mutation in a new species. When de Vries studied *Oenothera lamarckiana*, or Lamarck's evening primrose, he found an organism whose novelties led him to define the term »mutant« for the first time. He had to begin with a claim – this is a new species that has particular traits and reproduces in a consistent manner over later generations – that was visually accessible to others. This visual character of the »mutant gaze« was something that was important in establishing the shared intersubjectivity of the category of »mutation« in the first place. There is a nature out there that we can discover, and learn new things about.

On the other hand, how we put together what we observe about nature into a new understanding is a synthetic act – we invent new terms and concepts to grapple with our observations and experiences, and so our very humanity and identity as a scientist may be relevant to the kind of understanding of nature we reach. Our understanding about the nature of the world may have something to do with one's identity as a scientist. This was a question that I wanted to explore in that article, but in a new way that I had not seen done before. Scholarship from decades prior had already examined how the embodiment of being a scientist mattered, for example in access to materials, availability of time to work, one's position in the academy or outside of it, or the privilege of gentlemanly status. Questions such as how the modern laboratory emerged, or how the modern scientific article emerged from letters written between gentlemen who trusted each other's word – these elements provide the grounding for understanding science as practice, as class-based, and as in important ways fundamentally characterized by its social nature. Others have suggested that gender and race have as clear a bearing on the nature of what science comes to know – that it matters for understanding the history of development of theories of race science, for example, that it is European scientists living in particular political systems, with imperial access tied to systems of colonialism and resource extraction, who are constructing new understandings of natural history, of human diversity, of sexual difference. Race, class, gender – these are the standard categories that historians of science have sought to bring in understanding the construction of scientific knowledge of the natural world.

I was inspired by these efforts, but it soon became clear to me that what we were missing as an analytical lens in the history of science was another major category of human identity, which we now refer to with the language of sexual orientation. I had been curious to know whether there was a way in which a scientist's personal or private relationships could be useful in understanding the kind of scientific work that they produced. And when I stumbled onto the case of Hugo de Vries and his discovery of mutation in the evening primrose, a queer little plant with a queer cast of supporting characters (I learned a great deal about de Vries' personal life and that of many of his friends and supporters), it seemed like a great opportunity to expand the boundaries of the history of science. Could sexuality be a useful tool for understanding the history of mutation? Does it matter if a queer scientist studies the reproductive behavior of a plant whose behavior does not at first glance fit with the basic expectations of Mendelism?

Hugo de Vries, Oenothera (Lamarckiana x Hookeri) laeta, in: *Gruppenweise Artbildung unter spezieller Berücksichtigung der Gattung Oenothera*, Berlin 1913. Courtesy Biodiversity Heritage Library. Creative Commons Attribution (CC BY 2.0)

To do this work, I had to train myself in the skills of those familiar with the challenges of queer history: its silences, its coded language, and often times the simple absence of evidence for queer lives. When letters are often burned, destroyed, or do not exist, a historian has to learn to read historical sources and even scientific sources against the grain, to find things that were not designed to be saved or to be known publicly. This work also meant I had to go beyond the standard Mendelian story of heredity, to focus specifically on a plant (the evening primrose) whose modes of reproduction struck some biologists as so »aberrant« or »degenerate« that they sometimes even called the behavior of its chromosomes »queer.«

Such language, at the time, was not confined to plants, and I began to wonder about the discursive overlap between the sexualities of plants and of people. Despite being called »degenerate« for having a system of chromosomal interchange that produced hereditary patterns and novelties in variation inexplicable by changes in genes, the evening primrose is very evolutionarily successful. If the reproductive behavior of the evening primrose could not be shoehorned into traditional Mendelism, which with improvements in cytology began to imply the relationship of one parent with one sex chromosome, then I began to question whether Mendelism itself was heteronormative. Had we built into our understandings of the varied nature of hereditary systems in biology early twentieth century ideas about the »degeneracy« of diversity of sexual orientation? Exploring the history of mutation through exploring the private life of a plant led me into and through the private life of the people who studied it. And what had been a hunch became clear: this was not only a connection that I was making – this was a clear and evident connection for my historical actors themselves.

As a historian of evolution, constraint, and contingency, I came to see how the biological theories about heredity we had inherited were inescapably about living nature, and yet also had everything to do with our all-too-human framings and our subjective embodiments. I began to envision how another kind of understanding of heredity, of reproduction, and of its evolutionary implications, could be possible – how the very emergence of our modern idea of mutation could bring into question the very categories of »sex« and »species« altogether (if the appearance of a new variety of plant in one's garden has to do with a whole ring of interlinked chromosomes passing along into one daughter cell or another, are we talking about a new species, or a new sex?). This »mutant gaze« could surface new ways of understanding the history of biology, and the interspecies interrelations of plants and people.

Tracing resonances across seemingly different realms is a kind of associative method at the heart of my historical practice, and something that I have in common with some varieties of artistic practice. In my earlier work in the history of biology, for example, I had explored the powerful metaphorical resonances between radioactivity and the phenomena of life, and how conceptual and rhetorical moves across these two seemingly disparate fields not only inspired but directly affected even the interpretation of experimental results themselves. Metaphors mattered. The »transmutation« of radioactive elements and the »mutation« of species were analogous not only in mind, it turned out, but in the claims and experimental practices of my historical scientists, and intersected in provocative and productive ways at the dawn of genetics. I came to learn that our very idea of the nature and properties of a »gene« emerged from the heart of this resonance. And it was clear that our understanding of the »gene« was inseparable from our explorations of various »mutants.« Today, as we find ourselves besieged with ever-emerging new variants of concern in the Covid-19 pandemic, I am struck by the fact that in a world of dangerous mutants, we now use the language of »variants.« Even mutants can mutate.

Well, this does offer the opportunity to talk about the current SARS-CoV-2 pandemic, but also to mention one of Hugo de Vries's contemporaries – the Dutch microbiologist Martinus Beijerinck – to whom we owe the word »virus.« This idea of defining or giving a name to that which one cannot fully recognize, much less know what one is looking for, seems very present here.

Yes – the »viral« as that which goes beyond what we can see even, or that which is only not filterable, right? As with Beijerinck, the viral is that which we do not know what it is exactly, but is clear that causes infection – the virus is the »as yet unknown.«

All the more so when it comes to viruses, which are not even recognized as biological organisms or afforded the qualification of being »alive,« at least by some scientists. How do you understand the idea of the »mutant gaze« within our collective experience of SARS-CoV-2?

There's a big question! Let me begin by threading this question back to the history of mutation, to a moment

a few decades later when the idea of radiation-induced mutations becomes widespread after reporting of experiments done in 1927 by Hermann J. Muller, who won the Nobel Prize for his work on X-ray induced mutations in fruit flies. These possibilities of new mutants created by ionizing radiation got picked up in science fiction, and mutants, the idea of mutation, and even »mutant rays« begin to appear widespread in popular literature, including science fiction magazines. The association of radiation with mutation, with superpowers, and superhumans – think Superman and Spiderman – carried weight in a more intensely radioactive Cold War world, where an arms race foreshadowed new mutant forms of biological doom. »Mutant« became a popular term at midcentury, in very much the same period that »fallout« became a matter of popular concern, following the Bravo nuclear test of 1954. Cultural responses to fears of radiation intensified, as did fears of dangerous new mutants: the film *Gojira* (»Godzilla«), described the great mutant monster emerging from the depths of a radioactive Pacific, the result of nuclear bomb testing. So in that moment in time, at midcentury, »mutant« is not just a technical scientific term, but one that carries these other cultural meanings: scary, yet also still playful, and potentially within the realms of comics, science fiction, or film.

Film poster for the 1954 Japanese film *Gojira* (Gozilla), 1954. Toho Company Ltd. (東宝株式会社, Tōhō Kabushiki-kaisha). Public Domain

What I find intriguing about this particular moment we are in now, watching the news every day, is that we're talking about mutations of a virus, and yet at least the United States news reports that I have been listening to rarely use this language – rather, they refer to mutations as »variants.« This is strange. Why is the language of »variant« being used preferentially? Does »mutant« now cause so much fear that it must be avoided in public messaging? In a post-Chernobyl age, does »mutation« now sound like something uncontrolled or uncontrollable, fearful, and dangerous, bringing to mind cancer or other concerning conditions, such that even our particular language in this moment now deliberately avoids referring to viral mutations? Is this a way of both managing the pandemic as well as concern around its progression? I can imagine a new inquiry from the historian of the present moment: what is the history of the »variant?« Where does that language of variants come from? And how is it being deployed in this moment? There's a history of variation as a statistical property that can overlap with a history around mutation. But what is it that is going on now, between the 2000s and 2020s, say, such that »variant« is the preferred term today? Having hunches can be a useful creative tool for the scholar, a starting point for further investigation. And in fact, this is exactly how my previous project started, as I began to examine unexpected resonances between transmutation and mutation, or the private life of a plant (and those who studied it) and the public life of »mutation« in a broader culture. We can bring our mutant gaze to bear on the variants of concern in our world today, and uncover new meanings in our discourse.

To return to one of the most exciting elements about your book Radium and the Secret of Life *(University of Chicago Press, 2015), as well as in some of your earlier articles – when positioning mutations beyond a strictly »genic« or »gene-centered« history, it is amazing to see how dominant the definition of mutation as an alteration in a DNA sequence (be it nuclear or viral) has become, despite being less than a century old.*

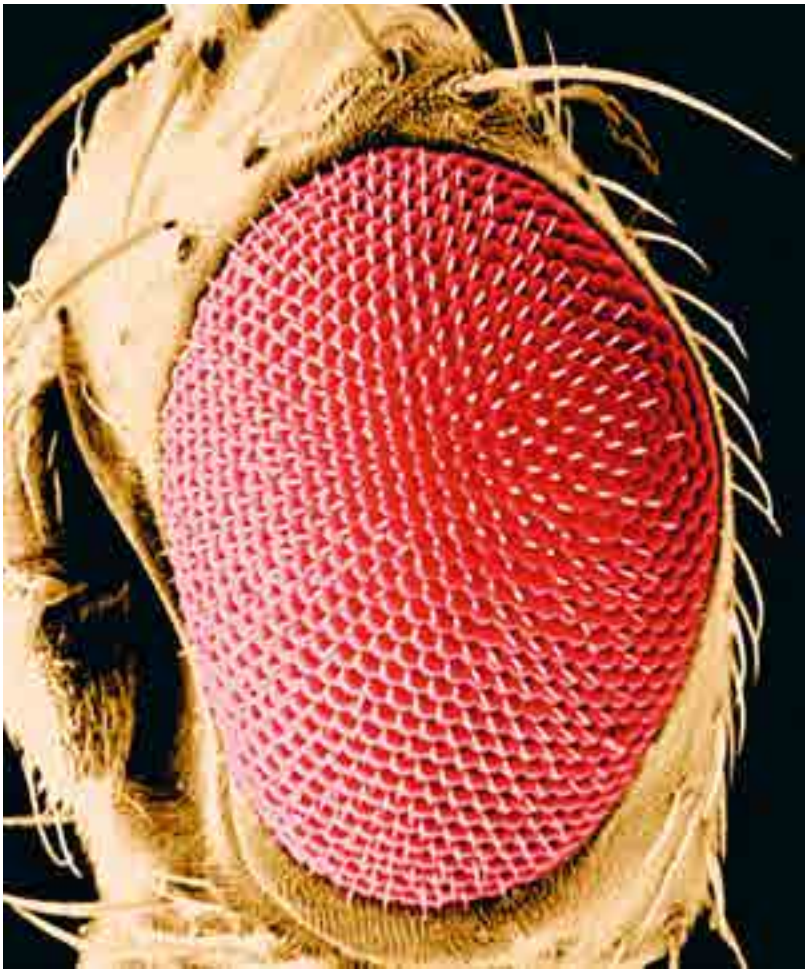
One of my narrative experiments in *Radium and the Secret of Life* was to take the specificity of what a scientific term means and how it works as a tool for scientists, ultimately transforming its very meaning in strange and unexpected ways, and see if I could use this in a parallel way to unfold new and surprising insights in my own work as a historian. From the earlier twentieth-century polyvalence of the term »mutation,« I saw how its meaning constricted over succeeding decades, until it ultimately

The Castle Bravo nuclear test. Detonation of a thermonuclear device tested by the United States, March 1, 1954.
Courtesy United States Department of Energy. Public Domain

came to mean »genic« mutation and the central role of the evening primrose – whose hereditary behavior at the heart of the very emergence of the idea of mutation itself, and which was studied without almost any reference to genes at all – was lost. In uncovering this history of the earlier forgotten and multiple meanings of »mutation,« I could recover and reanimate earlier definitions that had become inoperative – alternative understandings that reveal a much broader, far more contested, and ultimately more open history of mutation. And the further back we go from our contemporary understanding of mutation, the stranger these sorts of associations become – things that were called »mutations« then would never be called »mutations« today. And yet one knows that the history that made these associations and our meaning of mutation today possible was also eventually what made these earlier alternatives seem increasingly strange as time passed.

So for me it is less a conceptual project of starting from what we think the scientific term means now, or beginning by imagining other possibilities and meanings for a term – many people in other areas of endeavor, such as artists, can do this productively and to very interesting effect – but as a historian, as I work my way backwards in time, I have another slightly different aim with similar tools. I can reveal how a reductive meaning came to be, and to understand not only how this meaning changed over time, but also what was lost in its construction. I can explore how social dimensions become written out of the meaning of a scientific term – that when people called a plant »degenerate« or »queer« it had more than merely biological meanings. Or that our very belief that »mutation« has essentially a genic or hereditary meaning rather than other possible meanings – that when one is talking about an alternative understanding of mutation that involves not just a genic change but a linked ring of chromosomes, say, as is the case in *Oenothera*, this historical understanding of the meaning of »mutation« can challenge not only our understandings of the stability of heredity (and of a plant whose reproductive mechanisms are not easily encapsulated in principles of Mendelism), but can even challenge our understanding of the very distinction between »species« and »sex.« We have lost these alternative histories of biology, which are not invented fictions, but only past possible understandings, lost through the constraints of historical contingency. Understanding how the meaning of mutation has become so constricted might help us explore new ways we might think to study the meaning of variation today in our very muddy, empirical world, where the emergence of one kind of conceptual clarity is only one possible outcome from an exciting epistemological tussle with the blooming, buzzing confusion around us.

The game of the historian is to uncover the meanings that were actually present in past times, and to show that despite their seeming distance from our current understanding, they may yet offer new and different ways of understanding how science actually worked and works. In the case of »mutation,« for example, this term found a place in the language of biology to describe the new phenomena of heredity even as its associations with transformation, evolution, and descent was applied to



Close-up view of adult eye of Drosophila melanogaster (often referred to as a fruit fly), a model organism used for biological research. Courtesy of the Wellcome Collection. Credit. David Strutt. Creative Commons Attribution (CC BY 4.0)

characterize the newly discovered phenomena of radioactivity (for which there was no pre-existing language at the time). It was this kind of passage across realms of scientific and cultural production, across physics and biology, across transmutation and mutation, that led to provocative and productive experiments with radium. A metaphorical resonance or conceptual association between radium and life led to the possibility of certain kinds of experiments being conducted, and even how these experiments would come to be interpreted. These associations made it not only naturally inventive but scientifically generative to relate the world of the living and the world of the radioactive.

Years later, when biologists began to talk about genes as radiating forces that remake the living world around them, as Muller later did, this language of radiation came to suffuse its glow throughout an emerging scientific understanding of gene action – a radioactive legacy present but now largely decayed in our understanding of basic mechanisms in molecular biology. Even as the meaning of mutation constricted, it carried forth these radioactive legacies in how we conceptualize what genes are and what they do. So, sometimes we can recover alternative histories of biology that were contingently lost; but sometimes we can come to understand the contingent ways in which unexpected and powerful legacies can become transmuted over decades.

I am curious how you consider the historic permanence of the definition of mutation, as well as its accompanying conceptual frameworks, in your more recent work on astrobiology, a field that I also am very interested in precisely because it stretches our Earth-centric understanding of molecular architectures and definitions of life. You recently interviewed Steven Benner, a biochemist who aims to create DNA and RNA analogues that can support Darwinism yet differ from those found on Earth. Here, you mentioned a quote from Muller, where he said that within the »ability of the gene to reproduce mutations lies the most essential secret of life itself, and of living matter as compared to lifeless.« You also described how Muller was an early mentor to Carl Sagan, and even offe-

red us the lovely anecdote that Sagan gave Muller with a birthday card that included a photograph of Mars from the time, covered by a thread symbolizing the threads of the chromosomes of life, and Sagan's inscription of the phrase »the red thread slowly weaves its way upwards.« You further elaborate on this in your new article »Life as It Could Be.«

A hunch is an important place for a historian to begin, but to find an actual genetic or genealogical connection – a phrase, a card, an inscription – that brings that hunch into provable historical reality is one of the most beautiful moments for a historian. That Sagan was actually the mentee of Muller is a brilliant and amazing thing in itself – you can imagine the connections, as well the resonance and juxtaposition of putting their ideas together and the implications of this in historic terms. But it's actually in finding this »red thread« itself, an inscription from a particular moment in time testifying to a deep and longstanding relationship that is needed to do the work a historian requires for an argument, that is so wonderful. In one sense, I envisioned and anticipated this connection – I invented it before I knew it was there – but then I went looking for it, and finally found it. Historians might begin with invention but must end with discovery.

This tension between invention and discovery is a feature of science as much as it is a feature of history. And the ways in which good work is done in science at this intersection of invention and discovery is what I want to explore in my next work, on the intertwined histories of the engineering of life and of finding it elsewhere – of synthetic biology on the one hand, and astrobiology on the other. In the same way I explored the case of radium, I want to follow these powerful and deep resonances and rather than just suggest them, I want to establish them with irrefutable evidence. Have I invented the association? Or is it there in my sources? The answer is always both, so long as I can weave that evidence together into a compelling enough narrative that tells you something new and provable about the history of the development of a science. I did this with radium and life, and with the evening primrose and mutation and sexuality, and I hope to do something similar with this intersection as well.

That the engineering of life on Earth might have a great deal to do with considering how life might have emerged naturally on other worlds is thus not only a conceptual possibility or insight – it is a challenge to be proven historically. As I began to marshal the evidence I could find, it began to matter deeply to discover, for instance, that Muller was envisioning futures for engineering life on Earth at the same time that he was reading science fiction and going to science fiction congresses with Carl Sagan. Sagan's ideas about life elsewhere, for which he is most well-known today, clearly did not come from nowhere – they emerged in some significant part from these conversations with Muller. Ideas about the engineering of life and its natural alternative existence elsewhere were by mid-century never quite separate endeavors. For Muller, the gene was a biological reality and a conceptual tool, a self-replicating unit as well as abstract reproductive entity that structured the way he thought about life, both on our planet and beyond – and this dovetailed in striking ways that Sagan would later develop in astrobiology. Both men were deeply concerned with questions that we might now frame as part of a larger discourse of »habitability« – could humans survive a radiation-doused world? Could they live elsewhere? Could something else?

What is fascinating is that this is happening at the same time that Mendelian genetics is being contested in other parts of the world, such as through Lysenkoism in the Soviet Union, for example. Likewise, astrobiology is also being defined by Soviet scientists such as Gavriil Adrianovich Tikhov, who was able to envision vegetation on other planets and develop methods to study this through the study of vascular plants alone.

Yes – in an article I wrote for a compendium on the legacies of Lysenkoism, *Dialectics Denied*, I suggested that the geopolitical structure of the Cold War world may also be part of the history of the constriction of the scientific meaning of »mutation« and the loss of an intermediate level of chromosomal mutation that was increasingly problematic not only for western geneticists, but for Soviet investigators as well. For Lysenkoists, for a series of complex reasons having to do with the longstanding associations between genetics and eugenics as well as the anticlericalism of Marxism, the gene itself was understood as an ideological construction of capitalism.

But ideology does not only lead to illusive fictions – it can also be understood as a generative context for scientific theorizing. Tikhov's understanding of astrobotany is directly tied to his application of the principles of dialectical materialism to the understanding of the evolution of life in the universe. If you understand life as taking place in progressive stages that are predicted and expected to occur anywhere conditions are right,

Film poster for the 1971 movie *The Andromeda Strain*, directed by Robert Wise and based on Michael Crichton's 1969 novel of the same name.
© Universal Pictures

then we must expect there to be life in other places, Tikhov theorized. And if this life emerged on a neighboring planet, the question then emerges: how would we be able to look for it? This led Tikhov to develop methods in spectroscopy as a way to study high-altitude vegetation in the mountains of Kazakhstan, and high-latitude vegetation elsewhere, to envision (or to speculate – such optical metaphors!) how this could help him understand what he might be seeing when he looked at light from Mars through the telescope. He was studying life on Mars not through a genetic tool, or direct manipulation of an organism, but with a purely observational tool and the conceptual tool of analogy. He considered parts of the Earth as a Martian analog. Decades before Sagan, Tikhov's theorizing about the spectroscopic qualities of light from other worlds led him to conclude that looking at the Earth from a great distance away, it would appear as a pale blue dot. (Making the connection even more apparent: I first encountered Tikhov's work through a translation ordered by Sagan!)

It surprises me how few people know that this phrase which is regularly attributed to Sagan can actually be traced to Tikhov, whom I am researching currently in Russia for an upcoming project and first encountered through my own personal investigations on Ivan Efremov, a Soviet paleontologist who was among the first to formulate retrieval of fossilized traces of life beyond Earth and was also a well-known writer of space-travel science fiction.

The intersections of science fiction, space, paleontology, and the prospects for biology are a fascinating place to land. I recently referred to Efremov and his novel *The Andromeda Nebula* in a lecture I gave at the American Association for the Advancement of Science about Michael Crichton's *The Andromeda Strain* – a science-

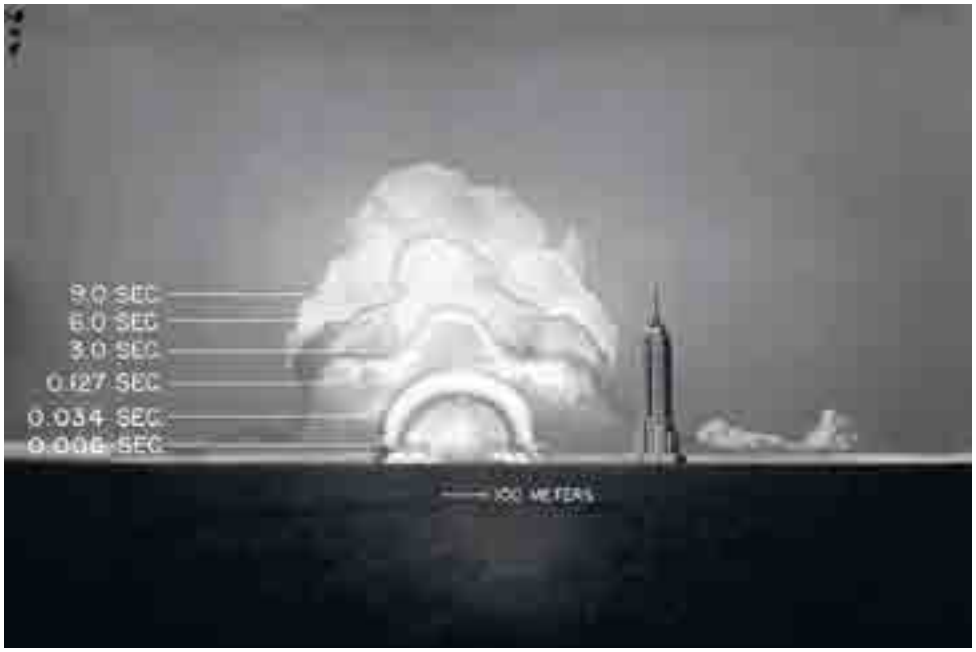
fiction novel that offered to a generation of molecular biologists food for thought about the cosmic potential hazards of genetic engineering. This book, interestingly enough, was inspired by Crichton having heard this throwaway line from another paleontologist, George Gaylord Simpson, who said in a graduate seminar that there might be microorganisms that live high in the atmosphere. In a forthcoming chapter, I have written about how *The Andromeda Strain* gets picked up and referred to constantly during the 1975 Asilomar meeting on the potential biohazards of recombinant DNA research. And references to the novel continue to appear all the way up, even reaching the U.S. Congress and Stanford University's Office of Technology Licensing, who talk about *The Andromeda Strain* as a future we need to avoid.

It is in circumstances like this, where I trace the line between science and science fiction, that we can come to understand that *The Andromeda Strain* is not just a work of science fiction, but plays a key role in authorizing speculative futures for new innovations in genetic technologies. A science fiction novel can even change how scientists themselves imagine the future prospects and potentials for their field, and more concretely, even federal legislation governing the use of a powerful new technology of genetic engineering. In that chapter, I also look at how Andromeda is the galaxy that operates for us as a parallel, much like how Mars operates as an analog for Earth. It's also fascinating how *The Andromeda Strain* picks up on a speculative tradition regarding contamination in exobiology that existed for several years beforehand, and then transformed this concern into fears of laboratory mishaps in relation to the novel uses of recombinant DNA on Earth. The invention of new forms of life in the laboratory was informed by imaginaries of life as it may have emerged elsewhere – that powerful intersection between synthetic biology and astrobiology, both of which are concerned about »life as it could be.«

In the context of our current global pandemic, the idea of what can happen if government officials do not take appropriate precautions on rapidly mutating viral strains is certainly registering and resonating with aspects of The Andromeda Strain*, otherworldly fears aside. But it does strike me that the language of a mutation as a »contaminant« in the case of SARS-CoV-2 poses a similarity, one that falls alongside ideas of its pervasive airborne transmission, likely zoonotic origins, and ongoing speed of mutation. Yet these notions of the virus as a contaminant also nevertheless appeal to broader planetary questions of industrial pollution and anthropogenic ecological destruction.*

This reminds me of the case of a factory linked to the so-called »radium girls« in Orange, New Jersey, which is adjacent to the Thomas Edison National Historical Park and Laboratory. Mutation and contamination are not just metaphors – they are also very real and tragic realities with consequences for our health. Some years ago, I was teaching in New Jersey, near the site of a former radium watch-painting factory. The factory had long since been demolished and the site was a simple grass field surrounded by a fence to keep people out. Yet the site was so contaminated it was designated as a toxic Superfund site, which continued to cause radon problems in the basements of houses nearby. And so a large working-class community was buying homes that had radon problems because of the factory that no one even knew had ever been there. I happened to visit the area again last year to go take a look, and while a fence had previously kept visitors out, the site had now been remediated and turned into a baseball field. There's even an orchard and garden center across the street where they do not plant in the local dirt, but have raised beds with substituted soil in which plants are grown. The radioactive contamination is literally an underlying history of this place that is only known to homeowners (if even they know) and yet is completely invisible when you drive by. While uncovering a hidden history between synthetic biology and astrobiology, or between Muller and Sagan, was invigorating and fun, and an epistemological challenge to how we might sometimes think about the nature of science or its history, not all hidden histories are fun. Sometimes they are quite toxic and dangerous.

I currently teach a course titled »Atomic America,« in which my students meet and learn from the leader of a »downwinders« group here, an activist group that has been fighting for federal recognition and compensation for New Mexicans who were downwind of the Trinity test site in 1945. They have never been compensated, and despite having suffered generations of epidemiological effects they do not have access to federal protections and reparations, unlike downwinders in Utah, Nevada, and other places. The leader of this group is a quite powerful speaker who just testified before Congress last week – one important moment of many years of grassroots advocacy in which she has been trying to draw attention to this situation. One of her main claims is that living in the radioactive aftermath of New Mexico has led to a high rate of cancers; she herself has had her thyroid removed, and she suggests a direct correlation between the plutonium strewn across the region by the first atomic bomb blast and these illnesses. She believes



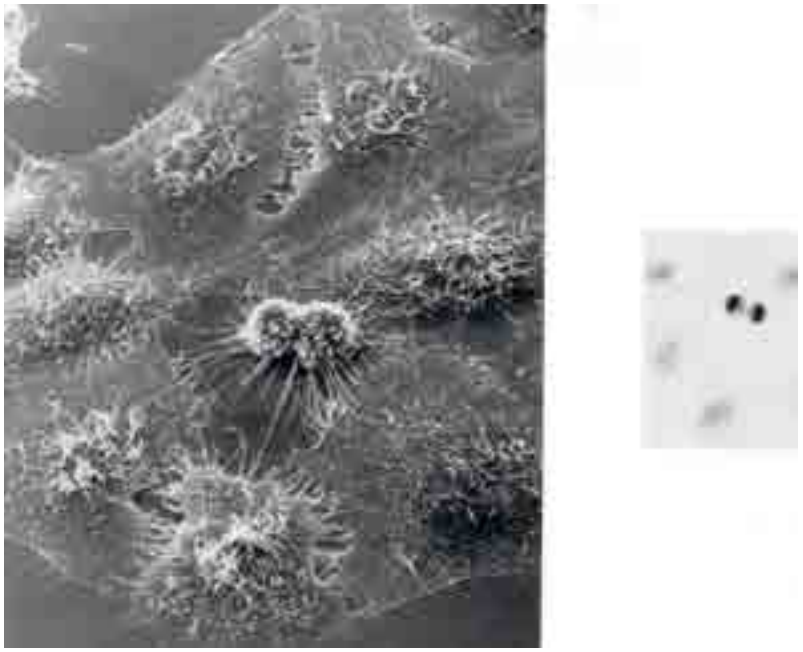
Trinity test explosion, 0.016 seconds after detonation in the desert near Alamogordo, New Mexico, July 16, 1945, at 5:29:45 am. The Empire State Building is included at right to represent the scale of the blast. Courtesy of Los Alamos National Laboratory. Public Domain

that these legacy radionuclides and fission products are being constantly stirred up by the conventional bombing that still happens in the same place where the first atomic explosion took place, on the active White Sands Missile Range. While the Trinity test was a one-time event, she argues, its consequences have lasted decades for residents of the state. The half-life of plutonium is 24,000 years. What does it mean to have radioactive contamination causing health problems for people living in such a heartbreakingly beautiful but contaminated place? And how can we understand these harms in light of the longer term colonial history of New Mexico, including its later nuclear colonization with the Manhattan Project?

These forgotten stories raise powerful questions about the very real health effects resulting from imbalances in privilege, power, and access. If we take our mutant gaze to these topics, so personal and human (and inhumane), we find new ways of understanding how one's subjective embodiment, one's being subject to radiation-induced mutations that can lead to cancer, can be a different sort of powerful starting point for understanding the place of science in our lives. Mutations are not only strange plants found in our gardens, objects of curiosity that can inspire a new theory, or increasingly complicated concepts that help us characterize the nature and properties of the gene. Mutations are, in an important sense, inextricable from our existence as living beings in a contaminated world.

These multigenerational accounts about the ongoing effects of mutations in living populations offer a real and all too painful reminder that the history of radiation-induced mutation in the laboratory is often directly intertwined with its parallel experience of lethal experiments in the laboratory and in the field, which affects both humans and ecosystems alike. It is a difficult place to end – in thinking about the downwinders, I can do no better than to cite the Tokyo-based artist collective Chim↑Pom and their project Don't Follow the Wind*. Together with other artists from Japan and elsewhere, they created in the Fukushima exclusion zone an »inhibition« rather than an »exhibition,« which will not be visited by people other than those inhabiting the area due to ongoing radioactive contamination.*

Yes – I think this highlights quite beautifully how associative thinking can be useful not only in identifying problems, uncovering forgotten alternative histories, tracking constrictions, characterizing ideological shifts, and uncovering dangers we only imagined were buried, as I do within the constraints of the discipline of history, but can also point the way toward ever-new ways of thinking. This is why I so appreciate working with artists and others who engage in the hard work of making these often difficult connections, and who find and share with us all new possibilities for exploration and explanation, and who consider subjective embodiment not only as a conclusion, but as a starting point for artistic expression – and for the expansion of our mutant gaze.



First photograph of HeLa (Henrietta Lacks) cells. This human cell line was derived from cervical cancer cells taken on February 8, 1951, from Henrietta Lacks, a 31-year-old African-American woman who died the same year. These were removed by George O. Gay from John Hopkins Medical Hospital without Lax's consent and continue to be used extensively in bio-medical research. 2021 marks the centennial anniversary of Lack's birth and 60th anniversary of her death. Image from the George O. Gay Collection. Courtesy of the Alan Mason Chesney Medical Archives, John Hopkins Medical Institutions.

1 Hugo de Vries (1848–1935) was a Dutch botanist and geneticist who first introduced the term »mutation« and developed a mutational theory of evolution, largely based on his studies of the evening primrose (*Oenothera*). One of the so-called »rediscoverers« of the work of Gregor Mendel, de Vries carried out hereditary studies on plants that in some ways confirmed and in other ways deeply challenged Mendel's earlier work, helping to consolidate mutation into the heart of what would soon become the early history of genetics. See Luis Campos: »Mutant Sexuality: The Private Life of a Plant,« in: *Making Mutations: Objects, Practices, Contexts*, Luis Campos and Alexander von Schwerin (eds.), Berlin 2010, pp. 49–70.

2 Ana María Gómez López: *Inoculate: A Florilegium*. http://manual.vision; and *Vital Practices: Self-experimentation as Artistic and Scientific Form*. https://experiments.life. (both accessed May 31, 2021).

3 Gregor Mendel (1822–84) was a botanist and Augustinian monk from Brno (then Moravia, currently the Czech Republic) who was the first person to establish the mathematical foundations of classical genetics by growing pea plants with subsequent attempts using bee species. Mendelism refers to his principles regarding the inheritance of single-gene traits.

4 Martinus Beijerink (1851–1931), a Dutch microbiologist, was the first person to name viruses. He used the Latin name virus, which means poison, to identify an invisible substance that could be filtered through a thin mesh and proved to sicken tobacco plants. Beijerinck asserted that the virus was somewhat liquid in nature, calling it *contagium vivum fluidum* (contagious living fluid). Difficult to test at the time, the *contagium vivum fluidum* languished for more than three decades before resurfacing as a subject of study with the electron scanning microscope.

5 Hermann Joseph Muller (1876–1931) was a United States geneticist who studied the hereditary characteristics of fruit flies. Between 1926 and 1927, he discovered that the number of genic mutations observed in the cells of fruit flies increased when they were exposed to ionizing radiation such as X-rays. This finding earned him the Nobel Prize in Physiology or Medicine in 1946.

6 The Bravo tests were high-yield nuclear energy tests that were carried out by the United States on March 1, 1954, in the Bikini Atoll of the Marshall Islands, as part of Operation Castle. At the time of its detonation, Castle Bravo was the largest nuclear explosion in history.

7 Luis Campos and Steven Benner: »Other Genetic Alphabets,« in: *Journal of Design and Science*, 2018. https://jods.mitpress.mit.edu/pub/issue4-campos-benner (accessed May 5, 2021).

8 Carl Sagan (1934–96) was a U.S. astronomer and astrophysicist, as well as one of the most popular science writers and communicators of this time. He is well-known for his television documentary series and book titled *Cosmos*.

9 Luis Campos: »Life as It Could Be,« Kelly C. Smith and Carlos Mariscal (eds.): *Social and Conceptual Issues in Astrobiology*, New York 2020, pp. 101–15.

10 Gavriil Adrianovich Tikhov (1875–1960) was a Soviet botanist and one of the earliest self-identified astrobiologists. He coined the term »astrobotany« in reference to his speculative postulation of extra-terrestrial life, especially the presence of vegetation on Mars. Luis Campos: »Blue Vegetation on the Red Planet: Soviet Astrobotany and Earthly Analogues for Life on Mars,« Istvan Praet and Perig Pitrou (eds.): *Anthropology of Earth*, Cambridge, forthcoming.

11 Trofim Lysenko (1898–1976) was a Soviet agronomist and biologist who rejected Mendelian genetics and natural selection, leading a decades-long campaign that bore enormous influence across the Soviet Union and across the Eastern bloc, and resulted in massive censorship and execution of dissenting Soviet scientists.

12 Luis Campos: »Dialectics Denied: Muller, Lysenkoism, and the Fate of Chromosomal Mutation,« William deJong-Lambert and Nikolai Krementsov (eds.): *The Lysenko Controversy as a Global Phenomenon* (Volume 2). Palgrave Studies in the History of Science and Technology, London 2017, pp. 161–184.

13 Ana María Gómez López: »Intergalactic lithospheres: Ivan Antonovitch Efremov at the Paleontological Institute in Moscow,« *Center for Experimental Museology*, Moscow: V-A-C Foundation, 2020. See also an excerpt of the short film *Cosmos and Paleontology*, 2020. at https://vimeo.com/amgomezlopez (accessed May 5, 2021)

14 Luis Campos: »Strains of Andromeda: The Cosmic Potential Hazards of Genetic Engineering,« in: Campos et al.: *Nature Remade: Engineering Life, Envisioning Worlds* Chicago 2021, pp. 151–72.

15 The Asilomar Conference on Recombinant DNA was held in February 1975 to discuss the potential risks of biotechnology and proposed voluntary guidelines to ensure the safety of recombinant DNA technology.

16 The »radium girls« refers to hundreds of female factory workers who during World War I and afterward painted wristwatch dials with luminous radium paint. Many of them ingested traces of radium, which caused radiation-induced cancer and, in many cases, early death. One of these plants was located in Orange, New Jersey (now East Orange).

17 »Superfund« is a common name given in the United States to sites with hazardous pollutants or toxic-waste contamination, which are designated governmental funds for long-term clean-up operations.

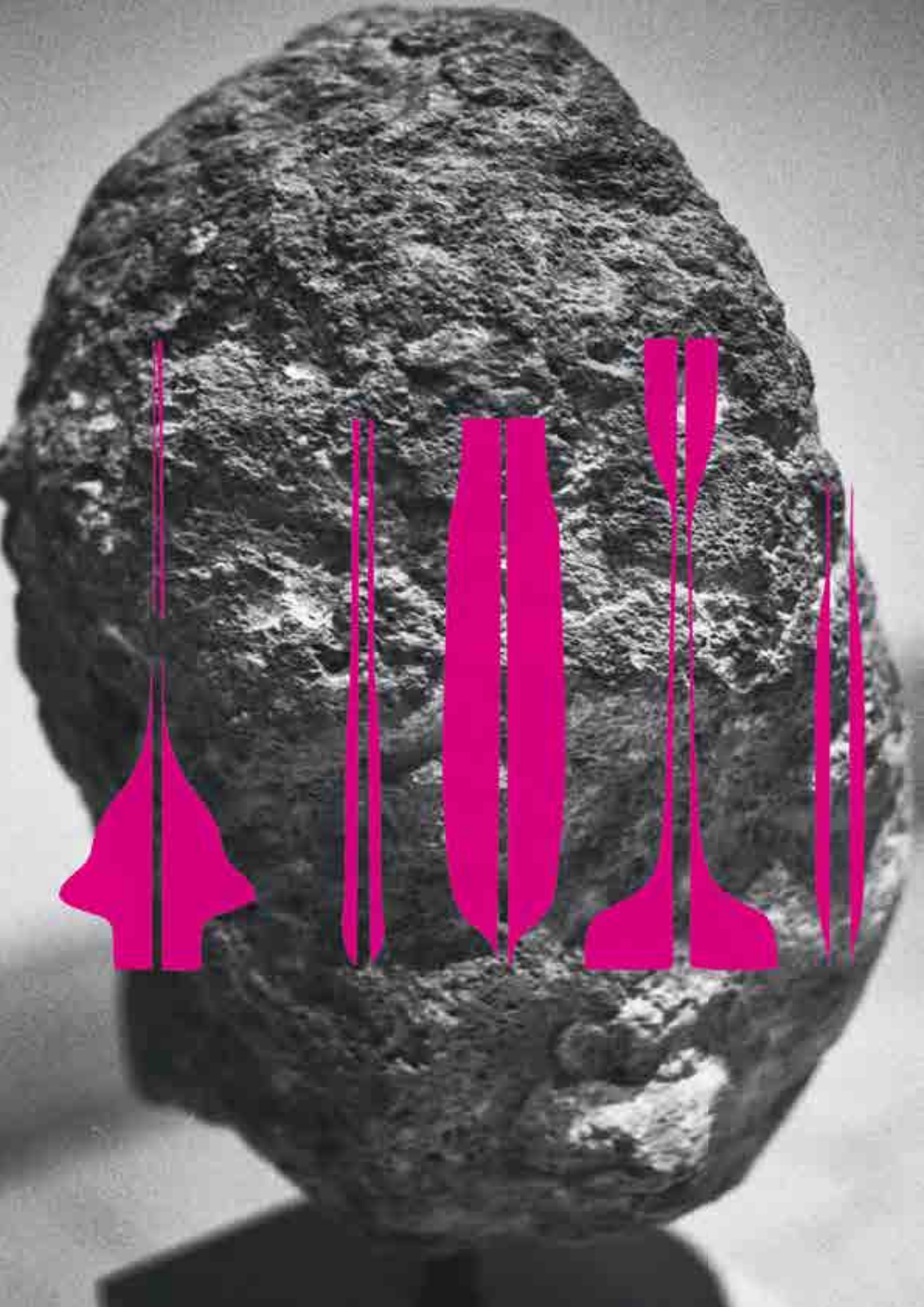
18 The Trinity nuclear test was conducted on July 16, 1945, by the United States Army as part of the Manhattan Project, or the research and development program for nuclear weapons during World War II. »Downwinders« is the term used to describe communities primarily in Arizona, Nevada, New Mexico, Utah, and other regions of the United States which were exposed to radioactive contamination or fallout due to this testing of nuclear weapons. The New Mexican downwinders were the first downwinders in history, but have not been covered under the federal Radiation Exposure Compensation Act of 1990.

19 The White Sands Testing Facility has been in operation since 1963 and is used by NASA and the U.S. Department of Defense for evaluating hazardous materials, space flight components, and rocket propulsion systems located near Alamogordo, New Mexico.

20 For more information on this project by Chim↑Pom, visit http://dontfollowthewind.info (accessed May 5, 2021).

That the word »mutation« shares its etymological
root with the word »mutual« locates the communal as the basis from
which to effect change at conceptual and applied levels.
The following three collectives – Matter in Flux, Órbitat, and SSEA – have
been invited to respond to the theme of mutation,
which grounds the first interdisciplinary group residency
at Akademie Schloss Solitude.
Each of these image-based and textual responses offers a
distinct approach to what mutations can encompass.

All of these
contributions – from the
human eye's self-reflective observations,
the geological inscription of a pollen grain across time, and
the course of a waterway traversing topographic and semantic
landscapes – exemplify transformative possibilities
in art making and scholarship: mutations in form
and content, method and production,
vantage point and
assemblage.



Because tempo is really a question of depth. Seen from the wrong perspective, land is an accidental occurrence. Where *we* are is just the right amount of glacial withdrawal. Individual elements appear first as *desire*, the longing for and from correct striation, or the absolute fact of climate, given by vegetation, given by pollen. But by what precise angle of the spade's thrust is *just this past* known?

Beginning in the 1930s archaeologists, ecologists and geologists were drawn into English fenland and set to work excavating Mesolithic sites, where the remains of human industry – flint knapping, butchery – could be correlated with pollen sediment that indicated the arrival, first of birch and pine, then oak forests. Successive waves of vegetation are shown as pulsing diagrams, a translation of hundreds of hours spent at the microscope identifying and counting ancient pollen: the ultimate particle of the accelerator that is climate change.

The landscape is a zero-point: a flat depth into which a group of scientists could plunge a muddy past. That past *is* the sediment, *is* the core sample, *is* the corer, *is* the work-party, *is* 'succession', 'and the limits are not time but ridges / and thermal delays, plus or minus whatever / carbon dates we have.' This is from J.H. Prynne's 'The Glacial Question, Unsolved', which is only a poem so long as the climate is a steady state. Otherwise it is a body composed from the limbs and viscera of scientific discourse, and from the landscape it invokes: its 'beautiful head' is 'frost', its 'curving spine' a 'cretaceous ridge'. It is – *we are* – 'rocked / in this hollow': the pan-handle of East Anglia, the strangest geology of the air pressing on our foreheads. The personal is palaeontological. As with many poems from *The White Stones*, Prynne's iridescent 1969 collection, there is a desiring heart in 'The Glacial Question', a vast technical matter encases an absolutely irreducible moment of intimacy: 'the / cut back down, to the shore'. I cannot read this as anything other than a lament for the idea of England: the weak and dangerous nationalism that will not let its scientists and writers escape.

Pollen science emerged in the early-twentieth century from the ruins of industrialization: plant fossils were first used to identify coal seams; the fens present themselves as a tractable landscape for analysis because they have been drained and managed for Big Agriculture since at least the seventeenth century. For the new science of ecology pollen could act as an index: a way of fixing and understanding the succession of past vegetation. Climate was, itself, another proxy. But over the course of the twentieth century the picture has emerged not only of a changing climate but of an unbreakable entanglement of land use, sea-level, vegetation and habitability. For Prynne and the palynologists alike, the landscape discloses itself as an event horizon of survivability: persistence enters the mind as crystal growth. The possibility of sentiment is given by the reality of sediment.

It is hard to think that the *time* given to us by palaeoclimatologists is itself a surface onto which political possibilities can be written, but we are soon to learn that the climate operates not on a single time-line but across multiple, even contradictory temporal fields.

How Rivers Think, 2018.

One of eighty slides customized to host actual water gathered from a river in the Amazon.
The final piece is activated by means of a slide projection of the entire sequence.

MAYU

CONCIENCIA

CONFLUÊNCIA

CUENCA DEL RÍO

CORRENTES EM CADEIA

DINÁMICAS ECO-FLUVIALES

RIVER DELTA

CASCADE

HAH:

The sign and the object it points to are inversed in time, so lightning is suddenly a sign pointing to thunder. Lightning and thunder are supposed to converge in the geographical present; the closer they are in space, the closer they are in time until they are aspects of the same event, as, of course, they are. But we think of them more like twins: they belong together, are the same and not the same, they may be separated in time. I spend some minutes looking at pictures of two sets of identical twins who were mixed up at birth, raised in different families as two sets of fraternal twins. Two brothers raised in the city, in an educated middle class household, two brothers dirt poor on a rural farm. The photos are like mug shots—blank backgrounds, unsmiling faces. I study them carefully, trying to imagine who grew up where. All four have short hair and wear tee shirts. I close the browser tab and go outside. Later, I pass one of my neighbors walking on the sidewalk with her baby in her arms. I smile at her and she either [illegible] or smiles back. I don't know because we are both wearing masks.

I was lying in the grass, first time since lockdown, spine stretched out over the curve of the earth in the private school's sports grounds. The gardens are open to the public during these 'extraordinary circumstances' as a kind of olive branch from the rich to the poor. It was a sunny, clear morning and in the northern hemisphere it is spring so the temperature was mild, the bugs are reproducing, the birds are feeding. An aeroplane crossed the sky, and my girlfriend downloaded an app that told us it had travelled all the way from Rwanda and would be landing at Heathrow in three minutes. It also said that another one would soon pass—a British Airways flight from Los Angeles. The plane obediently appeared—a strange reversal in the dynamics of image and information, a sort of lightning after the thunder.

Looking up into the sky I could see straight for what seemed like hundreds of miles—infinite, even. Then I spotted two black dots, swallows. They were probably 100 feet from the ground, excessively high. My eyes attuned, and then there were others, even higher up, sweeping the air.

JT:

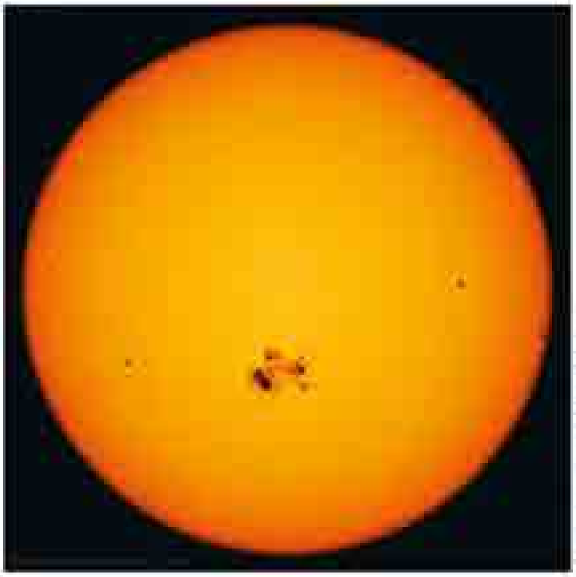
Recently, when revisiting an essay by Lithuanian philosopher Kristupas Sabolius, I stumbled upon his definition of the metaphor "The eyes of the other." The eyes of other signals a mode, which doesn't simply enable vision but allows one to listen or look into the realm of the imaginary. It opens up the visual semi-object as something semi-apparent, a semi-determined formation that is also alien and incomprehensible. There are registers for which fictions are no longer cosy, compensatory and reconciliatory, and I agree with him here, that the world is no longer protected by a safety shield and gradually overpowered through disturbing gestures. A symbol can become the possibility of overcoming—i.e. The kind of transgression which not only reconciles us with a harsh reality, but intensifies it further. Here, imagination acts not as a process of dissociation, but as a specific association to be enacted in, so as to think further about radical ethics in a world in flux.

WS:

The phenomenon of young spiders casting off from the earth is known as ballooning. Spiderlings, protected and borne by their silk threads, float as high as the upper atmosphere, where they are detected by atmospheric data balloons launched by humans. Ballooning spiders though are not in fact lofted by the air that lifts the weather balloon—instead, the spiders rely on the planetary electric field, which the spiders detect with small hairs on their feet. Extruded silk carries a negative charge that repels the similarly charged ground or plant from which the spider lifts, now buoyed by an electric field. It's ballooning [illegible] "When the first colonizers of new volcanic islands," points out Erica Morley of the University of Bristol. It is difficult to envision a technology of planetary [illegible] that is not wrapped into the [illegible] tools of [illegible], mapping, and surveying, but the ballooning spider, to the best of my ability to understand, does not fly in the pursuit of empire. The high-flying swallows perhaps were playing or perhaps were eating or perhaps both, and whatever [illegible] there were [illegible]. The spider [illegible] doesn't deal in [illegible] and concerned with the spider world [illegible] for high [illegible] altitude [illegible] by ballooning spiders but that's not to say she's not [illegible] with the pleasures of flight.

Birds don't have storage space in their digestive systems so they have to eat continuously. I wondered if they were using precious energy to play or [illegible]. At this point, the air acquired a further sense of depth and I could see the bugs hovering and zipping just a few meters above me. Gauging depth in empty space is challenging, and some dots went from being bugs to far away swallows and vice versa. As I tuned in, trying to qualify the dots further, the squiggles appeared. Eye floaters are entoptic phenomena, or visual effects that result from sources within the eye itself. The surface of the eye is covered in veins and structures that are usually blanked out of vision by the brain—stable and non-useful information—and sometimes pieces break off, cell matter and different particles. Mine were squiggles, like you'd do testing out a pen; transparent filaments that could be brushed away when I focused on the birds or the bugs. If given enough attention they would emerge more boldly, intersecting bugs, birds, sinking into different levels of space, as happens when swimming in sea water in search of plankton that all of a sudden acquire presence in spite of their transparent selves. Similarly, the eye floaters qualify, revealing themselves as thin chains of cell-like material, like protein filaments. I looked away from the sky, and they disappeared. I looked back at the sky, and there they were—gliding across the sky from right to left, with the swallows. I read after that [illegible], somewhat dulling my surprise at the only being visible against the blue of the sky, but the fact still remains that when looking at the sky the eye becomes more visible to itself.

HAH:



NASA/SDO

HAH: She was sure that there was something wrong with her eyes because a shadow covered the inner third of her vision. Her mother peered into her eyes, told her to look right and then left. The doctor examined one eye and then the other with a bright light, but couldn't find anything unusual. At first her mother used to ask her about it, but as she eventually stopped mentioning it, so did her mother. One day, ten years later, as she lay in bed staring at the ceiling, it occurred to her: the two shadows add up to a nose. She lay still a little longer, looking at her own nose.

AAD:
...they spawn in open water dart up from the reef into the water column to release their eggs on ebbing tides. The currents then carry the eggs away from the reef and from the huge numbers of egg-predators that live there. Once hatched, the larvae often use an incoming tide to ride in to a reef to settle.

AAD:
For divers the sight is something to behold—millions and millions of gametes floating to the surface, the future of life rising smoke-like through the water.

RH: [illegible]

RH:

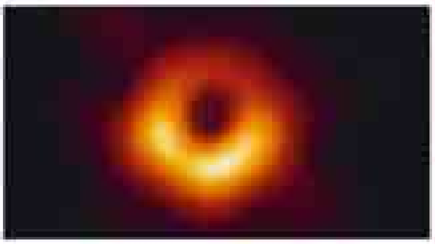


Image of black hole, NASA

CB: For reference, in regards to transparent forms and other invisible correspondents:
A) A string of salps, plankton chains that can be kilometers long and pass perfectly unnoticed.

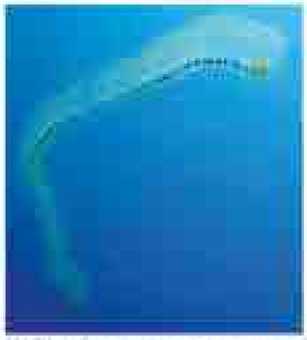


Image: Hartmut Olstowski

B) The fantastic structure of tocilizumab, a biological immunosuppressive protein. Tocilizumab is bein used in trials for the treatment of Covid-19

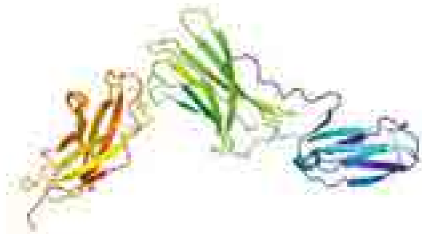


Image: Wikipedia

Luis Campos is associate professor in history of science and Regent's Lecturer in Arts and Science at the University of New Mexico. He held the Astrobiology chair at the John W. Kluge Center at the Library of Congress in Washington, DC, and is currently the Secretary for the History of Science Society, the primary international academic association for this field. Luis Campos published his first book *Radium and the Secret of Life* (University of Chicago Press, 2015) and has recently co-edited the volume *Nature Remade: Engineering Life, Envisioning Worlds* (forthcoming, also with University of Chicago Press). He will be a resident fellow at Akademie Schloss Solitude in 2022.

Ana María Gómez López is an interdisciplinary artist and researcher based in Amsterdam. Her work has been exhibited at the deCordova Sculpture Park and Museum, Fonds d'art contemporain Genève, and the Rijksmuseum Boerhaave, among others. She has held residencies and fellowships at the Rijksakademie van Beeldende Kunsten, the Max Planck Institute for History of Science, the Beinecke Rare Books and Manuscripts Library, and the Vossius Center for the History of Humanities and Sciences. Ana María's work during the »Mutations« residency was supported in part by the Mondriaan Fund.

Matter in Flux is an educational and knowledge-building axis attached to the curatorial research-based entity The World in Which We Occur. MiF is committed to critical analysis, sociological inquiry, debate, and collective writing: its members are artists, curators, theorists, and health practitioners based worldwide and working at the intersection of multiple disciplines. MiF's interrogative line considers politically enmeshed scientific affairs in ecological politics and policy, economies of transition, history of science, material studies, and gender studies in science. http://twwwo.org

Órbitat is a collaborative and open platform comprised of Latin American artists and social scientists that seeks to activate existing and potential connections between art, science, indigenous and traditional knowledge, history of science, eco-activism, and science fiction. Órbitat was created in response to systemic inequality and hostile public policies that have caused the destruction of ecosystems and human communities on the continent, and aims to highlight historically marginalized worldviews to address these longstanding and contemporary crises. http://orbitat.art

SSEA is a collaborative group of artists, religious practitioners, and researchers in science studies based in London and Cambridge, United Kingdom. SSEA is committed to art making as a form of social praxis, to the interpretation of technoscience as inherently political, and to the examination of religious figuration in the contemporary world. Their current project is *Wetlands*, a work of experimental historiography that uses documentary techniques (photography, film, sound), archival research, site-specific artwork, and interviews to investigate the fenlands of East Anglia. http://ssea.hotglue.me

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Edited by Grayson Earle

Phonic In and Off the World
Text by Carola Uehlken
Image by Sarah Friend

Entropy
Grayson Earle

Donna
Sam Lavigne

IBM c.1964; Google c.2017
ann haeyoung

Getting in Front of Pharma: Automated Public Discovery of Drug Candidates
Francis Tseng

Phonic In and Off the World

Text by Carola Uehlken

Becoming Terrestrial

The Pale Blue Dot[1]

Participatory Thought[2]

The first organ spirals out from a pile of cells, the first beat creates the legs, the arms, and the spine. Together they spiral out. All components ready to survive, they compose and decompose to the rhythm of environmental change. Piles of cells pulsating with others, each one creating an entire ecosystem.[3]

A spicy soup is tentacularly spiraling through it, touching base with its parts, pushing the beat to go on. Any affect connects the gut brain with this pile. Intruders, charming microbes stay, the nasty ones leave. They remember, they listen, they communicate, they wait, and they vanish when we need more brainspace to focus. And yet, they are beaten up by language and systemic division constantly.

Lost in the terrestrial courtroom

A line divided between holy and earthly

Worlding happens constantly

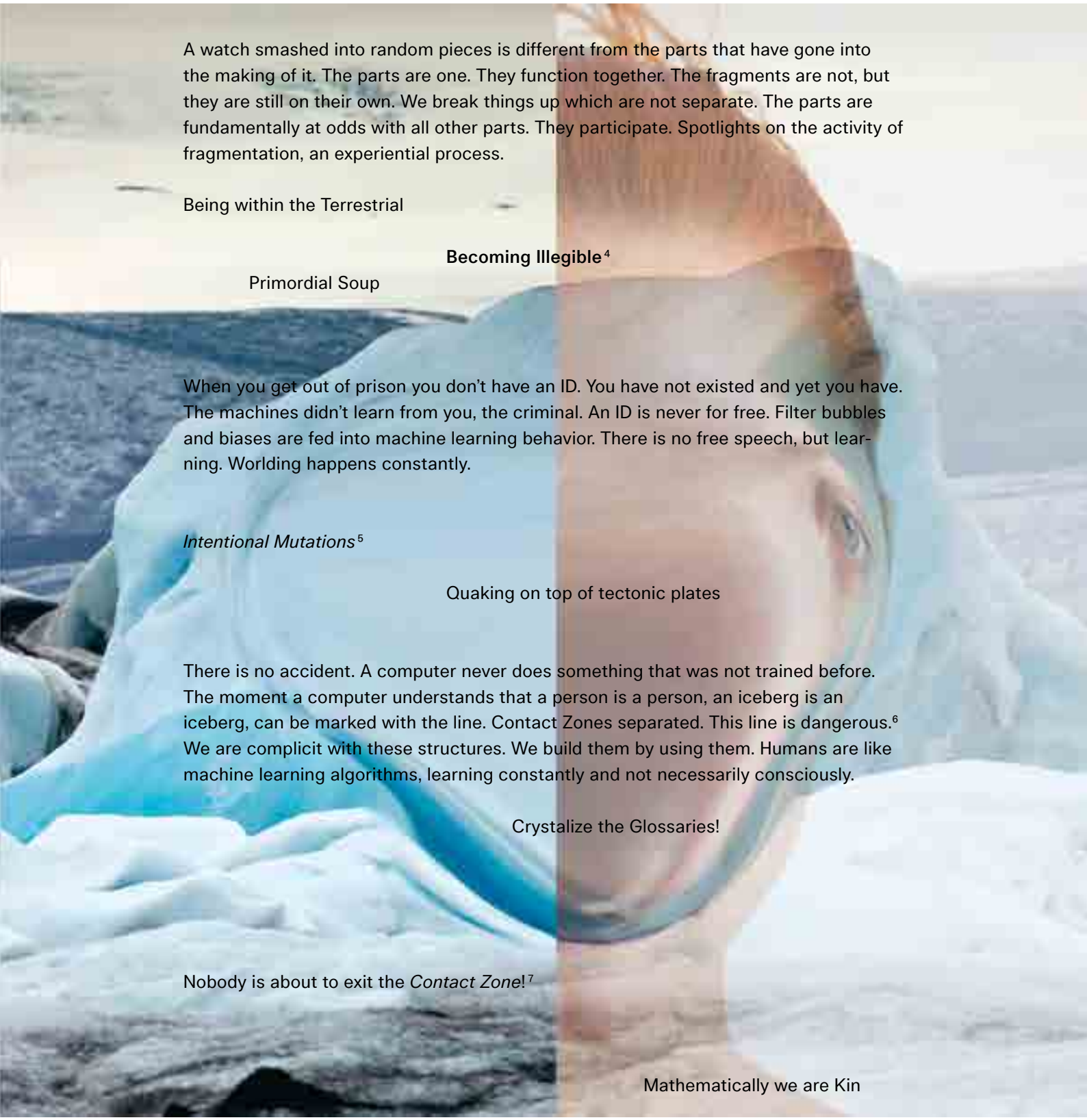
We are flying over damaged lands full of creatures curious to cross paths carrying complex stories with them. Microbes are Yourcrobes. In the biological court they judge on their own behalf by exchanging unearthly stories about the junk they got last night. A pig has eaten a holy oplate and was publicly hanged. Animals were in court until 1991. In the constitution of time a strong glossary has been made. Rotating actions create lines between living and dead material. Simplification is the end of symbiotic affairs.

As if we had no other ways to reworld

Zooming out of the comfort zone

Video still from *Becoming Illegible (spiraling)*, 2020

Image by Sarah Friend



A watch smashed into random pieces is different from the parts that have gone into the making of it. The parts are one. They function together. The fragments are not, but they are still on their own. We break things up which are not separate. The parts are fundamentally at odds with all other parts. They participate. Spotlights on the activity of fragmentation, an experiential process.

Being within the Terrestrial

Becoming Illegible[4]

Primordial Soup

When you get out of prison you don't have an ID. You have not existed and yet you have. The machines didn't learn from you, the criminal. An ID is never for free. Filter bubbles and biases are fed into machine learning behavior. There is no free speech, but learning. Worlding happens constantly.

Intentional Mutations[5]

Quaking on top of tectonic plates

There is no accident. A computer never does something that was not trained before. The moment a computer understands that a person is a person, an iceberg is an iceberg, can be marked with the line. Contact Zones separated. This line is dangerous.[6] We are complicit with these structures. We build them by using them. Humans are like machine learning algorithms, learning constantly and not necessarily consciously.

Crystalize the Glossaries!

Nobody is about to exit the *Contact Zone*![7]

Mathematically we are Kin

1 Carl Sagan: *Pale Blue Dot*, 1994.
2 David Bohm: *On Dialogue*, 1996.
3 Lynn Margulis and Dorian Sagan: *Origins of Sex: Three Billion Years of Genetic Recombination*, 1986.
4 Sarah Friend: *Becoming Illegible*, 2020.
5 Paul B. Preciado: *Intentional Mutation*, 2020.
6 Elizabeth Povinelli: *Geontologies: A Requiem to Late Liberalism*, 2016.
7 Donna Haraway: *When Species Meet*, 2008.

Entropy

Grayson Earle

A shitty password, a long-distance relationship. All energy seeks dispersal, and can only be recapitulated by stubborn organisms and random chance.

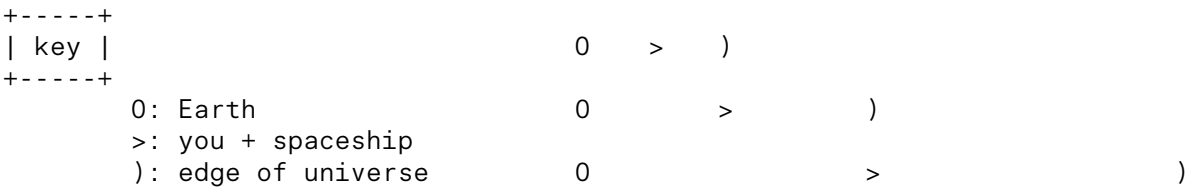
It is the only physical theory of universal content concerning which I am convinced that, within the framework of the applicability of its basic concepts, it will never be overthrown.
—Albert Einstein on entropy

Classical thermodynamics hinges on the idea of entropy, that any physical system will move towards a state of equilibrium. Energy will dissipate over time and cannot be increased without outside intervention. This is how Rudolf Clausius descriped the functioning of the steam engine, which leveraged the heat differential between two chambers to oscillate a piston. The heat must be maintained as it is cooled by the ambient temperature, and the cold must also be maintained as it is warmed up by the engine.

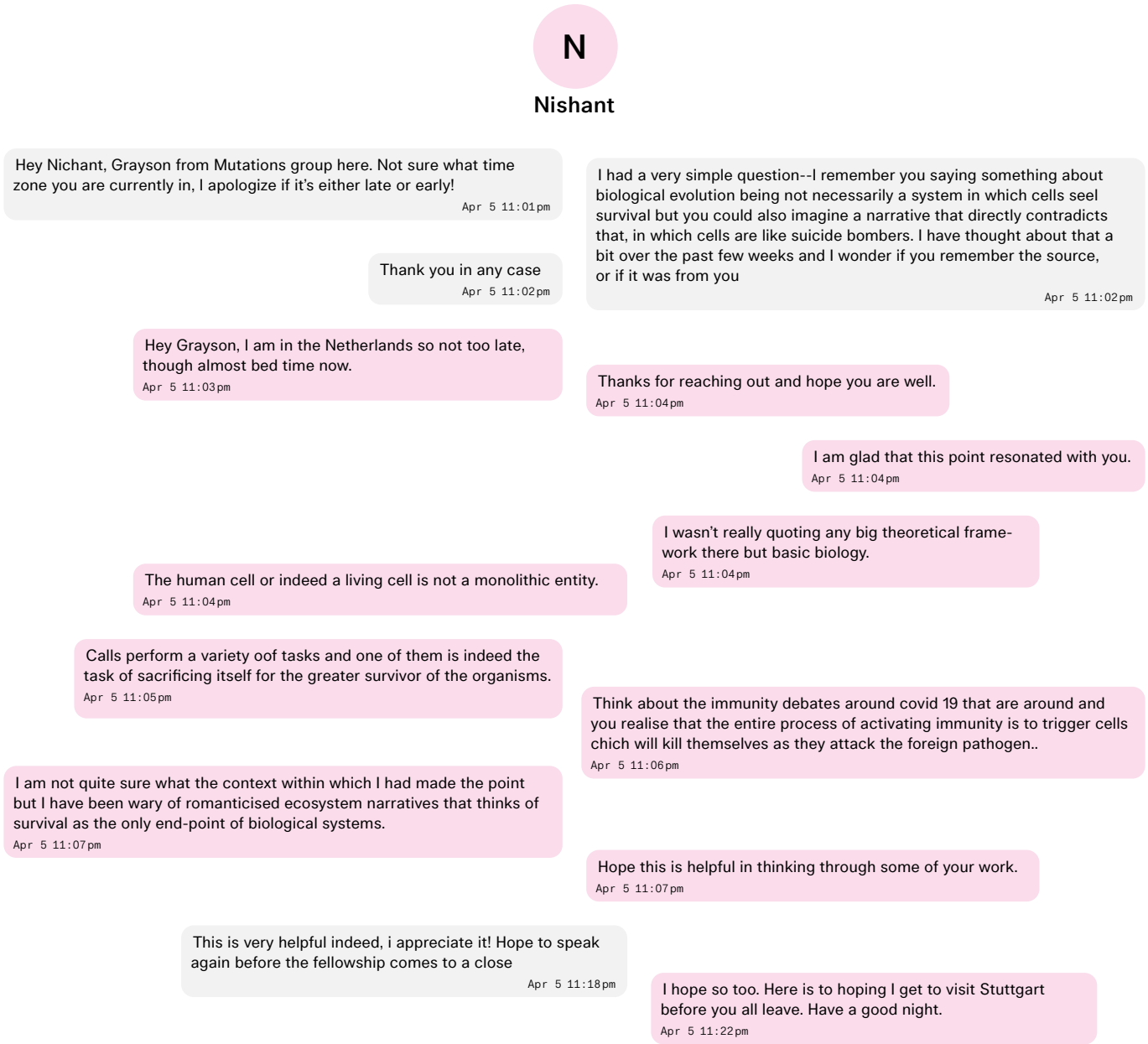
Often misdescribed as a movement towards disorder, entropy could be said to return things to a state of order, in which all matter in the universe is distributed uniformly.

A brief interlude

You board a spaceship and fly toward the edge of the universe. The universe is always expanding, and so it expands as you fly toward its perimeter. By the time you are halfway to your destination, the universe has expanded so much that not only will you never be able to reach the edge, but the point from which you started will grow farther and farther away. It will expand so quickly that your spaceship will never be able to travel back to your point of origin. This is surely the loneliest feeling in the universe. This is the force of entropy.



As its basic function biological life resists the forces of entropy. Matter which seeks dispersal is recapitulated by lifeforms, held together by the dumb luck that water molecules stick together. We put matter into what we call our mouths and then what we call our digestive system breaks that into constituent parts and so on and so on until it becomes our brains and our mouths and so on and so on. Matter is constantly escaping through the billions of holes in our bodies but we keep putting more matter into one of those holes and so we keep on living and leaking. Our bodies then are constantly intervening in the forces of entropy, grabbing the matter that has escaped and using it to reconstruct an organism that can continue to die. It is our incipient senescence.

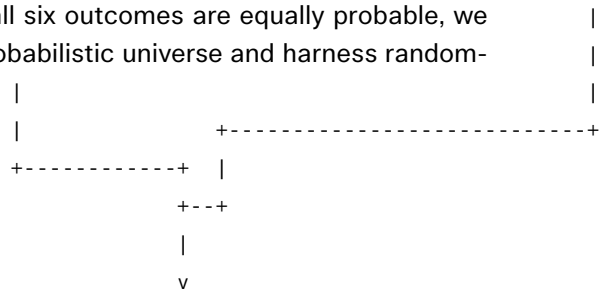


Politics, too, suffer from a kind of entropy that is only reversed by direct intervention. The moment of organization is a moment in which disparate atomized people become a resilient form, a collective body. We might call these people »workers« and their form a »union.« 1953, 35% of private-sector workers in the United States were part of a union, and by 2015 that number had fallen to 7%.

Disregarding the liberal use of metaphor at work in my description of disparate phenomena as entropic, quantum physicists today will take issue with considering entropy a force at all. It is contemporaneously considered only to account for the probability of an outcome concerning the movement of particles in the universe. They will say that it is improbable for an ice cube to do anything but melt at room temperature, that the particles will make state changes that tend towards the most likely outcome, and that the ice will become water. This does not invalidate what is asserted by classical physics, evidenced by the mere functioning of the steam engine. It accounts for the incalculably rare moments when the ice does not become water, or when just after the Big Bang, some particles did not act like the others, and so now here we are. It is only another way of looking at the universe, it is to think in terms of indeterminacy.

Humans have been experimenting with indeterminacy for at least as long as 3,000 B.C. through the use of Egyptian throwsticks and Chinese dice. By balancing a die such that all six outcomes are equally probable, we tap into the probabilistic universe and harness randomness as a tool.

Any revolutionary act hinges on the notion of indeterminacy, that there exists a possibility outside the set of conventions presented to us.



Part of Edward Snowden's revelations about the United States' National Security Agency described the agency's plans to alter the Random Number Generator on Intel manufactured processors to include a »backdoor.« The implications of this potential modification include the ability to decrypt online communications, passwords, and most forms of privacy related to our online movements.

Encryption is ubiquitous and entirely obscured. Every time a credit card is swiped or a »send« button on a smartphone is tapped, a random key is created that scrambles the message, only to be reassembled on the other end. If the key is not random, unscrambling the message becomes a trivial task. Text encryption involves taking each character and changing its value by some number. Given »A« and adding 1 we get »B,« for example. For a string of characters, each individual letter would be changed by a different offset value. Consider the word »ENTROPY« going through this transformation, known in cryptography as a reverse Caeser-Shift.[1]

E	N	T	R	O	P	Y
1	1	1	1	1	1	1
F	O	U	S	P	Q	Z

E	N	T	R	O	P	Y
1	2	3	4	5	6	7
F	P	S	V	W	V	F

E	N	T	R	O	P	Y
054	212	002	194	015	116	027
C	J	R	F	Z	D	X

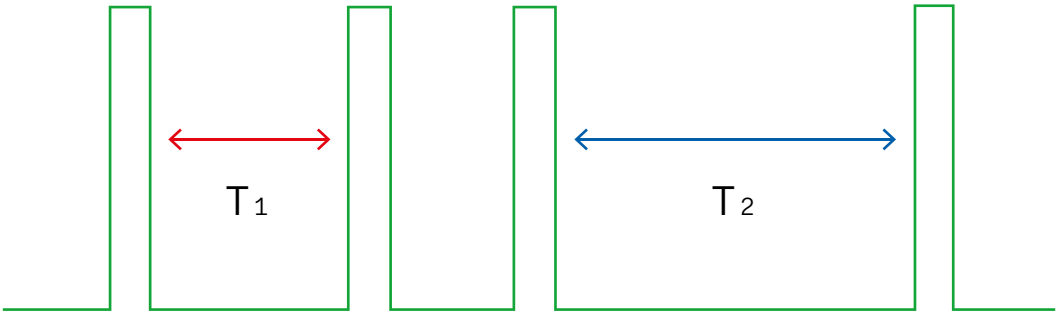
The example on the left is not a strong encryption. Even though the middle is more difficult to discern, there exists a predictable pattern being used to modify the text. In the third example the numbers are greater and seemingly unpredictable. But these numbers were generated by a computer, a deterministic machine. Therefore there necessarily exists a calculus that can explain how these numbers came to be in this particular order. The number that begets all of these numbers is the »seed.« If it is known, the subsequent encryption is rendered useless.

In cryptography, entropy is the measurement of how unpredictable a random number generator is; using a technical algorithm one can determine the »Shannon Entropy« or bit-level entropy of a random number generator. Given 8 bits of random information (as in »01001100,« for example) the highest level of entropy would be 8-bits, meaning that all 8 bits are completely unpredictable as far as we can reasonably determine.

Given the concerns regarding sufficient entropy in random number generation, an industry has been created for Random Number Generators used by individuals and institutions for which security is prioritized to a degree such that relying on a (potentially compromised) consumer-level processor is untenable.

One such service, HotBits, provides a stream of random numbers produced by events of radioactive decay, which operates in the »inherent uncertainty in the quantum mechanical laws of nature.«[2] Random numbers generated algorithmically have been given the epithet »pseudorandom« by cryptographers given the relative level of predictability, while systems such as HotBits have come to be called »True Random Number Generators.« Similar projects observe thunderstorms and lava lamps to access a high degree of uncertainty. HotBits leverages the unpredictable radioactive decay of the element Cæsium-137; a sensor detects instances of nuclear decay and counts the microseconds between them. If the period between a first pair of decay events is greater than a second pair, the system generates a »0« bit, and in the other case it generates a »1« bit. These binary numbers are strung together to create numerical values for the purposes of computation. This service is sold in a niche security marketplace, with clients receiving a direct line of random numbers to use as they desire.

00101011010110100100100111101001010100001110101001111011011000010110101000010010101

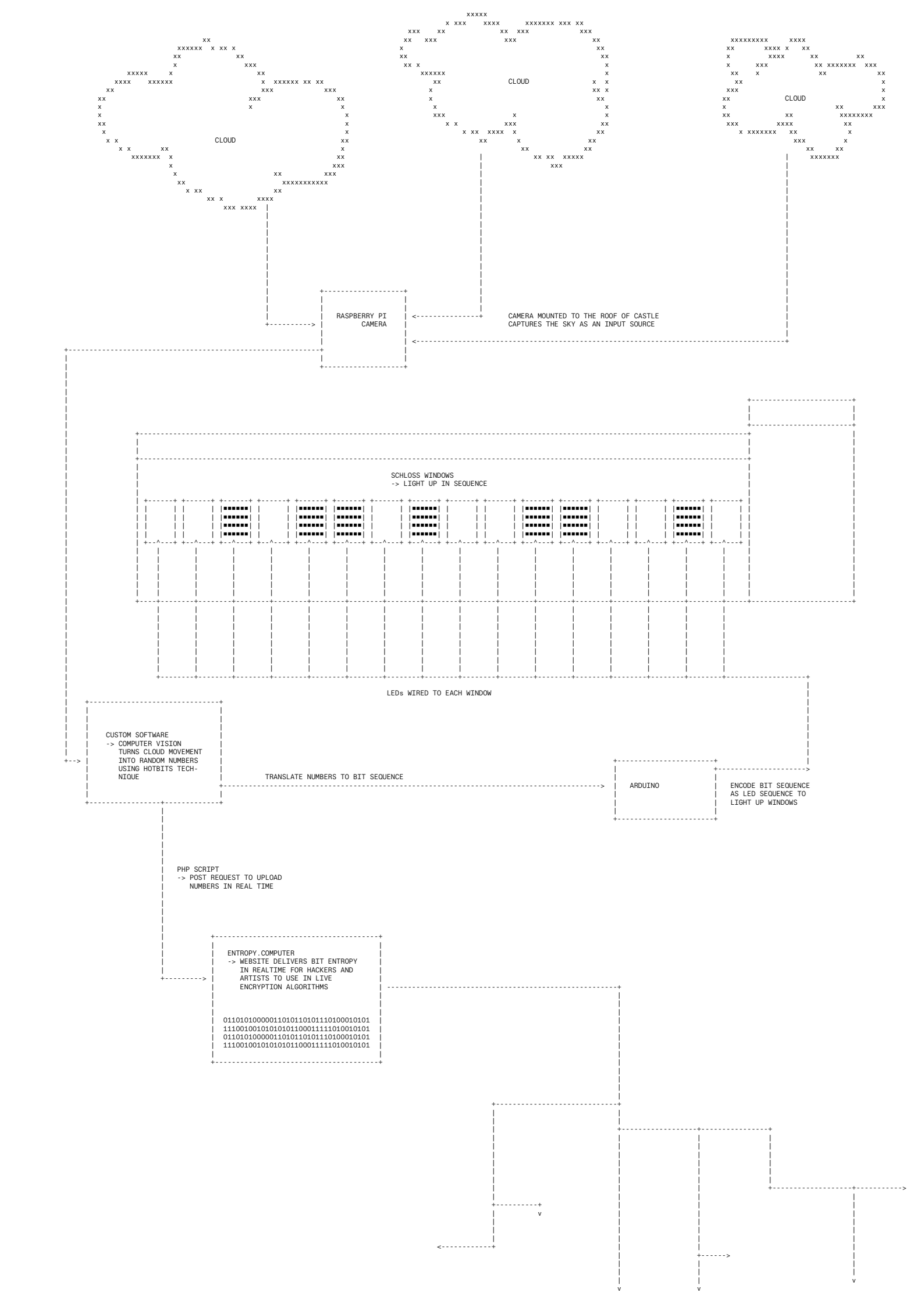


Even an innocuous visit to a web page initiates a secure connection to its server, which requires thousands of random bits to be generated. Our email passwords and credit card numbers are protected through this process as well. Given the frequency and importance of random number generation, we must ask: Who controls our access to randomness? In this sense the state requesting Intel to intentionally compromise the random number generator concedes a desire to control more than our online movements. It is a direct attempt to curb what attempts to escape the gravity of the determinate.

If the dice have been rigged, perhaps we should roll our own. As we create our own operating systems and tools for communication, we must also assert our autonomy in the domain of indeterminacy, like Cæsium-137 and all the matter in the universe that sometimes doesn't do what it is supposed to.

1 This example is simplified by disregarding numbers and symbols as possible text characters.

2 See https://www.fourmilab.ch/hotbits/.


CLOUD
CLOUD
CLOUD
RASPBERRY PI
CAMERA
CAMERA MOUNTED TO THE ROOF OF CASTLE
CAPTURES THE SKY AS AN INPUT SOURCE
SCHLOSS WINDOWS
-> LIGHT UP IN SEQUENCE
LEDs WIRED TO EACH WINDOW
CUSTOM SOFTWARE
-> COMPUTER VISION
TURNS CLOUD MOVEMENT
INTO RANDOM NUMBERS
USING HOTBITS TECH-
NIQUE
TRANSLATE NUMBERS TO BIT SEQUENCE
ARDUINO
ENCODE BIT SEQUENCE
AS LED SEQUENCE TO
LIGHT UP WINDOWS
PHP SCRIPT
-> POST REQUEST TO UPLOAD
NUMBERS IN REAL TIME
ENTROPY.COMPUTER
-> WEBSITE DELIVERS BIT ENTROPY
IN REALTIME FOR HACKERS AND
ARTISTS TO USE IN LIVE
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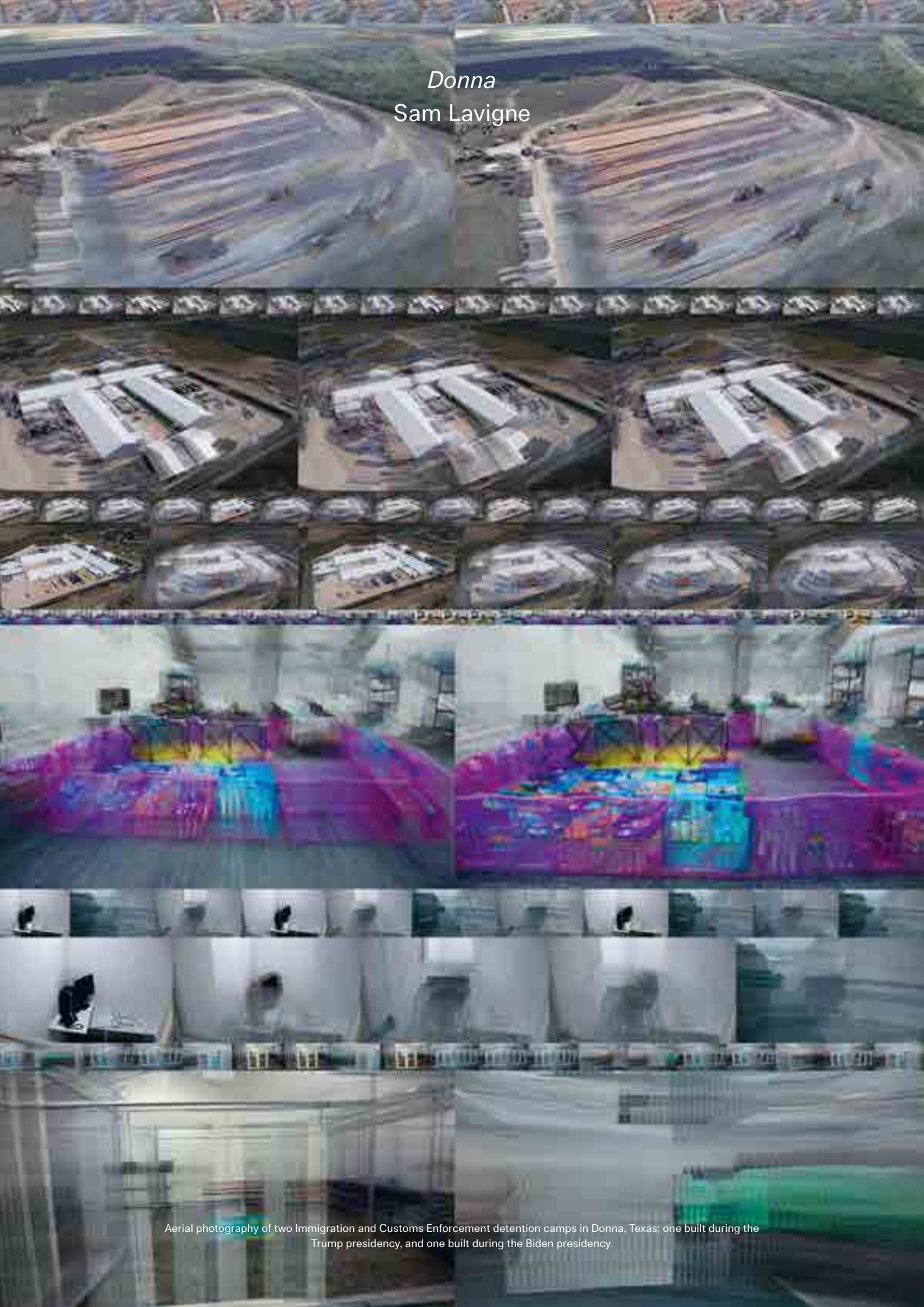


Donna
Sam Lavigne

Aerial photography of two Immigration and Customs Enforcement detention camps in Donna, Texas; one built during the Trump presidency, and one built during the Biden presidency.

Video frames extracted from a propaganda video posted by Immigration and Customs Enforcement, showing the construction of a detention camp built by the Biden administration.

IBM c.1964; Google c.2017

ann haeyoung

Image from www.artstor.com. Creative Commons Attribution

IBM c. 1964. this space was designed as a projection of businesses become homes, their leaders our parents –> –> but –> (profit > people) –> companies say they are *sui* –> but really it's the same old future we've seen before we've forgotten the ones who said, »no thank you« to the –> and so we go around again –> in our comfortable

Image from archive.curbed.com. © Google

the new, modern world -> mediated by technology -> where (welfare capitalism) -> in this space they say they care *generis* -> (innovative, futuristic, moonshot thinkers) (right down to the furniture) -> and in the meantime same old future (sometimes loudly, sometimes quietly) chairs -> designed for this space. Google c. 2017.

Getting in Front of Pharma: Automated Public Discovery of Drug Candidates

matter.farm

The online version of this article comes with numerous hyperlinks. Access the online version here:

Francis Tseng

The pharmaceutical industry relies on patent law to keep its drug prices high, in part to recoup expensive costs for drug discovery and development. New technologies for automated drug discovery may streamline this process, but there's no reason to believe that drugs will become any cheaper for it. matter.farm uses these new technologies to discover drugs and publish them in the public domain so that they can't be patented.

In 2018, Sean Raspet and I were invited to participate in Rhizome's 7×7, this time in Beijing in collaboration with the Chinese Central Academy of Fine Arts (CAFA). I was very excited to collaborate with Sean again after our first collaboration in New York at the New Museum, and to have the chance to try something different together.

We thought about revisiting our previous project, cell.farm, which was a proposal for a cryptocurrency/distributed computing system for which the proof-of-work protocol involved computing simulation updates for an atomic-level model of a human cell (though our proposal initially suggested simulating a ribosome). Such detailed simulation of biological processes would be a boon for medical research, but simulating even the simplest cell at that resolution is so computationally demanding that it's infeasible even for the world's best supercomputers. But the aggregate computing power of the Bitcoin network is orders of magnitudes larger than any supercomputer, and might be able to run such a model in a reasonable amount of time. By adopting that model for in *silico* cells, a crucial part of medical research is essentially collectivized, and as part of our design, so too are the results of that research. The project bears similarity to Folding@Home and its crypto-based derivatives (e.g. FoldingCoin), but as far as I know none of these projects explicitly distribute ownership of the research that results from the network. There were also some design details that we didn't have time to hash out, and we left open a big question of *computational verifiability*: given a simulation update from a node, how can you be certain that they actually computed that value rather than returned some random value? This is a problem with any distributed computing system where nodes are out of your control and doesn't have an easy solution.

This time around, rather than a project about medical research abstractly, we focused specifically on the pharmaceutical industry: the 1.1 trillion-dollar business lying at the nexus of intellectual property law, predatory business practices, and the devaluing of human life.

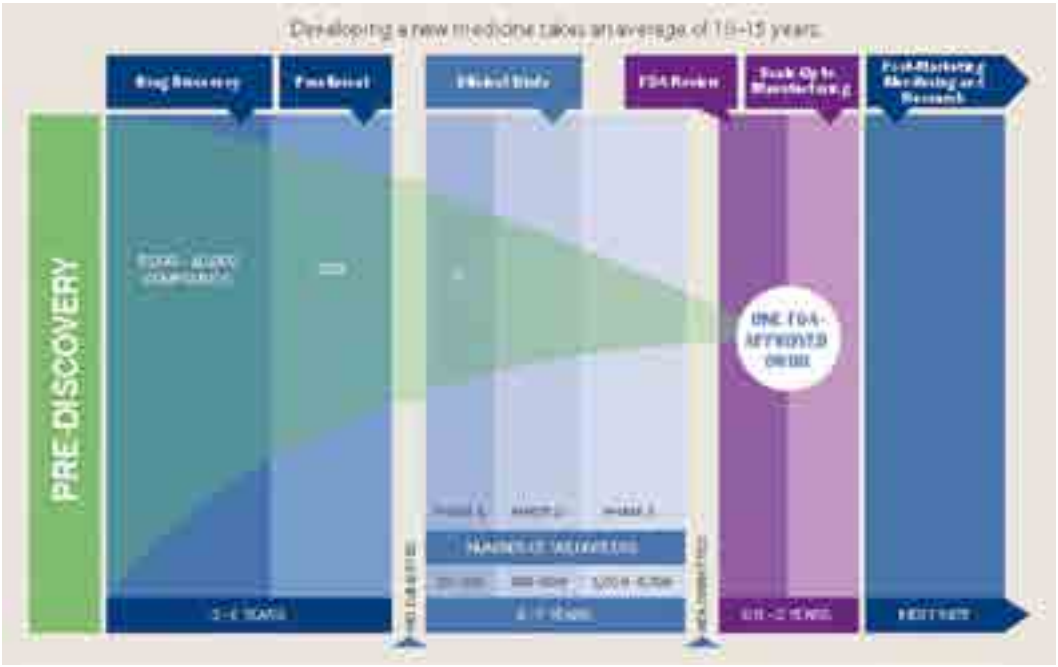
»Is curing patients a sustainable business model?,« Goldman Sachs analysts ask. Screenshot from www.arstechnica.com

This section leans heavily on the »Pill of Sale« episode of the Ashes Ashes podcast for background. The episode goes into more detail about the pharmaceutical industry – definitely worth a listen.

Most Americans are familiar with exorbitantly priced drugs – if not directly, then via one of the many horrifying stories of people crowdfunding their continued existence, flying elsewhere to access more reasonable prices, or using fish antibiotics from Amazon as a cheaper substitute. A hepatitis C cure from Gilead, Solvadi, costs $84,000 for a twelve-week course and is the subject of a recent Goldman Sachs report. The report describes cures as effective as Solvadi (up to 97 percent) as bad for business since you cure yourself out of a market. Even something as common as insulin can cost a significant portion of income – to the point where people die from needing to ration it.

This hostile environment is thinly justified with rhetoric around drug development costs and enforced through the patent law system, all under the implicit, sometimes explicit, assumption that it is necessary for drug companies to make a profit on their drugs. Patents provide exclusive rights for a company to sell a particular drug; this temporary monopoly essentially gives them carte blanche to set whatever price they want so that they recoup the drug development costs, so the story goes. These patents last 20 years and can basically be extended by »exclusivity« periods which add up to another 7 years. A drug may take 10–15 years to develop, leaving a window of at least five years of exclusive rights to produce and sell it. »Orphan drugs,« drugs that treat rare conditions, may have longer monopolies to compensate for the smaller market size. After this period generics are permitted to enter the market, which drives the cost down, but there are all sorts of tricks available that can prolong this protection period even further, a practice called »evergreening.« For example, slightly modifying how the drug is delivered (e.g. by tablet or capsule) can be enough for it to essentially be re-patented.

(It's worth noting that prices can be high even for generics. For example, epinephrine – commonly known as an EpiPen, essential for severe allergic reactions – can be bought for about 0.10–0.95 USD outside the US, whereas generics in the US can cost about $70.)



Drug development pipeline. From: Pharmaceutical Research and Manufacturers of America, Pharmaceutical Industry Profile 2012 (Washington, DC: PhRMA, April 2012). Original from: Pharmaceutical Research and Manufacturers of America, Drug Discovery and Development: Understanding the R&D Process. Image from www.innovation.org

Drug development is expensive, averaging at over $2.5 billion per drug, and that's only counting for those that gain FDA approval. However, these exclusivity rights are not merely used to recapture R&D costs, as is often said, but instead to flagrantly gouge prices such that the pharmaceutical industry is tied with banking for the largest profit margins of any industry (as high as 43 percent in the case of Pfizer).

The narrative around high drug development costs also takes for granted that pharmaceutical companies are the ones bearing all of these costs. A considerable amount of the basic research that is foundational to drug development is funded publicly; the linked study found that public funding contributed to *every* drug that received FDA approval from 2010–16. The amount of funding is estimated to be more than $100 billion.

It used to be that inventions resulting from federal funding remained under federal ownership, but the 1980 Bayh–Dole Act offered businesses and other institutions the option to claim private ownership. The result is the »public paying twice« for these drugs. The Act does preserve »march-in rights« for the government, allowing the government to circumvent the patent and assign licenses independently if the invention is not made »available to the public on reasonable terms,« but as of now these rights have never been exercised. In 2016, there was an unsuccessful attempt to use these march-in rights to lower the price of a prostate cancer drug called Xtandi, priced at $129,000/year.

All of this isn't to say that the work of the pharmaceutical industry isn't valuable; drugs are a necessary part of so many peoples' lives. A couple years ago, I started using Sumatriptan to deal with debilitating migraines, and am hugely grateful it exists (and is not ridiculously expensive). It's because pharmaceuticals are such a critical part of life that their development and distribution should not be dictated by the values that currently shape it.

One particularly egregious example of this mess is the nightmare scenario of Purdue Pharmaceuticals, owned by the Sackler family (who are also prolific patrons of the arts), producers of OxyContin (accounting for more than 80 percent of their sales last year), basically responsible for the ongoing opioid crisis (affecting at least 2.1 million Americans

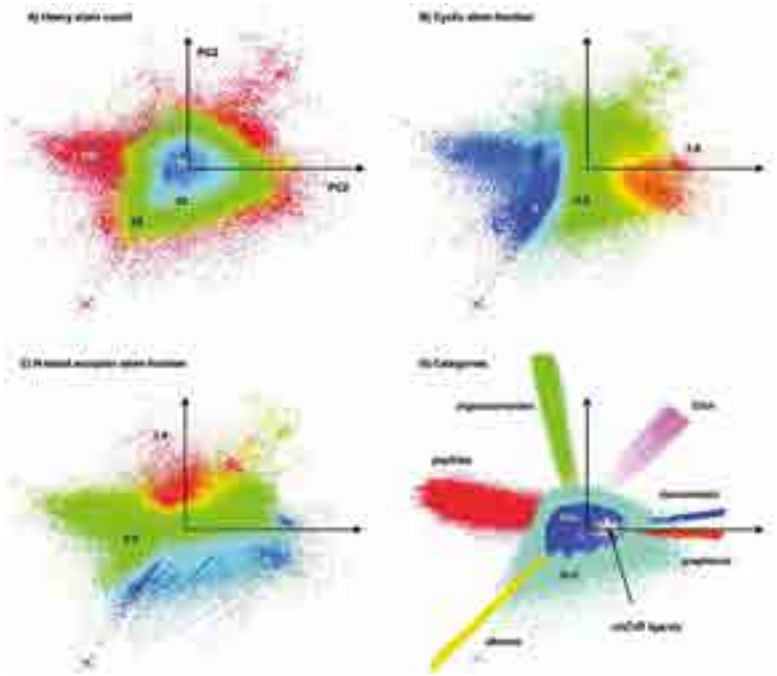
directly, and many more collaterally), and recently granted a patent for a drug that treats opioid addiction. The patented treatment is a small modification of an existing generic.

The day before our 7×7 presentation a story broke in the Guardian: »Sackler family members face mass litigation and criminal investigations over opioids crisis.«

matter.farm

matter.farm combines these two key components of the pharmaceutical industry: patent law and drug discovery, specifically the emerging practice of *computational drug discovery*.

One reason drug development is so difficult is that the space of possible drug compounds is extremely large, estimated to be between 10^{60} and 10^{63} compounds. For comparison, there are an estimated 1022 to 1024 stars in the entire universe, and according to this estimate about 10^{49}–10^{50} atoms making up our entire world.



PubChem's chemical space. Image from J. Reymond and Mahendra Awale, »Exploring chemical space for drug discovery using the chemical universe database,« in: *ACS chemical neuroscience*, 3(9), 2012, pp. 649-657. OER

Drug development is in large part a search problem, looking to find useful compounds within this massive space. A brute-force search is impossible; even if it took only a couple seconds to examine each possible compound you'd see several deaths of our sun (a lifespan of about 10 billion years) before fully exploring that space.

More effective techniques for searching this space include slightly modifying existing drugs for different therapeutic applications (»me-too« compounds) and literally looking at plants and indigenous medical traditions for leads (this general practice is called »bioprospecting« and this particularly colonialist form is called »biopiracy«).

Of course with the proliferation of machine learning there is a big interest in searching this space computationally. Two main categories are *virtual screening* (looking through known compounds for ones that look promising) and *molecular generation* (generating completely new compounds that look promising).

Because drug development is so difficult, companies rely on patents to monopolize any promising results. One crucial criteria for a patent is that the invention must be *novel*; that is, the invention cannot have already been known to the public. An existing publicly-known instance of an invention is called »prior art« and can invalidate a patent claim. However, sufficient variations to an invention may qualify it as *original* enough to be patentable (this is the idea behind evergreening, described above).

If a drug is discovered and made public prior to a patent claim on it, it would function as prior art and make that compound unpatentable in its current form. If we were able to generate new molecules that could function as useful drugs, and make public those new molecules, then perhaps we can prevent companies from patenting them and maintaining a temporary monopoly on their distribution.

matter.farm is an open-source and *public* computational drug discovery system. One of our goals was to frame computational drug discovery as a potential mechanism for drug development for public good. Of course, there's nothing about the current system that can't become more public good oriented as-is, except for entrenched interests. But our drug discovery system, in combination with patent law, means that any beneficial compounds discovered by our system automatically become unpatentable. The system originally ran continuously, proposing new compounds and estimating their applications every few seconds, and published these compounds to the website matter.farm, thus placing them in the public and making them prior art (in theory, at least). Because the space of possible compounds is so large, it's unlikely that any useful compound is produced by our system. Our limited resources mean that our training was not comprehensive and the rate of new compound generation is quite low. In theory, a dedicated set of hardware and more fine-tuning would have a better chance of worthwhile discoveries. The project is meant more to put forth a model for how drug discovery might move forward for common benefit. The machine learning component is just a means, the point is public ownership of essentials like medical discoveries.

Additional efforts

Other efforts to address the problems with the pharmaceutical industry can be found in initiatives like Medicare for All and the proposed Prescription Drug Price Relief Act, and the organizing happening around those. The issues with the pharmaceutical industry are just one piece of a more general hostility in American healthcare.

There is also a burgeoning DIY medicine movement which aims to build alternatives to industrialized medicine, providing autonomy, access, and reliability where those are normally withheld. For example, the artist Ryan Hammond is working on genetically modifying tobacco plants to produce estrogen and testosterone, and the Four Thieves Vinegar Collective (discussed in the Ashes Ashes »Pill of Sale« episode) provides instructions for a DIY EpiPen and a DIY lab (»MicroLab«) for synthesizing various pharmaceuticals, including Naloxone and Solvadi.

This post was originally written in 2018 and published on space & times, https://space-andtim.es/projects/matter_farm/ (accessed April 30, 2021).

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Edited by Grayson Earle and Ana María Gómez López

Anti-politics

Excerpt from Enzo Traverso,

The Faces of Fascism: Populism and the Far Right

Verso, 2019

Anti-politics

British historian Ian Kershaw once wrote that
»trying to define ›fascism‹ is like trying to nail jelly to the wall.«
In *The New Faces of Fascism: Populism and the Far Right*, Enzo Traverso offers a nuanced approach to the slippery and unstable manifestations of post-fascism, characterized by the alt-right, white nationalism, and right-wing extremism, among contemporary movements. Describing both »the present as history« and »history in the present,« Traverso analyzes the »unfinished mutations« of the far right against the century-long backdrop of fascism in Europe, focusing on its ongoing transformation and metastasis across the continent and worldwide, its inherent contradictions notwithstanding.

Excerpt from Enzo Traverso, *The New Faces of Fascism: Populism and the Far Right*, Verso, 2019

If »populism« is often defined as a form of »anti-politics«, one has to understand what this term really means. For Pierre Rosanvallon, populism is a »pathological« form of politics, that is, the »pure politics of the unpolitical« (*la politique pure de l'impolitique*).[1] The triumph of the »unpolitical« (or anti-politics) simply means that representative democracy is paralysed and ultimately »vampirized« by »counterdemocracy«, a set of counterpowers that is both needed by democracy and susceptible to killing it. This could appear as a naïve return to Rousseau, but instruments for evaluating and putting checks on power – referendums, transparency, permanent controls, elimination of any intermediate bodies between the citizens and power – may destroy democracy when they bring the principle of representation itself into question. According to Rosanvallon, these counterpowers create a gap »between civic-civil society and the political sphere« that can be both fruitful and dangerous: on the one hand, »social distrust can encourage a salutary civic vigilance and thus oblige government to pay greater heed to social demands«; on the other, »it can also encourage destructive forms of denigration and negativity«.[2]

The philosopher Roberto Esposito defines »the impolitical« (impolitico) as a disillusioned approach to politics that reduces it to pure »factuality«, to pure materiality: the classic Schmittean vision of modern politics as a secularised form of the old political theology has become obsolete.[3] Modern politics consisted of the sacralisation of secular institutions – first of all the state sovereign power, then the Parliament and the Constitution – as a substitute for the old monarchy based on divine right. The emblems and the liturgies of absolutism were replaced by republican rituals and symbols. In this vision, political forces embody values; political representation has an almost sacred connotation and pluralism expresses a conflict of ideas, a powerful intellectual commitment. Today's statesmen universally consider themselves good pragmatic (and, most important, »postideological«) managers. Politics has ceased to embody values and has instead become a site for the pure »governance« and distribution of power, of the administration of huge resources. In the political field, they no longer fight for ideas, but instead build careers. The »impolitical« reveals the material reality that underlies political representation. What today is usually called »anti-politics« is the reaction against contemporary politics, which has been divested of its sovereign powers – mostly subsisting as empty institutions – and reduced to its »material constitution« – the »impolitical« – that is, a mixture of economic powers, bureaucratic machines, and an army of political intermediaries. Viewed as the embodiment of »anti-politics«, populism has countless critics. But these critics are mostly silent on its real causes. Anti-politics is the result of the hollowing-out of politics. In the last three decades, the alternation of power between centre-left and centre-right governments has not meant any essential policy change. For the alternation of power means a change in the personnel who are administrating public resources, each using his or her own networks and patronage structures, rather than any change of government policies. This development is combined with two other significant transformations in both civil society and state politics. On the one hand, we see the growing reification of public space – the site of a critical use of reason in which the authorities' actions are analysed and criticised[4] – for this space has been absorbed by media monopolies and the communications industry. On the other hand, the traditional separation of powers is put into question by a continuing shift of prerogatives from the legislative to the executive power. In this permanent state of exception, parliaments are dismissed from their original function of making laws and compelled to simply ratify laws that have already been decided by the executive. In such a context, it is inevitable that »anti-politics« will grow. The critics who denounce populist »anti-politics« are often the same people responsible for these transformations: pyromaniacs disguised as firemen.

Postfascism no longer has the »strong« values of its 1930s ancestors, but it purports to fill the vacuum that has been left by a politics reduced to the impolitical. Its recipes are politically reactionary and socially regressive: they involve the restoration of national sovereignty, the adoption of forms of economic protectionism, and the defense of endangered »national identities«. As politics has fallen into discredit, the postfascists uphold a plebiscitary model of democracy that destroys any process of collective deliberation in favour of a relationship that merges people and leader, the nation and its chief. The term »impolitical« has a long history dating back to Thomas Mann, one of the leading representatives of the Conservative Revolution in Germany at the end of World War I.[5] But contemporary forms of anti-politics do not only belong to the right. In Italy, the Five Star Movement incarnates a regressive critique of representative democracy, but it is also able to canalise the search for an alternative to the current crisis of politics. Nonetheless, it is clear that any attempt to stigmatise

This is an additional symptom of an unfinished mutation, which puts into question the traditional categories used to analyse the far right. Beyond the differences between the French, Italian, and German cases, the ambition of classical fascism was to ground its politics in a new project and a new worldview. It purported to be »revolutionary«; it wanted to build a new civilisation and sought a »third way« between liberalism and communism. Today, this is no longer the concern of the radical right.

»anti-politics« by defending actually existing politics is doomed in advance.

The new forces of the radical right certainly do have some features in common – first and foremost, xenophobia, with a renovated kind of rhetoric. They have abandoned the old clichés of classical racism, even though their xenophobia is indeed directed against immigrants or populations with postcolonial origins. Second, Islamophobia, the core of this new nationalism, has replaced anti-Semitism. We shall return to this point. They certainly also have other themes in common, but nationalism, anti-globalisation, protectionism, and authoritarianism can be embodied in very different ways, with certain ideological shifts. The National Front no longer calls for the reintroduction of the death penalty, but it demands a strong government and a sovereign state that refuses to submit to the power of finance: it proposes an authoritarian, autarchic nationalism.

There is a certain coherence to such discourse, even if no longer grounded in a strong ideology. The militarist and imperialist rhetoric of Mussolini, Hitler, and Franco is no longer credible. Postfascism does not want to rebuild colonial empires or foment war, and its opposition to Western wars in the Middle East on first glance looks like »pacifism«. Of course, even classical fascism was characterised by incoherence, tension, and conflict. Italian Fascism and German Nazism brought together a variety of tendencies, from the futurist avant-garde to conservative romanticism, from agrarian mythologies to eugenics. As we shall see, French fascism was a galaxy of political forces, »leagues« and groups far beyond Marshal Pétain's »National Revolution«. In the 1920s and 1930s, however, ideology played a very important role in this galaxy – and certainly far more so than it does among the forces of the radical right today. Behind the National Front we do not see intellectual figures comparable to the Action Française leaders Maurice Barrès and Charles Maurras, or to Robert Brasillach and Henri de Man, the exponents of collaborationism in Nazi-occupied Paris and Brussels.

[...]

This is an additional symptom of an unfinished mutation, which puts into question the traditional categories used to analyse the far right. Beyond the differences between the French, Italian, and German cases, the ambition of classical fascism was to ground its politics in a new project and a new worldview. It purported to be »revolutionary«; it wanted to build a new civilisation and sought a »third way« between liberalism and communism.[6] Today, this is no longer the concern of the radical right. Historically, fascist nationalism needed to set itself in opposition to some sort of »other«. First came the Jew, the mythical vision of a sort of anti-race, a foreign body that sought to corrupt the nation. Added to this was a sexist and misogynous worldview in which women would always remain submissive. Women were considered the reproducers of the race; they had to take care of the home and raise children and not play a role in public life.[7] One could point to cases like Italian fascist Minister of Culture Margherita Sarfatti (who was also Jewish) or the propagandist Nazi filmmaker Leni Riefenstahl, but they were exceptions. Homosexuality was another figure of the anti-race, the embodiment of the moral weakness and decadent mores that stood at odds with the fascist cult of virility.[8] Today, all this rhetoric has disappeared, even if homophobia and anti-feminism are very much widespread among the radical right voters. In fact, such movements often claim to be defending women's and gay rights against Islamism. Pim Fortuyn and then his successor Geert Wilders in the Netherlands are the best-known examples of this LGBT conservatism, but they are

not exceptions. In Germany, Alternative für Deutschland is opposed to gay marriage, but its speaker in the Bundestag is Alice Weidel, a lesbian. Florian Philippot, the former secretary of the National Front, does not hide his homosexuality, and Renaud Camus is an icon of French gay conservatism.

[...]

Postfascism starts out from antifeminism, anti-Black racism, anti-Semitism, and homophobia; the radical right continues to bring these impulses together. The most obscurantist layers vote for the National Front, but at the same time, the latter adopts wholly new themes and social practices, which do not belong to its own genetic code. Thus, Marine Le Pen's ambiguous position on gay marriage and the Manif pour tous is not simply a tactical choice. It reflects a historical change that the far right has been forced to acknowledge, in order to avoid becoming marginalised. The European societies of the early twenty-first century are not what they were in the 1930s: today, advocating the relegation of women to the domestic sphere would be as anachronistic as demanding the return of French colonial rule in Algeria. Marine Le Pen is herself a product of this change and is well-aware that remaining bound to old ideological clichés would mean alienating wide layers of the population.

> What was most striking with the Manif pour tous (beyond the idiosyncratic and ultra-reactionary aspect of certain groups) was the fact that conservative opinion, which we often call the »silent majority«, was now taking over the streets. And this occupation of public space involved the adoption of aesthetic codes that come from the left – think of the posters of May '68 – and whose meaning the protestors had inverted. This appropriation and diversion of symbols and slogans that do not belong to their own history reveals a certain degree of »emancipation« from the right-wing »canon«, as well as a general redefinition of the intellectual landscape.[9]

The main feature of today's postfascism is precisely the contradictory coexistence of the inheritance of classical fascism with new elements that do not belong to its tradition. Wider developments have encouraged this change. The National Front is engaging in politics in today's world, a world in which both the public sphere and the political field have experienced a deep metamorphosis. The twentieth century had its great mass parties, which had their own ideological bedrock, their own social base, a national structure, and deep roots in civil society. None of this exists anymore. Political parties no longer need an ideological arsenal. Across Europe, governing parties of both left and right no longer need to recruit intellectuals; they instead recruit experts in advertising and communications. This is also true of the National Front, which assiduously manicures its image, its slogans, and its talking points. Political style is becoming ever more important, precisely insofar as ideology is disappearing. Faced with this new context, nationalism no longer seeks to define the national community in racial, cultural, or religious terms, but rather in terms of resistance against the threat of globalisation.

1 Pierre Rosanvallon: *Counter-Democracy: Politics in an Age of Distrust*, Cambridge UK 2008, p. 22.

2 Ibid., p. 253, p. 24.

3 Roberto Esposito: *Categories of the Impolitical*, New York 2015; Carl Schmitt: *Political Theology: Four Chapters on the Concept of Sovereignty*, George Schwab (ed.), Chicago 2006.

4 Jürgen Habermas: *The Structural Transformation of the Public Sphere: Inquiry into a Category of Bourgeois Society*, Cambridge, UK 1991.

5 Thomas Mann: *Reflections of a Nonpolitical Man*. Walter D. Morris (ed.), New York 1983.

6 George L. Mosse: *The Fascist Revolution: Toward a General Theory of Fascism*, New York 2000.

7 Claudia Koonz: *Mothers in the Fatherland: Women, the Family, and Nazi Politics*, New York: St. Martin Press, 1987; Victoria de Grazia: *How Fascism Ruled Women*, Berkeley 1993.

8 George L. Mosse: *The Image of Man: The Invention of Modern Masculinity*, New York 1998.

9 Camille Robcis: »Catholics, the ›Theory of Gender,‹ and the Turn to the Human in France: A New Dreyfus Affair?« in: *Journal of Modern History*, 87, 2015, pp: 893–923.

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Edited by Angela Anderson

Pipeliners for Trump
Energy, Extraction, and White Supremacy in the US Midwest
Angela Anderson

Reports From an Extraction Zone
Joletta Bird Bear, Lisa Finley-DeVille, and Jodi Rave Spotted Bear

Plastic
Heather Davis

Truck outside of Williston, North Dakota, May 2018. © Angela Anderson

Pipeliners for Trump Energy, Extraction, and White Supremacy in the US Midwest

Angela Anderson

In this excerpt of a longer essay, video artist and researcher Angela Anderson sketches the symbolic connections between fossil fuel infrastructure and settler colonialism in the US Midwest, looking in particular at how »energy« has become a euphemism for the maintenance of patriarchal white settler supremacy in the face of calls for defossilization, in particular from native communities directly impacted by oil and gas extraction and pipeline projects.

On a road trip through North Dakota in 2018, investigating the impacts of the recent oil boom and the subsequent expansion of oil infrastructure in the US Midwest, one of the things that caught my attention when stopping at petrol stations was the incredible selection of energy drinks available in the cooler section. I found myself repeatedly confronted by refrigerators full of artificial-looking beverages, bearing names like »Monster,« »Bang,« »Diesel,« »Full Throttle,« and »V8 Energy.«

The bottles formed an intimidating wall of glowing neon colors, their label designs evoking heavy metal or Harley Davidson aesthetics, featuring lightning bolts, flames, bald eagles, ominous looking slashes, and in the case of the »Bang« brand, a target. Words and phrases like »extreme,« »unleash the beast,« »fuel your destiny,« »relentless,« and »no limits« promised virile, performance-enhancing, energy; aggressive and uncontrollable.

The target audience for these products arrived at these gas stations in oversized, jacked-up pickup trucks with thundering exhaust pipes, sporting bumper stickers reading things like »don't tread on me« or depicting images of dramatically waving American flags. For the most part they fit the profile of the white male between the ages of puberty and retirement.

As I drove through the stunning landscape of the western North Dakota Badlands, I was surrounded on all sides by these trucks. Some of their license plates bore the names of other oil and gas producing states, like Texas, Oklahoma, or Montana. These trucks belonged to the massive, imported, and mostly well-paid workforce needed to install and maintain the impossibly vast network of industrial infrastructure that has inundated the western North Dakota landscape.

You know you've arrived in the geological zone known as the Bakken when you start to see fire on the horizon.[1] The Bakken formation is a layer of limestone saturated with oil and gas, sandwiched between layers of shale rock two miles underground. It stretches at an angle from western North Dakota into Montana and the Canadian province of Saskatchewan. Thanks to the technical innovations in hydraulic fracturing – otherwise known as

fracking – extracting the oil underneath western North Dakota became profitable enough to set off an oil boom starting in 2006. The fires are from the methane being burned off from oil wells.[2] There are hundreds, if not thousands, of gas flares burning at one time in the Bakken, releasing endless amounts of carbon dioxide and other volatile compounds into the atmosphere. As a result, a thick layer of black smog hangs halfway between the ground and the sky over these fires. The residents of the Fort Berthold Reservation of the Mandan, Hidatsa, and Arikara nations, which sits entirely on top of the Bakken's oil and gas reserves, are disproportionately affected by this flaring due to the high concentration of wells on the reservation.

Traveling through the Bakken, I couldn't help but register the sinister convergence of combustion engines, roaring natural gas flares, neon bottles of artificial liquid promising superhuman powers, and the pervasive rhetoric of »energy« that dominates political discourse in North Dakota. The state's government, located in the capital of Bismarck just south of the Bakken formation, is controlled by white Republican men, and is predictably pro-industry.[3] The unwritten formula for acceptable political discourse in North Dakota looks something like: goodness = industry = Christianity = heteropatriarchy = whiteness. »Energy« is the euphemism for the financialized synergy of these discursive elements.

The historical uprising on the Standing Rock Reservation in 2016 for the protection of the water and Indigenous sovereignty, and against the construction of the Dakota Access Pipeline, which now carries Bakken oil under the Missouri River just north of Standing Rock, materialized an already present settler colonial entitlement to stolen land in the form of a massive, highly militarized police and private security operation, hell-bent on protecting the pipeline corporation and the oil companies it serves.[4]

In her lucid text »Petro-masculinity: Fossil Fuels and Authoritarian Desire,« Cara Daggett writes that »analyzing petro-masculinity alerts us to those perilous moments when challenges to fossil-fueled systems, and more broadly to fossil-soaked lifestyles, become interpreted as challenges to white patriarchal rule.«[5]

The alignment of fossil fuel extraction with racist settler colonial nationalism, infused with misogyny, climate-change denialism and distorted remnants of McCarthy-era anti-communism, is evident throughout the midwest. The Trump presidency bolstered this alignment with his push to build the Keystone XL pipeline and his dismantling of key environmental protections, characterizing the oil industry as a victim of burdensome regulation in his classic gaslighting style.[6]

The criminalization of protests against fossil fuel extraction via »critical infrastructure« legislation written by oil industry lobbyists[7] after Standing Rock and the direct payment of police forces by oil and pipeline companies[8] further disclose the anti-democratic entanglements of financial capital and the maintenance of settler colonial fantasies of entitlement which deny historical responsibility for the genocidal policies.

As I write this, Indigenous women, two spirit people, and their comrades are putting their bodies in front of heavy machinery in an attempt to stop the construction of Enbridge's Line 3 oil pipeline through wild rice lakes, sugar bush stands, and underneath the Mississippi River in northern Minnesota.[9] Local police forces have stocked up on chemical agents and less lethal ammunition, ostensibly to ensure »public safety.« In *The Force of Nonviolence*, Judith Butler reminds us:

> The state monopolizes violence by calling its critics »violent« ... Hence, we should be wary about those who claim that violence is necessary to curb or check violence ... the institutional forms through which it (violence) operates compel us to ask: Whose life appears as a life, and whose loss would register as a loss? How does that demographic imaginary function in ethics, in policy, and in politics?[10]

Enbridge Line 3 Pipeline equipment yard, northern Minnesota, April 2021. Photo: Anonymous

The conflation of supposed public safety with the construction of fossil fuel infrastructure, and by extension the combustion of oil and gas, done by, for example, energy-drink drinking white men in huge pickup trucks whose racism has been cultivated over generations, produces an adrenaline-laden feedback loop of toxic masculinity, toxic chemicals, and the toxic value system of »generalized equivalence« described by Félix Guattari, where every possible thing or relation is reduced to monetary value.[11]

The Biden administration's canceling of the Keystone XL pipeline, shortly after taking office in January 2021, offered a momentary respite from the unbridled model of perpetual economic growth at all costs which characterizes the fossil fuel industry. And yet the specter of oil remains ever-present in the US midwest, from the Bakken to the Mississippi Headwaters, standing in for white settler supremacy, in all of its delusional and destructive ahistoricity.

1 The Bakken Formation was named after an oil well drilled on land owned by the North Dakota farmer Henry Bakken by the Amerada Petroleum Co. in 1951.

2 Because the infrastructure needed to capture methane is costly to install, most often the natural gas is burned off as a waste product.

3 Named after Otto von Bismarck, the (protestant, anti-socialist, colonial) first chancellor of the Prussian-dominated German Empire (1871–90). Forty-seven percent of North Dakota's population are of German descent.

4 For a comprehensive account with historical context, I recommend Nick Estes: *Our History is the Future*, London 2019.

5 Cara Daggett: »Petro-masculinity: Fossil Fuels and Authoritarian Desire,« in: Millennium: *Journal of International Studies*, Vol. 47, no.1, 2018, pp. 25–44. https://doi.org/10.1177/0305829818775817 (accessed May 5, 2021).

6 See: https://www.epa.gov/newsreleases/icymi-trump-administration-has-removed-environmental-regulations-hamstring-american.

7 Lee Fang: »Oil Lobbyist Touts Success in Effort to Criminalize Pipeline Protests, Leaked Recording Shows,« in: *The Intercept*, Aug 19, 2019. https://theintercept.com/2019/08/19/oil-lobby-pipeline-protests/ (accessed May 5, 2021).

8 Alleen Brown: »Local Cops Said Pipeline Company Had Influence Over Government Appointment,« in: *The Intercept*, April 17, 2021. https://theintercept.com/2021/04/17/enbridge-line-3-minnesota-police-protest/ (accessed May 5, 2021).

9 Line 3 is a pipeline being constructed by the Canadian corporation Enbridge, intended to carry tar sands oil from Alberta, Canada, to the port of Superior, Wisconsin in the United States. For more information: https://www.stopline3.org (accessed May 5, 2021).

10 Judith Butler: *The Force of Nonviolence*. London 2020, p. 107.

11 Felix Guattari: *The Three Ecologies*. London: Continuum, 2008, p. 41.

Natural gas flaring on the Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

Reports From an Extraction Zone

Joletta Bird Bear,
Lisa Finley-DeVille,
and Jodi Rave Spotted Bear

Thanks to technological advancements in hydraulic fracturing, the US state of North Dakota is now the second largest oil and gas producing state in the US after Texas. While the political establishment in the state is quick to point to the economic benefits of the oil industry in the form of jobs and tax income, the social and ecological toll that this oil boom has taken has yet to be accounted for. Over the past decade, Joletta Bird Bear, Lisa Finley-DeVille, and Jodi Rave Spotted Bear have become specialists in the devastating environmental impacts of fracking and the politics of extraction. As members of the Mandan, Hidatsa, and Arikara Nation, living on the Fort Berthold Reservation, which is situated entirely on top of the Bakken shale oil formation in western North Dakota, they have watched as the oil industry has drastically transformed the landscape, and with it, their lives. This section was commissioned by video artist and researcher Angela Anderson, following from her research into the expansion of fossil fuel infrastructure in the US Midwest.

Sign outside of the community of Mandaree, Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

Earth Endures
Joletta Bird Bear

My ancestors, the Mandan and Hidatsa men and women, protected these lands for me and I carry that obligation and respect to these lands forward during these challenging times in my tribal community. In the back of my mind, the words of a song affirm what my ancestors believed: »the earth endures.« For them, this could have meant that Earth is unyielding, quiet, formidable to all storms, or that Earth is benevolent, providing for and sustaining life, or encompass both. Those few powerful words have always been in my heart and mind as I witness my community transformed into an industrialized oil and gas zone through the multitude of environmental, health, social, cultural, and economic impacts caused by the federal Bureau of Indian Affairs Oil & Gas Hydraulic Fracturing Drilling Project.

I am a Mandan and Hidatsa grandmother, an enrolled member of the federally recognized Three Affiliated Tribes, and cofounder of the citizen action group Fort Berthold Protectors of Water and Earth Rights. I reside on my allotted land with my grandson, who is growing up with me. Our home is now surrounded, in close proximity in every direction, by the intrusive permanent presence of federal oil and gas wells, flares, the roaring noise of pressure, the grinding scraping mechanical noises, and associated infrastructures and numerous dusty well pad access roads. My land is held in trust by the US government, located within the Fort Berthold Indian Reservation in North Dakota.

Map of North Dakota by NordNordWest.
CC BY-SA 3.0 DE (Wikimedia Commons)

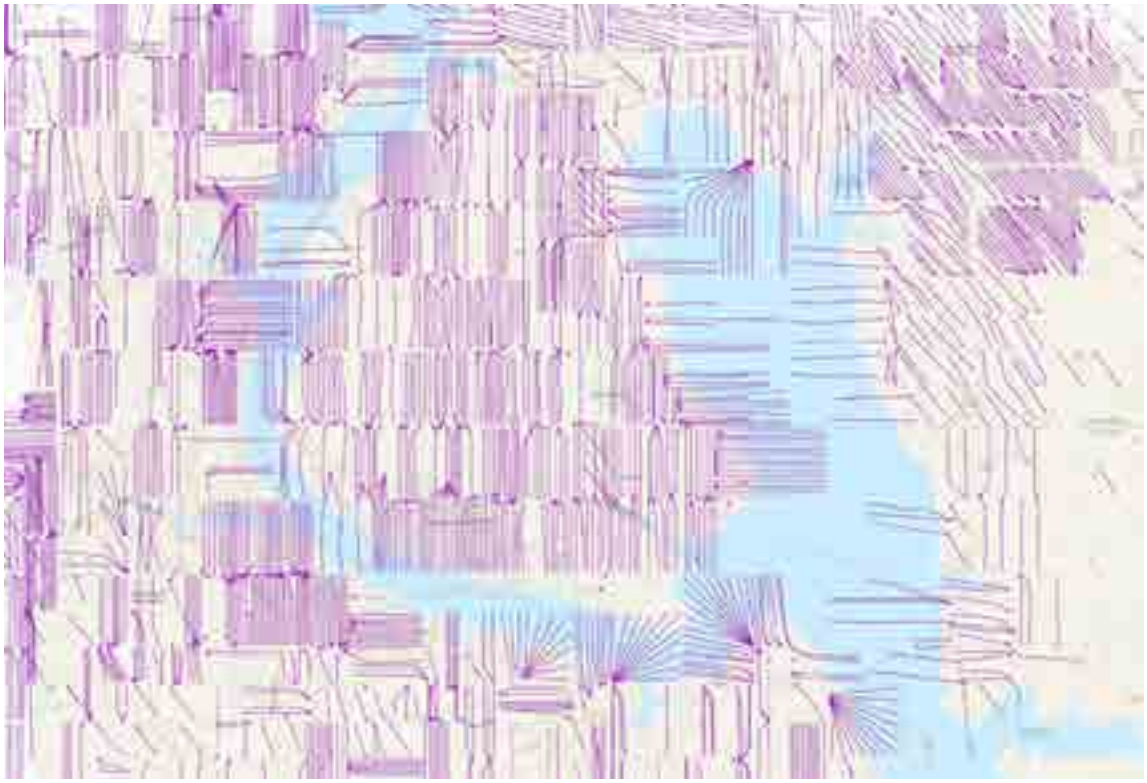
The lands within the reserve predate United States and state government territorial divisions, including the formation of the six state counties that dissect our reserved lands, the formation of the North Dakota state government, and the formation of the colonial US government and its constitution. The US government

entered into treaties between two sovereigns: the newly formed US colonial government and the longstanding senior tribal governments of the Mandan, Hidatsa, and Arikara. While the treaty making policy acknowledged the sovereignty of my tribes, it was an instrument used to dispossess us of at least twelve million acres of our land, which was historically and traditionally our home. As encroachment and railroad expansion ensued, executive orders were issued in 1870 that did not require tribal government consent nor congressional approval, which further reduced our holdings and created the boundaries of the Fort Berthold Indian Reservation, resulting in further diminishment of our lands to less than one million surface and mineral acres. All these policies, the Homestead Act and the General Allottment Act, were construed to accommodate further intrusion. The General Allottment Act divided up tribal collective lands on the reserve into individual allotments, declaring the rest »excess.« The Allotment Act was a racist assimilationist policy to further dispossess us from our lands and was specifically designed to force change the original producers of foods before colonial times into postcolonial white-thinking farmers. Through this act, our best, most fertile unallotted lands were deemed »excess« lands for sale, and ownership was offered to early European immigrants under another supremacist US policy, the Homestead Act.

A significant characteristic of land holdings on Fort Berthold is that individual Mandan, Hidatsa, and Arikara persons own their allotted land, and those individual allotted lands represent the majority of the trust lands held, whereas my tribal government owns the smaller share of trust acreage. This is significant because the US government, through the Department of Interior (DOI) and its sub-agency, the Bureau of Indian Affairs (BIA), has a treaty-based, legally mandated trust responsibility to allottees and tribal governments trust lands, and has jurisdictional authority over the allotted lands and tribal government trust lands.

Like this earth, we Mandan, Hidatsa, and Arikara have endured tremendous US policy pressures to change into something other than what we are meant to become, but like the earth, we endure. My teenage years, when I resided in a boarding school distant from my familiar lands, became a decisive time, a defining apex in my life when I felt the depth of love for the lands I grew up on which are called the Fort Berthold Indian Reservation. I was away from home to learn, and for the most part enjoyed that challenging time; homesickness was not an option. My identity to the familiar geography, my culture, and the distance to my family solidified the framework of my bond to the lands of my tribes, the Mandan and Hidatsa. These lands of hills, gentle slopes, oak-lined draws, healing waters, swaying grass, sweet plums, sweet turnips that taste like earth, curious antelope, returning migratory birds, barking coyotes at dusk, grazing deer, and the distant song of the meadowlark were my outdoor retreat to connect to the natural sounds intertwined with quietude which I loved about my land from very early in life. These lands were and remain like a spirit in me, just like the blood of my ancestors, which sustains me and flows life within me. I knew early that our lands on Fort Berthold were owned by my parents and their paternal and maternal parents, and that there would be a day when I would own those lands.

At a 2015 US Senate hearing on the Government Accountability Office Report on Indian Energy Development, North Dakota Republican Senator John Hoeven stated, »I think now that if the Three Affiliated Tribes were an independent state, they would be the ninth largest oil producing state in the nation.« By then the federal DOI BIA Oil & Gas Hydraulic Fracturing Drilling project was well underway, after its first producing trust well in 2007. The North Dakota Department of Minerals reported that a whopping 358,000 barrels a day was being produced on Fort Berthold, which represented 30 percent of all North Dakota oil production, on which the state received tax payments. An internal audit revealed that it was actually 200,500 barrels a day, or 17 percent share of the state's total oil production. Expediency and haste were the modes of the early years of the BIA frack project, when oil companies hired local tribal members as oil landmen, who fanned out across the lands to seek allottee signatures in exchange for quick bonuses, all while proclaiming allottees would become »millionaires.« Simultaneously, tribal government leaders were quickly forming their own personal oil companies from their tribal council desks, bolstered by industry executives and some tribal landowners to drill without delay, in anticipation of quick royalty payments. Even before the industrialized pressures of underground fracturing were injected into the earth, the surface level pressure had become insurmountable and the BIA reached its own critical collapse point and approved its proposed fracturing project with complete disregard and exclusion of the required National Environmental Policy Act Environmental Impact Study (EIS). A rapid series of five tribal government Indian Mineral Development Act agreements allowed for tribes to enter into oil and gas extraction with greater expediency and less federal liability, at the cost



Horizontally drilled oil wells, Fort Berthold Reservation, North Dakota, April 2021. Image source: fractracker.org

of environmental considerations, as Indian Energy Policy was designed to streamline the process of getting trust lands into leaseholds for the economic benefit of tribes and allottees.

Early on in federal agency public hearings held on Fort Berthold, tribal members requested the BIA, Bureau of Land Management (BLM), and EPA, all agencies that had lead and functional roles in the proposed fracking project, to comply and adhere to the NEPA requirements of conducting an EIS and incorporate scientific and cultural-based findings in the final decision-making. The lead federal agency, the BIA, did not conduct the EIS in a way that tribal allottees and concerned tribal members had a direct role in identifying all the anticipated environmental impacts if the project were to be approved. Tribal members were not afforded that level of participation. Instead, agency officials were vocal advocates of the economic bonuses and royalties, but were completely silent about the other side of fracking. They never mentioned that the amount of our clean water that would be needed for fracking a well depended on the well's depth and lateral length, and the need to refrack over its lifetime; that it was impossible for industry to know the actual length of a pressurized fracture injection line deep into the earth until after the frack occurs; that our communities and tribal homes were already at a public safety disadvantage because the oil industry possessed proprietary protection from disclosure of the chemicals they used, and that we would be exposed on a daily basis as they delivered them through our communities; that there would be a proliferation of makeshift man camps in our communities to house the huge influx of transient workers who were strangers to the community and did not know how to navigate correctly to the locations of the well sites they were charged with delivering these toxic oil fluids to; that extraction and production of oil also produced huge volumes of toxic and hazardous wastes, transforming the clean water provided for fracking into chemically laden, extremely saline, radioactive oil waste fluids; that these oil waste fluids posed a perpetual threat of spills that would contaminate our lands and leach deep into our earth, and that we would never receive public notice nor allottee direct notice about these spills from the lead federal agency; that radioactive filter socks were a necessary and highly toxic waste product of fracking that would pose a high risk of radiation exposure wherever the oil companies or elected tribal officials illegally dumped them; that copious volumes of natural gas would be wasted by the oil companies, despite the fact that natural gas is a mineral for which the mineral own-

Natural gas flares. Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

ers would be denied payment, because the oil company could simply claim it was an »unavoidable loss« while allottees watched the oil company burn the allottees' mineral before their very eyes – everyday; that the degradation and contamination of our soil and water would happen as oil companies repeatedly proved that oil and oil waste will contaminate the ground and flow into the Missouri River because there is no leak detection in their pipelines; and, that our airshed would be degraded by the oil companies defiant and continued flaring, despite our tribal government's resolution requiring them to capture the gas in a defined time frame.

The mounting evidence to act brought to life the Fort Berthold Protectors of Water and Earth Rights, a volunteer citizen action group that aimed at reducing the tonnage of natural gas wasted by the flaring, venting, and leaks happening on Fort Berthold. Our first priority was finding federal regulations on oil and gas and familiarizing ourselves with the language. In 2016, we learned that the Bureau of Land Management, the primary federal agency responsible for the physical fracking activity, had proposed to revise the 1940 NT4LA, which was the government policy regarding fracking on federal lands. We knew that our participation as concerned tribal members and allottees was necessary in this discussion and organized fellow Mandan, Hidatsa, and Arikara people to drive between 70 and 90 miles one way to Dickinson, North Dakota to testify at the BLM Public Hearing. Never before had a federal agency experienced the level of interest and participation that was entered into the record that day; we had come to support the proposed BLM revision of the NTL4A because it required oil industry to stop wasting natural gas, to stop dumping unburned natural gas (methane) into our airshed, and to actively inspect and repair oil industry's leaky infrastructures populating our communities. We lined up one after the other behind the microphone and spoke, propelled by our instilled value to protect our lands, directing the BLM to approve the proposed regulation because we could already see the waste that oil companies were bringing to our communities.

Epilogue to our journey: The BLM 2016 Waste Prevention, Production Subject to Royalites, and Resource Conservation rule that we supported was put into effect January 17, 2017. When Trump took office, he issued E.O. 13783 only three months later, which halted further implementation of the beneficial regulation. The real battle ensued and continues; Fort Berthold POWER have become plaintiffs in the legal fight for clean air on Fort Berthold.

Pump jacks, oil tank battery, and natural gas flares. Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

Living with Oil and Gas
Lisa Finley-DeVille

I always knew that one day, oil and gas would be here on the Fort Berthold reservation. My grandmother would tell me this when I was little. »I do not know what will happen to the land, air, and water,« she would say. One day we were picking june berries and plums, and she said »you may not have any plums or june berries if oil is here.« My grandmother would always tell me to get an education, »because long ago your ancestors didn't know what they were signing, so they would put an x down for their signature.« I was told that our purpose here is to protect Mother Earth, who provides all we need to survive, to honor those who have past on and to protect the water, and give thanks.

Fall of 2010 is when the red tape was cut by the incoming tribal administration on the Fort Berthold Reservation for industry to run all over us. »Drill baby drill,« is what I call it. There was no environmental impact statement, and no baseline studies were done. None of our leaders, at any level of government, informed our tribal members or the people of North Dakota of the aftermath of oil and gas extraction. They never explained anything to our tribal elders, yet they let them sign the oil and gas leases. When industry came to negotiate leases they gave the elders very low royalties compared to the white men off the reservation.

This was about the same time I was called by a woman who lives behind the community of Mandaree, who told me that the snow was yellow around her house. When I got there, I saw the yellow snow and looked around to see where it could have come from. What I saw was a huge flare burning behind her house, and there was something like ash coming off the flare. I started to ask Mandan, Hidatsa, and Arikara Nation departments what this was. No one had any answers for me. This was the beginning of my advocacy work, monitoring the environmental effects of the oil and gas industry on Fort Berthold.

For the past eleven years I have witnessed the increase of oil and gas industrialization along with its environmental impacts. I live with my family in Mandaree, North Dakota, the most extracted community on the Fort Berthold Reservation. Mandaree and the reservation are special to me because this is where I was raised, and my ancestors are buried here along the shores of Lake Sakakawea. Being Native American, this is the only land that we have left that is our own. We were relocated several times in our history as a people. When my ancestors were intentionally infected with small pox we

Water tanker on oil service road, Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

were forced to move from our ancestral lands along the Missouri River. And a second time when much of the Fort Berthold Reservation was flooded to build the Garrison Dam as part of the Pick Sloan project.

We've been living with oil and gas for just over a decade and we did not know that there would be so much environmental destruction with fracking. Every day we witness the environmental, health, and social impacts of living on the front lines of oil and gas extraction. Our quality of life is diminished by the rotten-egg smell of the polluted air, the constant roar from the gas flares, the light pollution that obliterates the night sky, and the rumbling of the earth beneath our homes from the drilling operations.

In 2011, we were informed that our local post office was going to be closed. I thought »this cannot happen,« because the oil traffic is too dangerous for our people to go get their mail 30+ miles away, especially for our elders. I went door to door with my husband Walter gathering signatures, and at the same time we heard about people's concerns with the impacts of the oil industry. We then conducted a local assessment of people's issues, which indicated that most people in our community were experiencing negative impacts because of the oil development.

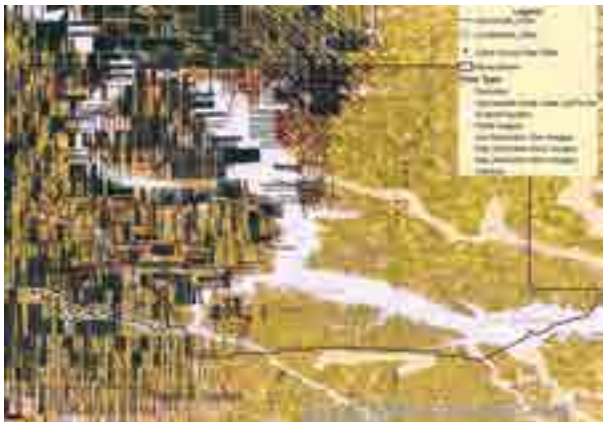
In July of 2014, a pipeline operated by Crestwood Midstream Services Inc. broke and spilled one million gallons of produced water just uphill of Bear Den Bay and our drinking water intake. Not long after, in August 2014, another Crestwood pipeline broke and spilled 250,000 gallons in the Independence area east of Mandaree near Lake Sakakawea. Crestwood was not held accountable, nor were they fined. Pipelines continue to spill in the Mandaree area, and the grasses, shrubs, and trees stand dead around those 2014 pipeline spills, and the salt contamination continues to spread.

Every direction you look here there are gas flares. Every year the oil and gas industry releases millions of tons of methane into the air in North Dakota. Between 2009 and 2014 alone, oil and gas producers on public and tribal lands vented, flared, and leaked about 375 billion cubic feet of natural gas. That's enough to supply more than five million homes for one year. Our air is being polluted and our state and tribal tax dollars are being burned or vented into the atmosphere. In North Dakota, oil development has overwhelmingly outpaced gas capture due to lack of infrastructure, a major oversight that has left reservations and public lands open to unnecessary flaring; and the oil industry has been given a free pass to wilfully waste a valuable, finite resource.

Pipeline markers with drilling rig, Fort Berthold Reservation, North Dakota, March 2019. © Angela Anderson

Methane is the second largest contributor to human caused global warming after carbon dioxide. It has a global warming potential that is 86 times greater than carbon dioxide. In addition to methane, natural gas leaked and vented from oil and gas development also contains volatile organic compounds and hazardous air pollutants such as benzene, a known carcinogen. Long-term exposure to these emissions result in health impacts such as asthma, cancer, neurological damage, pulmonary reduction, coronary problems, endocrine disruption, and headaches. The impact can be devastating if we're breathing in carcinogenic material that is a result of the oil and gas production.

Creating and strictly enforcing environmental laws and policies to regulate oil and gas development is very important. Environmental racism is real. The Dakota Access Pipeline is a prime example, because when the white community of Bismarck said no, it was rerouted to just north of the Standing Rock Reservation. Right now in North Dakota, government agencies under tribal, state, and federal leadership, together with industry are destroying the earth for money. We need monitoring, research, testing, and studies that show the environmental and human health impacts of exposure. We were taught that if you destroy Mother Earth, you destroy yourself. The intruders can leave whenever they want; we don't have that option. We will have to deal with the aftermath of the irreparable environmental destruction. These white people are only here to profit off our oil, which is another flood of the same invaders who came to our lands centuries ago. We have continuously been forced to assimilate to live how their society thinks is the only way. Everything



Active oil and gas producing wells, Fort Berthold, December 2017.
Map by Tanya Sand-Driver and Lisa Finley-DeVille.

has been taken repeatedly, every promise broken. And we have to accept it. Our lands have been taken, mined, and extracted of resources that will never be available again because of white man's GREED. It's destroying us.

Jayley, Max and Alexandrea Brugh observe the pump jacks and flares from the deck of the family home in the Four Bears community on the Fort Berthold Reservation in North Dakota. © Victoria Windy Boy

Acknowledging Disillusion
Jodi Rave

I live in a little community on the south side of the Little Missouri River. My home sits atop a high bluff overlooking the little river before it flows into Lake Sakakawea. When I look across the river channel, I'm glad I don't live on the other side of the water. It's the land of fire.

When I cross the water, I see hundreds of natural-gas burning flares. This is the land of oil and gas fields, the Bakken shale formation. My little community of Twin Buttes is located on the south side of the Fort Berthold Reservation. We see significantly less oil production than the north side. I think I'm spared from living next to battalions of flares and oil pump jacks, but there's a lot more happening that I can't see.

Oil companies drill using a process called hydraulic fracking – a chemically-laden, technically-invasive practice used to extract oil in tight shale formations miles beneath the earth's surface. The process not only unlocks oil from rock, but also unleashes byproducts like natural gas.

The gas gets burned in flare stacks which emit air pollutants, including volatile organic compounds, polycyclic aromatic hydrocarbons, carbon monoxide, toxic heavy metals, formaldehyde, and soot. Natural gas is typically burned because there is not enough infrastructure to capture it. Instead, it's set on fire and burned into the atmosphere. The process of extracting oil from shale also releases ethane into the atmosphere. The Bakken oil and gas fields extend across North Dakota, Montana, and Saskatchewan, Canada.

University of Michigan researchers found that oil and gas production in the Bakken emits about two percent of global ethane. While ethane emissions had been decreasing across the planet, drilling in the Bakken has led to a global ethane spike. Ethane, like methane, is a greenhouse gas, which can damage air quality and effect climate. Oil production in the Bakken releases 250,000 tons of ethane per year, according to the Michigan study.

My son, James »Jimmy« Brugh, and his family live on the north side of Lake Sakakawea. Like many families who live on Fort Berthold, my son, daughter-in-law, and grandchildren feel the direct brunt of massive oil production. Their home is located in a »sweet spot« of the Bakken oil shale deposit, an area with some of the highest producing wells in North Dakota.

The Brughs are surrounded by oil rigs, pump jacks, gun-toting security forces, semi and truck traffic, light and sound pollution, oil field trespassers, natural-gas

A fire burned more than 8,000 acres on the Fort Berthold Reservation in North Dakota in early May 2021. © Jodi Rave Spotted Bear

burning flares, and transient workers. After years of drilling and fracking new well sites, oil companies have turned Fort Berthold and my son's backyard into an industrial zone. All his family members have ongoing health concerns related to the hydraulic fracking operations and burning flares that surround them.

More than 19,034 wells have been drilled in western North Dakota since the Bakken oil boom began. The state is now the second largest oil producer in the United States. I've seen my son physically and emotionally stressed because of the constant drilling, fracking, and flaring activity on the reservation and within the Four Bears community.

As a mother, I try to help my son the best I can. I see him having a hard time coping with devastating natural resource extraction and all the associated risks. I've often told Jimmy to write about his experiences hoping it might help him unwind. One day, he surprised me. He called me and said he wrote some poems. He inspired me to do the same.

Land for Sale
James Brugh

I damn sure ain't Crazy Horse
But, I know how he felt
His world went to hell
On this thought, I do dwell

The land is for sale
Your souls are as well
Laws will not save you
They're written to fail

Fight for your freedom
They'll give you a cell
Put trust in your people
They'll try to haul you to jail

Seems that these days
Honor is frail
I damn sure ain't Crazy Horse
But, I know how he felt

Heart of a Warrior
Jodi Rave

Son says he ain't no Crazy Horse
Yet, he carries a bow
Modern-day fur traders, oil corporations, hire
security forces, armed with assault weapons,
Greedy men have to put on a show

Natural-gas flares dominate the Missouri River, the
Badlands, the prairie
Goliath's torches scorch the air
*VOCs, just what are we breathing?
Why treat us like the miner's canary?

Tribal leaders eat greasy steaks
Dine alongside corporate cowboys, what can we do
to please you?
Toxic spills poison the lake
Kleptocracy, Oligarchy rules, we're here at your
leisure

Who is the real *wasicu*? The fat taker?
Indian land for sale, sold to the capitalist bidder
Mother wills her son the beating heart of a warrior
Hold your bow high, son, be wise, consider

*Volatile Organic Compounds

Oil producers in North Dakota reached an average of 16,000 producing wells in 2019. Pump jacks and drilling rigs are a common site on the Fort Berthold Reservation in 2021. © Jodi Rave Spotted Bear

Ringside at the Fire of Affliction
Jodi Rave

Drawing by Jayley Brugh, age 9

Dad's in the boxing ring,
Not such a shocking thing
Go Dad

Fight, Fight, Fight

Capitalists erect intrusive oil rigs, 'Drill Baby Drill'
Family's outside, trying to chill,
Cook a few hot dogs, put some burgers on the grill

Fight, Fight, Fight

Another round with Marathon Oil
Dad, please, don't let your blood boil
It's not easy to bear witness, to feel the recoil

Fight, Fight, Fight

Take a rest, Dad
Don't get too crazy
Now's not the time to be pushing up daisies

Fight, Fight, Fight

Oil field workers here to make a quick buck,
No cares, no worries, carry on like a schmuck
If Dad was in charge, they wouldn't run amok

Fight, fight, fight

Back in the boxing ring, swinging,
Next round, no one to stop the bell from continually ringing
Sometimes, watching ringside can be an alarming thing

Fight, fight, fight

Dad, bring this match to an end
Mom's bringing home a baby,
Remember who she is

A good mom
A good woman
A good lady

Natural gas flares burning in Mandaree, North Dakota on the Fort Berthold Reservation, 2020.
© Jodi Rave Spotted Bear

The Burden
James Brugh

Oil companies, tribal leaders,
You put a gun to my head
And tell me it's for my own good
Am I better off dead?
Or do I fight like anyone would?
I cling to life
As you throw it away,
Shedding tears as I watch
You lead us to our graves
I wonder and pray
Do I fight for what's left?
To let you ruin it anyway?
Or do I take from you
Your power to destroy what love remains?
I've been burdened long enough,
It's time for you to go
I have more to live for,
More than you'll ever know
While my trust in you has vanished
Resilience and strength have grown,
It's time for things to change
In due time it will be shown

Goodbye Settlers
Jodi Rave

Euro-immigrants arrive upon the Indigenous lands of the Americas
Far away, they've left behind the bones of their ancestors

Colonizers wreak havoc in the Land of Plenty

Men without consciousness,
Men without souls,
Men who defy the meaning of damage control

They arrive bearing small pox, full throttle genocide
Unquenchable thirst for riches
Pumping Mother Earth with viciousness

Colonizers wreak havoc in the Land of Plenty

Men without consciousness,
Men without souls,
Men who defy the meaning of damage control

My relatives, keep your faith, this shall all pass
Native sons, Native daughters, this is our land
We've been here for many a millennia, we're the Center of Mass
Colonizers wreak havoc in the Land of Plenty

Men without consciousness,
Men without souls,
Men who defy the meaning of damage control

One day they'll walk the path of the dead – so long
Goodbye invading settlers, barbarians of nature,
You've never been welcome, cheerio – be gone

Drilling rig as seen from my house. Fort Berthold Reservation, North Dakota, 2021. © Jodi Rave Spotted Bear

Daughter Come Home
Jodi Rave

Beautiful Indian woman
Gone, #MissingMurderedIndigenousWomen

Dad searches for daughter,
    days turn to months
She's at the bottom of a lake,
    lifeless woman in a truck

Sacagawea blankets her with moonlit tears
Ancient ones lift her to the Spirit World

Oliva Lone Bear, #MMIW
Babies miss mama

Photo: Heather Davis

Plastic

Plastic has become ubiquitous:
in our lives as a material of functionality and
convenience, and in our surroundings, masquerading as
familiar objects and becoming part of ecosystems. And yet
»what does this mean, to live in times where our long-dead ancestors,
compressed with geologic force, have been revived, and to take this
revelation so blandly?« is the question Heather Davis asks.
What does plastic tell us about the »split consciousness
of contemporary existence,« the fact that
»the damaged planet has become part of our everyday lives?«

Heather Davis

It is by now an everyday scene. Gazing down from a boat, or dock, into the water and seeing a gently moving translucent object that initially appears to be just another floating jellyfish, bobbing around, expanding and contracting, but on second glance is a plastic bag. A similar experience happens on land, where a flutter catches the corner of your eye, and as you look up, you see a bag drifting in the wind, arching and tumbling. Or, as you bend down to pick up a particularly bright coloured rock from the ground, you realize it is actually a well-worn piece of plastic, some broken and weathered toy or lighter. Plastic has now become one of the vectors to understanding the flows of water and wind, the pressures and speeds and variegations of the world around us. The transformation of our landscapes through the omnipresence of plastic is now a platitude. The saturation of the world with oil is so commonplace as to be a banal observation. Plastic and oil reinforce each other. Fracking drives a booming plastic industry and plastic textiles protect oil workers from the hazards of their jobs. What does this mean, to live in times where our long-dead ancestors, compressed with geologic force, have been revived, and to take this revelation so blandly? That sleek, slick substance that marks all of our relations in the twenty-first century is as pervasive and all-encompassing as our atmosphere. And for many of us, now, this reality appears unremarkable.

The slow suffocation, the temperate starvations, the seeping of chemicals, all these conditions form a entral part of the banality of environmental horror, the ways in which ecocide is rather mundane. The damaged planet has become part of our everyday lives, and in this sense this extreme state of exception appears quite ordinary. This state of affairs is characterized by the split consciousness of contemporary existence, where many of us are quite aware of the dangers that we are surrounding ourselves with and the violence we are perpetrating against others, and yet we carry on working and loving and living as if everything were just fine, caught up in the pleasures and infrastructures and duties of everyday life. Plastic can be understood as a materialization of these realities. For it can be seen as a condensation of the forces of petro-capitalism, with all of the attendant violences on humans and the more-than-human worlds we inhabit. And yet it is also just the bag that we carry home, it is also just the paint that is in our homes, it is also just the keys on which these words were typed and the glasses through which I see and the pavement of the roads and the tires on those roads. This creeping and pervasive transformation is too encompassing to find horrifying, at least not on an ongoing basis. It is too convenient and omnipresent and, frankly, beautiful. It is too seductive, too pleasurable, too easy, too normal.

Plastic is a question posed to us from a different time, from an ancient time, from a distant future. It asks, How do we deal with banality? What does pervasiveness feel like? For plastic is now everywhere, in everyone, and there is no outside or escape or safe room to retreat to, even if these conditions of exposure and toxicity are differentially distributed according to race and class. So, what does this material have to teach us about contemporary environmental thought? What might we learn from these intractable and, in many ways, irreversible conditions? How are we to deal with the mundane horrors of environmental decline, and the slow violence enacted on the bodies of many organisms because of the suffocating, toxic, starving qualities of plastic? What does it mean to unearth the dead? And for all of this to exacerbate and intensify pre-existing patterns of disparity and privilege? These are the questions that plastic asks of us, demands us to consider, as it swirls, lazily, through the waterways, as it drifts on the winds, as it clogs our gutters and fills the stomachs of camels and whales and coral. These relatively new materials are calling us to reimagine our relations to water, oil, air, and soil, and to each other.

This essay was originally published in *Connectedness: An Incomplete Encyclopedia of the Anthropocene,* Marianne Krogh (ed.), Copenhagen 2020.

Angela Anderson is an artist and researcher working at the intersection of philosophy, ecology, economics, migration, and feminist and queer theory. Her artistic production is research-based and takes the form of multichannel video and sound installations, sculptural elements, and photography. Much of her work centers around the devastating effects of large-scale natural resource extraction projects and the complex economic, social, historical, aesthetic, and affectual forces that converge in them. She is Assistant Professor at the School of Art Kassel and a doctoral candidate in the Ph.D. in Practice Program at the Academy of Fine Arts Vienna. From Wisconsin/USA, she lives and works in Berlin.

Joletta Bird Bear is an enrolled Mandan Hidatsa tribal member of the Three Affiliated Tribes of the Fort Berthold Indian Reservation and a member of Fort Berthold Protectors of Water and Earth Rights.

Heather Davis (she/her) is an assistant professor of Culture and Media at The New School. She is the co-editor of *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies* and *Desire Change: Contemporary Feminist Art in Canada*. Her current book project, *Plastic Matter*, reexamines materiality in relation to plastic. She is also a member of the Synthetic Collective, an interdisciplinary team of scientists, humanities scholars, and artists who investigate and make visible plastic pollution in the Great Lakes. Her writing can be found at http://heathermdavis.com.

Lisa Finley-DeVille is an enrolled member of the Mandan, Hidatsa, and Arikara Nation. She is cofounder and creator of grassroots group of Fort Berthold Protectors of Water and Earth Rights (POWER), a board member of the Dakota Resource Council (DRC) and of the Western Organization of Resource Council (WORC) and a member of DRC Oil and Gas Task Force. She served on the National Environmental Justice Advisory Council (NEJAC) in Washington, D.C.

Jodi Rave Spotted Bear lives on a high bluff overlooking the last stretch of the Little Missouri River before it flows into the big Missouri. She is the founder of the Indigenous Media Freedom Alliance and publisher of Buffalo's Fire, a digital news site. She is currently a Massachusetts Institute of Technology Knight Science Journalism Fellow and is writing about oil production on the Fort Berthold Reservation in western North Dakota. James Brugh is her son.

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Edited by Joana Quiroga

We Belong to the Land
Antônio Bispo dos Santos

Between Avarice and Sharing
Joana Quiroga

A conversation with the artists
Castiel Vitorino Brasileiro and Fredone Fone
inspired by the word »Bannrecht« (right to ban)
(Available online only in English and Portuguese)

* At the request of the guest editor, this section
has been very little redacted, to ensure complete original style.

We Belong to the Land

This article presents reflections about the colonial model in contemporary Brazil – barely disguised by so-called democratic institutions – and the practices and thoughts of *quilombola* culture in the resistance to the oppressive mechanisms carried out by this model. By examining the Christian, European, colonialist matrix of thought, as opposed of ways of life forged in the dialogue between indigenous and African peoples in the diaspora, the author introduces the concepts of *confluence* and *transfluence* as part of the countercoloniality theory.[1]

Access Portuguese version online:

Antônio Bispo dos Santos

I.

When I provoke a debate about colonization, the *quilombos*,[2] their manners and their meanings, I do not want to position myself as a thinker. Instead, I am positioning myself as a translator. My elders formed me first through orality, but they put me in school to learn through written language so that I could translate the contracts we were forced to make.[3]

I went to the school of written language at the age of nine but since I started to speak, I have also been trained by »craft masters« in our community activities. When I went to school in the late 1960s, oral contracts were being broken in our community to be replaced by written contracts imposed by white colonialist society. I studied until the eighth grade, when the community assessed that I could already be a translator. In the 1940s there was a major campaign of land regularization by writing, i.e., official documents. This occurred in Piauí and also all over Brazil.[4] The law said that the people who occupied the land would be called *posseiros* (squatters). That law put a name, objectified these people. We were not squatters; we were people... What did that mean to us?

From the moment that the law says that we are squatters, plays an important role for colonialism. Colonialism names all the people they want to dominate. Sometimes we do the same thing without realizing it: when we have a dog, for example, we give him a name but not a last name. Colonialists provide a name but not a surname because the surname is what power means. The name objectifies, the surname empowers. So by calling us *posseiros*, they put us in a situation of subordination, forcing us to fulfill the contracts that the nomination imposed on us.[5] Our people's contracts were made orally because our relationship with the land was through cultivation. The land didn't belong to us, we belonged to the land. We did not say »that land is mine« but »we are of that land.« There was an understanding among us that the earth is alive, and since it can produce, it must rest too. We did not start owning our land because we wanted to but because it was a state imposition. If we could, our lands would be as they are – in relation to life.[6]

Quilombola power over land is power based on word, attitude, relationship – not in writing.[7] When the state came to demarcate the land, my grandfather refused, saying, »How are we going to demarcate something that is already ours?« So, the white people arrived, bought the land and we lost the right over it. Even the elders who had demarcated their land at that time lost it because their heirs did not reregister the documents in their name. Most of the lands of traditional communities in Brazil are considered spoils, as no one has a deed to the land. However, if we register and obtain deeds today because it is imposed on us, there is something more serious involved. The process of obtaining a deed to the land requires an anthropological report – even though the law says that being a *quilombola* is a self-declaring identity – and an agronomic report. This process is the most sophisticated use of state intelligence to identify the profile of the people that resist state oppression and state strategies to organize and surveil resistance. Why would we need an anthropologist to diagnose us, understand our customs, our traditions, our culture? Because those who most threaten the system today are the traditional peoples and communities, because we are the owners of a knowledge transmitted spontaneously and orally, without charging anything for it. Because our people could not read, they did not know how the deeds worked, thus losing many possibilities to live on their land. So our people decided that one of us should be able to read and write to deal with this situation. I was trained for this and I do this work still today. That is why I say that I am not a thinker, but a translator of the thinking of my people. And for my people I am also a translator of colonialist thought. When we are discussing colonization, *quilombos*, colonialist ways of living and meanings, we are trying to understand what makes the colonialists think the way they do and how we should think so as not to behave like them. Our people were brought here from Africa. Unlike our Indigenous friends who were attacked in their territory and could speak their languages, cultivate their seeds, and dialogue with their environment, we were taken from our territories to be attacked on Indigenous territory. So, we needed and need nowadays – and have succeeded – to be very generous, because even though we were brought into Indigenous territory, we did not dispute the territory with them. We dispute with the colonialists the territory they took from the Indigenous people and it hurts us. But we need to do this. Otherwise, where are we going to live?

To the detriment and surprise of colonialists, and to our benefit and happiness, when we reach out in solidarity to Indigenous peoples, we find lifeways similar to ours. We find relationships with nature similar to ours. There was a great confluence in manner and thoughts. And it has strengthened us. We made a great cosmological alliance, even speaking different languages. By our lifeways, we understood each other. I was guided by our elders to try to understand why the colonialist people do such harmful and violent things to other people. I looked

at the Bible, I looked at what they wrote. And I found in the Bible, in Genesis, a good explanation: »Jehovah God said to the man, why have you disobeyed me? The earth will be cursed because of you. You shall only eat by the sweat of your brow. The land will offer you thorns and weeds. And all your descendants will be perpetually cursed.« At this point, this god of the colonialist Bible – rather, monotheistic *Euro-Christian* – de-territorialized a people. When he cursed the land to colonialist people, he said that his people could not even touch the land. When he said that the land was offering weeds and thorns, he said that the people could not eat either the fruit or the leaves or anything that land offered. When he said that these people had to eat by the sweat of their brow, at that moment he created work as an action of synthesizing nature. At the same time, he also created a disease that I call cosmophobia – the fear of the cosmos, the fear of God. These monotheistic Euro-Christian people feel desperate. As *quilombolas*, we also had to learn to live with this god. And we even learned to accept it. Because if it's god, it must be good. So besides having our goddesses and our gods, we also have this god. And that's where Euro-Christian people started to lose. Because they only had one god and they still had to share with us. And we have several. As they only have one god, they only look in one direction. So their look is vertical, it's linear, it does not turn. This is their thinking and doing. As we have many deities, we can look and see our deity in every corner. We see in a circular way, think and act in a circular way, and for us there is no end, we always find a way to start again. Our thinking is a thinking that allows us to better measure things, movements and spaces. The complexity of the world fits better in circular spaces than in rectangular spaces. And that allows us to live well with diversity and always allows us to think that the other – men and women – are important. We always understand the need for other people to exist. The Afro people invented *capoeira*.[8] Euro-Christians invented football. Imagine – there's a football game in Mineirão and let's say it has 40,000 people in the stands and 22 people in the field.[9] Let's say Cruzeiro and Atlético are playing today and Neymar came to watch the game. He left his position in Europe to watch the game. At one point, the team Neymar is rooting for is losing, and he asks to join the game. Is it allowed? How does Neymar, who is rooting for a team and wants to defend this team, join when he can't get on the field? Let's go to the other side. There is a capoeira circle, and now comes a European who has never seen capoeira. There are 50 people playing capoeira, and the one who has never seen capoeira asks to join. Is it allowed? The capoeira is spinning, the samba is spinning, the *batuque*, spinning in the umbanda and candomblé ....[10] Everything for us is spinning. Everything for the colonizers is linear. It is a look limited to one direction only.

The *quilombos* are persecuted precisely because we offer a different possibility of living. It's not simply because of the color of our skin. In the Church documents I evaluated, the permissions for peoples to be enslaved do not talk about the color of those peoples, they talk about their religiosity. Pope Nicholas V's 1455 papal bull says that the pagans and the Saracens should be enslaved. The instructions did not refer to people as black, nor white, nor Indigenous. They referred to people as pagans, the people who have a cosmology. What people are these? These are the people who continue to eat from the fruits of the trees. These are the people who have not obeyed the guidance of the Euro-Christian god. These are the people who feel no obligation to work. They are the people who do not need to eat by the sweat of their brow, because nature already offers the food.

II.

Concepts that we think are very similar to those of »living well« and »welfare« are »living organically« and »living synthetically.« To live well is to live organically and to have welfare is to live synthetically. We understand that there is organic knowledge and synthetic knowledge. While organic knowledge is knowledge that is developed by developing »being,« synthetic knowledge is what is developed by developing »having.« We operate through organic knowledge and colonialists operate through synthetic knowledge.

When the god of white people said that the earth was cursed because of Adam and Eve and that they would eat by the sweat of their brow, he said they could not enjoy nature as it presents itself. So they would need to synthesize everything and so they went out into the world synthesizing – including themselves. Much of white thinking is synthesized. The thought produced in the academy is a synthetic thought. It is a knowledge focused on the production of things. The thought operationalized by writing is a synthetic thought, disconnected from life. Our thinking, moved by orality, is an organic thinking.

»Being« [existence] has little value in synthetic knowledge, despite being the creator of the property. On the other hand, »having« [owning] is the creature that devours its creator. People always act based on having.

Even biology is becoming synthetic. Soon you will eat steak without the need of a cow.

Our assessment is that right now we are experiencing one of the greatest possibilities for an end to this Euro-Christian, monotheistic, colonialist and synthetic world. This world is coming to an end. No wonder we are experiencing this despair, this great confusion. But, incredible as it may seem, we are also experiencing a new confluence.

I work with the concepts of »confluence« and »transfluence.« *Confluence* was a very easy concept to develop because I only needed to observe the movement of the waters by the rivers, by the land. *Transfluence* took a little longer because I had to watch the water move across the sky. It took me a long time to understand how a river that is in Brazil merges with a river that is in Africa. I realize that they do so through the rain, through the clouds. By the rivers of heaven. Thus, if it is possible for the fresh waters that are in Brazil to reach Africa from the sky, also from the sky the wisdom of our people can reach us in Brazil.

That is why, even though the colonialists have tried to destroy our language, our lifeways, they have not been able to take away our relationship with the cosmos. They did not and cannot take away our wisdom. That is why we have managed to adapt ourselves wisely without harming the true owners of this territory who are our Indigenous brothers and sisters. We have this ability because we are able to connect with our elders who were in Africa, through cosmology, despite the fact that we are forbidden to return there physically. This is what we call *transfluence*.

III.

Both *quilombolas* and Indigenous peoples of Brazil became legal subjects only in the 1988 Constitution. Until that constitution, to be *quilombola* was to be criminal and to be Indigenous was to be wild. The 1988 Constitution said that we have the right to gain title to our lands by writing – which is an aggression, because by writing we would become landowners; but our elders taught us how to deal with this aggression.

I had an uncle named Antonio Maximus, who was the operator of a great martial art called Jucá.[11] He taught me that sometimes we need to turn enemy weapons into defense, so that we don't turn our defense into weapons. Because if we turn our defense into a weapon, we will only know how to attack and those who only know how to attack, lose.

If cities, with all their weapons, do not live in peace, and we in the community live in peace without weapons, then it is clear that it is not weapons that solve the problems. That's why my uncle Antonio said to turn weapons into defense. Mother Joan, also one of my great teachers, said that the vessel of giving is the same as receiving. So, if I point a revolver at you, this reveals that I am afraid of the revolver. I am offering to you a fear of the revolver, and thus this dispute will have no end.

Thus, to address land titling through writing does not mean we agree with it, rather it means that we adopt an enemy weapon and turn it into defense. For us, it is not land titles that determine if we are *quilombolas*, but rather the way we relate to the land. In this regard we and Indigenous peoples are conjoined. We *conjoin* in the territories because our territory is not just the land, it is all the elements.

Piauí is a state that practically does not exist for the rest of Brazil. When I say I'm from Piauí, people sometimes even ask me where Piauí is, as if it isn't on the map. It's not on the map that fits in those people's minds. Then, it is said that in Piauí there are no Indigenous people, as it is also said that in Roraima there are no *quilombos*. But in Piauí today there are three different Indigenous groups fighting for their self-identification, self-recognition, and the demarcation of their lands. And who are the partners of these peoples? The *quilombolas*. Their territories are continuous.

In Piauí there is a great alliance between *quilombolas* and Indigenous people, both in terms of the regularization of ownership of our territories and also of updating our cultural expressions based on an organic knowledge. Organic knowledge is the knowledge that updates, while synthetic knowledge is the one that recycles.

IV.

We are not losers. I do not work within this logic of »victimology.« I have no right to be a victim. I am a winner; my people have won. My great-grandfather had three sugar mills; I was raised in abundance. I have no scars of slavery in my memory. I do not disagree with those who work with the image of the scar of slavery. However, I don't work with this image of the victim, I work with the image of the winner. Even if they burn writing, they do not burn orality; even if they burn symbols, they do not burn meanings; even if they burn bodies, they do not burn ancestry. Because our images are also ancestral.

Many communities in every corner of Brazil are being attacked in the same way as were Palmares,[12] Canudos, Caldeirões, and Pau de Colher. Today, the Armed Forces are in Rocinha, a shantytown, practicing ethnocide. The government of Getúlio Vargas was one of the most ethnocidal governments we have ever had. He killed and burned the people of Caldeirões in the state of Ceará in 1936 and also the people of Pau de Colher along the border with the state of Bahia in 1942. But we still do not stop struggling.[13]

Our relationship with world images is based on the logic of the emancipation of peoples and traditional communities through counter-colonization. It is not through class struggle because class struggle is European and Christian monotheistic. I do not treat traditional peoples and communities as Marxist categories: as workers, unemployed or revolutionary. This language is not ours. This language is Euro-Christian-colonialist.

Some thinkers in Piauí wrote very well about the *quilombos* but they used the perspective of Marxism and it bothered me. I think of our walk from inside the slave ship. When the first slave ship departed, the first *quilombo* was formed. The first *quilombo* was in there, with people reacting, throwing themselves into the sea, crashing and dying. Then the *quilombo* began. And Marx didn't even exist at that time! What does Marx have to do with it? When Marx said something, Palmares had been established 200 years earlier. I think Marx has his role in Europe. As we say in the backcountry, »*cada quem no seu cada qual*« (i.e. each person takes care of their own).

The MST (Landless Movement), for example, is wonderful, one of the greatest inventions ever made, but it is a colonialist organization. You just have to go through most of the Brazilian states to see that the MST coordinator is usually a white and southern man. How? I do not believe that the other states could not produce their own leader. You get there in Piauí and the MST coordinator is drinking maté tea[14] Well, in Piauí what we drink is cashew juice![15] Of course, the contribution of the MST is important but from a political point of view, the MST is mono, linear, vertical. They wanted to be the only movement capable of representing the field. We do not want to be »the only one.«

From the beginning of colonization, from 1500 to 1888, the African people were regarded and treated as slaves, and what they thought and said did not enter Brazilian thought. From 1888 to 1988, our cultural expressions, *capoeira*, samba, continued to be considered crimes. This is colonialism. To colonize is to subdue, humiliate, destroy or enslave the trajectories of a people who have a cultural matrix, an original matrix different from yours.

And what is countercolonizing? It is updating our trajectories from our matrices. And who can do that? Ourselves! The trajectory of the *quilombola* people can only be updated and revisited by those who think of circularity and through the polytheistic worldview. It is not Boaventura de Sousa Santos, although he is playing a good role in this process. To the extent, at least, that he says we have to dismantle what his people, the colonialist people, did. This is already of enormous generosity. At least he is not saying that you need to sophisticate and do more. But we are discussing counter-colonization. For us, *quilombolas* and Indigenous people, this is the agenda: countercolonization. The day universities learn that they don't know, the day universities agree to learn Indigenous languages – instead of teaching – the day universities agree to learn Indigenous architecture and learn what the *caatinga*[16] plants are for, the day they are willing to learn from us as we learn one day from them, we will have a confluence. A confluence of knowledges. A process of balancing the diverse civilizations of this place. A counter-colonization.

Translated into English by Carmela Zigoni

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1 Translator's Note: The following text, authored by Antonio Bispo, has been translated from the original Portuguese into English by Carmela Zigoni. The author and translator wish to remind readers that in this piece, there are some concepts and ideas that are not explained fully in a manner typical of Western academia. This is intentional. We wish to leave room for imagination, and we wish to remind readers that these ideas are what the author has called »local philosophy.« This is a philosophy that does not follow or conform to colonial norms.

2 Translator's Note: the *quilombos* – also known in other countries as maroons – are communities of African descent who resisted the slavery of the colonialist period in Brazil, creating societies with alternative ways of life to hegemonic society. Currently, in Brazil, there are two thousand *quilombola* communities recognized by the State.

3 Translator's Note: the author is marking an opposition between oral and written cultures, and the issue of written contracts as a form of domination. After slavery abolition, the land in Brazil was registered in favor of the white population and the afrodescendents were deprived of any real possibility of land acquisition. The practice of using the official norms – written laws, »the papers« – to expropriate their territories is still a contemporary practice, as is the case, for example, in normative processes to implement mining projects in their lands, with procedures that involve many actors such as scientists, technicians, politics, lawyers, a kind of »State language« that is not accessible to the local *quilombolas*. Also, in Brazil, illiteracy in the countryside is still a current reality. So, the tension highlighted by the author here is among what is said, agreed, remembered, and therefore, worthless; and what is written, therefore, true.

4 Translator's Note: Piauí is one of the 27 states of Brazil.

5 Translator's Note: When the author mentions the »nomination« he is referring to the exogenous process of naming a population, i.e., the classifying it within an intelligible narrative for the constituted power, as opposed to self-nomination, or self-determination. So, if in the slavery period quilombolas were officially criminalized, after abolition they go through an institutional »limbo« and are named as »dispossessed,« starting to be appointed as land invaders or landless people. After the land laws promulged in the 1970s, they were recognized as unionized farmers, but this identity was not capable of reflecting their cultural specificities. They were recognized by the State as *quilombolas* in the 1988 Constitution.

6 Translator's Note: In the original the word is »terra,« but even in Portuguese the word does not reach the complexity of the meaning that land has for the *quilombola* perspective found in the text, namely: land as territory, land as place of cultivation, land as nature that provides medicine, land as the reference of memory and ancestry, etc. So, land here is at the same time soil, homeland, earth, clay and much more.

7 Translator's Note: the term *quilombola* refers to an individual resident of a *quilombo*.

8 Translator's Note: Capoeira is an Afro-Brazilian practice that combines martial arts, dance and music, and is played in the center of a circle of people.

9 Translator's Note: Mineirão is the name of one of the largest soccer stadiums in Brazil, located in the city of Belo Horizonte, state of Minas Gerais. The two main rival teams in that state are Atletico and Cruzeiro.

10 Translator's Note: Samba and *batuque* are both musical and dance practices, and also originate in the Brazilian African diaspora. They are also practiced in a circle: the musicians in the center and the public interacting around them. *Umbanda* and the *Candomblé* are Afro-religious practices that follow the same circular logic at the organization of rituals.

11 Translator's Note: Jucá is a local martial art with the use of handmade wooden clubs. As with Capoeira, this expression developed in the African diaspora and has some specific elements: it can be used as a defense against enemies but, more than a way of fighting, the Capoeira and Jucá are multifaceted practices involving music, dance, and local systems of learning (with masters and pupils) that happen in specific moments and have a public. In other words, they function as what Social Anthropology defines as rituals – specialized and separated, including a clientele, an apex, and produced social effects. Also, the circular form of the organization of space and practice in Jucá and Capoeira obeys a logic of horizontal participation, where the center and the border are connected not by a relation of power, but a relation of deference to knowledge and ancestry.

12 Translator's Note: Palmares is the most famous quilombo in Brazil, and had a population of 20,000 when it was destroyed by the official forces at the end of the seventeenth century.

13 Translator's Note: Palmares, Canudos, Caldeirões and Pau de Colher were alternative Afro-descendant communities created with social systems different from the hegemonic logic of the state and were harshly repressed by the military forces.

14 Translator's Note: In the original text, chimarrão.

15 Translator's Note: In the original text, cajuína.

16 Translator's Note: Caatinga is a Brazilian biome with semi-arid climate, low-leaf vegetation adapted to dry periods, and great biodiversity.

Between Avarice and Sharing

Bread.
An everyday presence
on the »banality« of our home tables.
Perhaps bread is one of the most complete records
of our »mutations,« from the discovery of a mixture of cereals and
water exposed to heat, to agriculture, which allowed the exponential
growth of the human species; from the »body of Christ« to
gluten-free options. The examples of transformations that bread
participated in and provoked along human history are so numerous
that bread has become synonymous to survival, work, life,
abundance, and the future. But is it, in fact? From my own
problematic position of privilege of being in this journal,
I invite you to ask you this with me.

Access Portuguese
version online:

Joana Quiroga

This is a draft.
A draft because [it is about that time in which] the old full stops came together so close, that became ellipsis ... question marks ... and some exclamation points, too.

It's a draft because I need to review this punctuation, for one day, who knows, have something to write about.

Because: what can I say about bread? Or, what can't I say about bread?

[Do questions show the »ellipsis« that I won't know how to manage ...?]

My space in this journal ranges around 4000 to 5000 words. But these 7 might be enough:

Who am I in the bread line?[1]

Intruder.

To wake up (or start working) at 2 or 4 am ... a crowded bus, boss, trade wage.[2] I can't talk about bread. Because I don't make bread ... I mean, I make it ... but I'm not a baker ... I am nobody in this line. And that's the place fit for me, to be nobody ...
... on the other hand, this is not how the world works, we know it well, and there are ways to jump the line. I am here, jumping the line ... and that's what I want to talk about.

... yes, it was the bread that brought me to this journal.
[Without having to take a crowded bus before dawn every day. If for most people the bread line does not move – and their turn never comes –, for others the line doesn't even exist. I didn't even jump, it was *delivered*.]
Before the bread, I arrived here through the ferment that makes the bread grow. Natural ferment, or rather, wild, according to professor Patrícia Fernandes. I got to the professor because I was doing an exhibition in an art gallery. And I made all the »art« from the ferment.[3] And, one day there I was, in a biotechnology laboratory at a Federal University to look at the ferments under the microscope.[4] I (who) am not a baker. But it was the bread that got me there. But it was not just that. [I jumped the line.]
... but I used to make bread to sell, about 4 or 5 years ago at the time before that ... but that was not what paid my bills. I did it because I could [and I had] the doubt of what I wanted to be. [Another name to jump the line here, it's really privilege.]
... it was making bread that I got to know that it was possible to make it without buying the ferment (I used the dehydrated. (... fresh, tablet? Real barker's stuff, and I'm not, not at all)... what do you mean bread that you make all of it, even the ferment?) Little romantic balloons filled my mind away from the asphalt where reality walks (I leave the concept of reality to Philosophy colleagues because I am also nobody in this line, but that is another matter).
I theorized ...

Autonomy.

Each one does. Each one discovers.

Survival.
Feed yourself with few resources.
(wheat and water)

Resistance to capitalism.
Opposition to the industrial logic, standardized and fast.

Another understanding of space and time.

The decomposition as food.

What makes us is unseen (gods; family ...)

Balance (the man does not rule)

What makes us what we are?
What makes us unique?

Compose/decompose. Phagocytosis.

Invisible transformation processes (time dilation) *

*taken from the notes I kept from that time

Almost mystically, the wild ferment would connect me to the ancient Egypt baker in his prebiblical time, in an infinite and mundane timeline, who told me about stucco houses, temples, feudal collective ovens. The bread that came under the arm, in the saddlebag, crossing towns and continents, mountains and deserts on the back of a mule, reached me, in that apartment in downtown Vitória-ES, Brazil, in the 21st century, when this wildly fermented bread was no longer the same: far from the banality,[5] it was now *gourmet*. [why do we call it *levain*?] Now it has *boutique*, authorship, concept. [Even anti-anti-gluten tendency that bread turned out to be.] Art. What a contradiction!
[... but I didn't understand it that way (or didn't want to admit it). This draft is an attempt at commitment, or ground zero, with bread, so that it overcomes the metaphor ... sharing... but sharing among whom? That's what I try to make you ask with me.]

Coming back ... close to the trip with history, it was that with time (I don't know if you know, but this way of making bread takes much longer than the »ordinary« way that it's done nowadays). The time that has nothing to do with the time on the clock ... would it be, perhaps, a more »pure,« »intuitive« time? [... what is the time needed by everyone in this world to have bread on the table?[6]]

... mainly, I traveled on the idea that the bread is made due to the invisible life that is in the air and if we took care of it, it could serve as food, and growth (doesn't it look like the way thoughts are for you, too?) ... And how about biology? The fact that bread is actually a contamination ... [yes, I am thinking I could talk about Covid-19 here, and also how we don't know how to deal with what we don't see, or how we refuse to see certain things ... [well ... should I talk about it? ... I need to wipe the slate clean, to draw a line, I don't know, in order to delimitate, for sure, what I can talk about bread.]

So, another way to ask this is: how to provoke the privileges for them to leave the romanticized (gourmetized) den where they hide the bread? This is much more serious than a trip of a »philosopher«/»artist.«[7]

This is my place in the bread line and this is what I must talk about: there has never been a lack of bread for me (and there is only at the expense of other people's bread) ... I'm talking about it to make it visible that bread is much more than a thousand-year-old heap of stories, recipes, miracles. »My« bread is a »hard bread.«[8]

For this very reason, another trip is about death. Bread represents death ... well, I think. In many ways. First, bread is, in fact, something rotten, since it is the mixture of water and wheat contaminated by microorganisms, which start to eat that dough making it »rot,« »mold,« just as they do with apples and corpses.

Because, it happens with everything that is alive, it rots. Biology here again ... But it's not this kind of death I'm talking about now ... I could talk a lot about this kind death too, because we have a lot of problems with it, like ... why do we pretend that death isn't a part of life? Well, it depends on which death ... [and that's the question ...] the death of bread I wanted to talk about is another ... I don't know if this trip is mine alone. [Does it sound like I want to create a fuss speaking like that? ... but I'm not!]
... bread is the opposite of what they say it is ... bread is avarice. [»There it is, I said it«] ... but, think with me: don't they say that bread is the food of sharing, of communion? No, it's not! It has never been. Does everyone have bread on the table? No, they don't![9]

»In the sweat of thy face shalt thou eat bread.«[10] And since that ancient Egypt, sweat drips from the forehead, but not necessarily, bread is eaten. And the one who fights for the »daily bread,« is choosing between *sourdough*, *brioche*, *ciabatta*, *focaccia*, *Hokkaido* bread with *Tangzhong* method ... baguette? Organic wheat? Spelt? Rye? Little seeds? And going back: wild fermentation?!]

Well let's see ... do you know what a »premix for bread« is? I don't know much, so I copied the formula:

> »Wheat flour enriched with iron and folic acid, salt, sugar, stabilizers: esters of diacetyl tartaric acid and mono and diglycerides of fatty acids, calcium stearoyl-2-lactyl lactate and polysorbate 80 and flour improvers: ascorbic acid, azodicarbonamide, and flavoring. CONTAINS GLUTEN.[11]

»Stabilizers« and »improvers.« What to say about it? Words that we can talk so much about that makes my job even more difficult ... the quality of the bread that most people eat is so low that it needs to be stabilized and improved ... [Glad it CONTAINS GLUTEN!][12]

... as if you could call it food, what would bread be if it were a »destabilized« food that showed what it really is, without »improvements?« Would that make us rebel? But that's the point ... while eating that bread, people are kept dying, little by little, without even knowing why ... (because, what would the bread have to do with that? Bread represents the miracle, doesn't it?[13]) ... and sick (and out of time, with trade wages) how do you rebel?[14] It's not up to the people to pay that bill.

... bread is avarice. Going back to wild fermentation (now, hopefully, less romanticized), which was the only known way of fermenting bread until it was replaced by little packets of yeast (to produce more and faster) ... what changes did that bring about?

> »While conventional bread has a high concentration of these carbohydrates, the natural ferment bread we have developed has much smaller amounts, and can be consumed without the presence of the symptoms of intestinal inflammation. (...) These disorders cause intestinal symptoms (bloating, change in bowel habits – diarrhea or constipation, abdominal pains) and nonintestinal symptoms (headache, tiredness, fatigue, skin problems, among others). (...) The yeasts normally available on the market present as sole functionality the growth of the dough, without adding the nutritional quality researched. »Naturally fermented bread has a greater amount of bioavailable minerals because of the action of ferment, which also makes it easier for our body to digest protein and is capable of producing some vitamins.«[15]

... well, I could keep putting other things together, but I believe you can already have an idea of the problem, right? So ... what to do in face of this problem? I make and eat wild fermentation bread, trying to use organic ingredients (for good reasons [and should even be the standard!], but, still far from producing many effects outside the restricted group that can produce and consume this wheat) ... finally, I, a privileged one: what can I do to reduce the material and symbolic gap between the sourdough and the premix?

I once thought that the revolution would happen if everyone made wild fermentation bread and ate better, and thus transform the world with the so called »micropolitics.« I am not invalidating this. Everyone can make this bread [and it would be great if it were this way!], but this is not a matter of technique, but of ... crumbs. If the bread is for yesterday, how to talk about long fermentation? To transform working and living conditions (the material and metaphorical bread) ... for those who have been in the bread line for so long, supported by the meager $1,300 of »bread from the sweat of your face,« standing on the bus at 2 am, much more [and in less time] needs to be done. [Sometimes I even think that the defense of this bread can produce the opposite result: without even realizing, as the process of concentration of income becomes more and more intense, functions previously relegated to »lower« levels of education [by the way, who can afford that Senac specialization?[16]?], they are being occupied by »educated« people, saying what bread is or what it is not, in the kitchen and in the word, pushing even further the ones who used

to make the daily bread to the end of the line. Yes, by promoting this autonomy in the production of bread, and defending this »healthy« bread – and by talking about bread here, when it is not my breadwinner – I may be doing the opposite of what I want and even silencing anyone who doesn't live between *focaccias* and footnotes. I may be helping to make bread even more avaricious … and if so, how to make use of my place in the line, that place of someone who always had bread on the table, so that that line ceases to exist?

… so, as I said at the beginning, all I can offer at the moment is this draft, where the punctuation of each sentence is changing. I try to expose here my anguish, my self-demand, my only, open and sincere question: how my work, and ideas as important as those of this journal, all nourished by bread somehow, can make it the true miracle of sharing?

1 Translation note: In Brazil the expression »who are you in the bread line?« is used to question the attitude of someone who thinks he or she is better than others, or that devalues a situation because of that thought.

2 Translator's note: In Brazil »trade wage« is an expression that indicates the remuneration of a group of professions, for a workload of 44 hours per week. It is common for job offers to adopt this salary as the minimum. In other words, this minimum remuneration becomes the maximum and, in general, it is insufficient to cover living costs in Brazil.

3 See: https://joanaquiroga.com/Fermento-do-ar-ao-seu-redor.

4 According to Fernandes, industrial biological yeast is also natural, since it is are also composed of micro-organisms, the only difference is that they are selected, asleep, compacted, and packaged. This fermentation at home, however, has none of this, so according to her, wild.

5 Banalities were tributes from the feudal age paid by the servant for the use of property owned by the feudal lord, for the use of the landlord's equipment and facilities (granaries, ovens, mills, bridges, etc.), because the feudal lord held all this equipment. See: https://en.wikipedia.org/wiki/Banality. In German, Bannrecht: https://de.wikipedia.org/wiki/Bannrecht (accessed on May 30, 2021).

6 »The baker's average salary, according to the Ministry of Labor and Employment, is R$1,343. For those who want to specialize, Senac offers courses ranging from R$648 to R$4,617, depending on how long the course is.« (how to specialize with this price?) (…) »I worked for years in the middle of the night and I can say that it is very exhausting. People need to value our profession more.« (Pires, Manoel) in: »On the Day of the Baker, professionals talk about the job of getting their hands dirty« - https://extra.globo.com/noticias/rio/no-dia-do-padeiro-profissional-falam-do-oficio-de-botar-mao-na-massa-21567608.html (…) (accessed on November 1, 2020).

7 »There is a consumer with high purchasing power who seeks to eat healthy things and for some reason, logical or emotional, associates GMOs with unhealthy things. This consumer is prejudiced against transgenics, against industrial agriculture and does not even want to consume flours. **We do not target this type of consumer, but the one looking for cheap food** and every part used as animal food or to replace petroleum products,« says the director of Bioceres as possible uses for wheat HB4. »Argentina evaluates to be the first country in the world with transgenic wheat« - https://brasil.elpais.com/brasil/2019/02/09/internacional/1549722520_670972.html My emphasis (accessed on October 31, 2020).

8 Translator's note: about the use of the expression »Hard Bread,« in Portuguese there is a common expression, *Pão-duro*, which is literally translated as »hard bread,« which means an old and hardened bread. This expression is commonly used to refer to people who are stingy, avaricious, or selfish.

9 To give an idea of this avarice, we could talk about the production of wheat, the main cereal used in the production of bread. Wheat is not food, it's a commodity. If in the market the price is low, production and grinding is reduced (to maintain or increase the price). (»WHEAT: Idleness of Mills Reaches 50 percent« in: https://www.cepea.esalq.usp.br/br/diarias-de-mercado/trigo-ociosidade-de-moinhos-chega-a-50.aspx, accessed on 01.11.2020). In other words, the goal is not to »kill the hunger.«

10 Genesis 3:19

11 http://www.bungeprofissional.com.br/produtos/premistura/pao-frances/pre-mistura-pre-mescla-faz-mais-pao-frances-25kg/ (accessed on November 1, 2020).

12 »Enzymes are modern baking's big secret. A loophole classifies them as ›processing aids,‹ which need not be declared on product labels. Additives, on the other hand, must be listed. Not surprisingly, most people have no idea that their bread contains added enzymes. (…) And now the safety of bakery enzymes has been radically challenged by the discovery that the enzyme transglutaminase, used to make dough stretchier in croissants and some breads, may turn part of the wheat protein toxic to people with a severe gluten intolerance. This development is important because it suggests that adding enzymes to bread dough may have unintended and damaging consequences. Surely no one can seriously suggest that bakery enzymes should be omitted from bread labels. (…) Baking technologists just can't leave well alone. There's always some functional advantage to be pursued, some marginal value to be prised from dumb nature, as if the human race had never quite mastered this business of bread. We have evolved an industrial bread-making system that, in a variety of ways we can no longer ignore, produces bread that more and more people cannot and should not eat.« (»The Shocking Truth about Bread« in: The Independent, October 20, 2011, https://www.independent.co.uk/life-style/food-and-drink/features/the-shocking-truth-about-bread-413156.html (accessed on November 1, 2020)

13 Then Jesus declared: »I am the bread of life: he that cometh to me shall never hunger; and that believeth on me shall never thirst.« John 6:35

14 »In another study, Chinese researchers in Chongqing collected a sample of the intestinal flora from patients with Major Depressive Disorder and inserted it into mice without germs. Later, they found that these mice gave up faster during a »forced« swimming exercise – a behavior that is often considered analogous to lethargy and despondency, typical depression symptoms. And when the mice were placed in a box, they spent less time exploring the central areas and were closer to the edge, where they felt most secure.« »How Your Belly Can Heal Your Brain« in: BBC Future, February 21, 2019, https://www.bbc.com/portuguese/vert-fut-47464664 (accessed on November 1, 2020).

15 L.A. Menezes claims that »Natural bread fermentation decreases the amount of carbohydrates that trigger symptoms of intestinal diseases«., https://noticias.ufsc.br/2019/05/fermentacao-natural-de-paes-diminui-quantidade-de-carboidratos-que-desencadeiam-sintomas-de-doencas-intestinais/ (accessed on May 30, 2021).

16 Senac is the acronym for »National Service for Commercial Learning,« and it is one of the largest professional education institutions in Brazil, which has »social inclusion« as some of its values. See: https://www.dn.senac.br/gestao-estrategica/planejamento-estrategico, (accessed on February 16, 2021).

Antônio Bispo dos Santos is a peasant, formed by craft masters, specialized in using the farmyard well, guided by the grandmother generation. He is a writer, teacher, and *quilombola* leadership of the Saco do Curtume community, municipality of São João do Piauí, Brazil.

Castiel Vitorino Brasileiro (b. 1996). Artist, writer and psychologist, master's student in the Clinical Psychology program at PUC-SP. She lives Transmutation as an inevitable design. She dribbles, incorporates and dives into her Bantu ontology. She took healing as a perishable moment of freedom. She studies and builds interspecific spirituality and ancestry. She was born in Fonte Grande. Vitória Espirito Santo, Brazil.

Fredone Fone (Brazil, b. 1981) grew up in Serra city, where he started his constructions, paintings and renovations over houses and things out of necessity, when he was a child, helping his father in civil construction. All his work – which is not just the artwork – talks about the dream of owning a home, about self-construction and the hip-hop as collective and subversive tactics of existence of the peripheral black population. Fredone recently received the Pollock-Krasner Foundation Grant, New York, USA 2020/21.

Joana Quiroga's work examines daily life and its philosophical depth, always looking at the specificities of each site, and bringing into the discussion the reality that she comes from, Brazil. She holds a bachelor and masters in Philosophy of Arts (Ufes, Brazil). Currently she is researching the parallels between social inequality and bread. joanaquiroga.com

I

Edited by Maxwell Mutanda

Of(f) the Tracks: The Legacy of Colonial Railway Infrastructures in Harare, Zimbabwe

Tomà Berlanda, Maxwell Mutanda, and Sunniva Viking

Cities and resilience are concepts which were present and informed urban life in Zimbabwe well before colonial rule. Ethnoarchaeological research[1] has amply demonstrated the long history of a close interrelation and overlay between human settlements and agroecological zones.

However, many of the urban centres we identify today were established as a result of the European project to control African land and population. In particular, the construction of railway infrastructure was imagined in parallel with the foundation of company towns, as means to facilitate the extraction of local goods.

The morphological scars in the structure of land tenure and urban form left behind by those infrastructural projects are a clear manifestation of a divisive, racist, and unjust process. Operating in, and upon, these segregated and divided terrains with the added complexity of imagining a post pandemic life, without recurring to specious »sanitary« measures, calls for geographical imaginaries that go beyond the morphological artifices. We posit it requires a restorative justice project that challenges the urban as a modern idea, highlighting the role infrastructure still plays towards facilitating extraction.

Cities and resilience are concepts which were present, and informed, urban Africa well before colonial rule: as evidenced by the settlements at iron-age Great Zimbabwe or medieval Mapungubwe. However, the colonial legacies of transport infrastructure and the particular role forced mobility had on the constant circular migration of an oppressed and exploited Indigenous labour force resulted in what Edward Said calls a »struggle over geography.«[2]

As in other white settler colonial cities, the imperial imaginaries of company towns and native townships in Zimbabwe developed in tandem with railway infrastructure, in order to facilitate the extraction and exploitation of natural resources and human labor. Today these leftover morphological scars clearly manifest divisive, racist, and unjust geographies.

This historical backdrop led us to conceive of our research trajectory as a screenplay following the three-act structure model of narrative fiction. Within this framework, we conceive of infrastructure as a *dispositif*, an interpretation recently proposed by Achille Mbembe, borrowing from Michel Foucault. In Mbembe's words »infrastructure is a multiplicity of lines of different nature, a set of moving vectors, which are nevertheless susceptible to coalesce momentarily, to turn into lines of sedimentation, fissure, fracture.«[3] As Mbembe convincingly articulates what this definition calls for is a map, a cartography, a survey. Our illustrations take on this challenge.

This photograph entitled *Man building railway planned by Cecil Rhodes near Broken Hill, Rhodesia* showing the human toll of railway expansion was taken between 1890 and 1923. Courtesy of the Frank and Frances CarpenterCollection at the Library of Congress, USA. Public Domain

Part 1 – The Setup and catalyst for the sequence of events can be brought back to the dual patterns of urbanization, which in our case is spurred in 1891 by the settlement of Fort Salisbury by the British South Africa Company (BSAC).

6 April 1652. The arrival of Jab Van Riebeeck in what is known today as Table Bay, marks the beginning of the permanent settlement of white people in Southern Africa. As the 1748 map of Cape Town shows, the city was established as a prototype of a company town for the VOC (Dutch United East India Company). Meanwhile roughly two thousand five hundred kilometres North North East, many »dzimba-dza-mabwe« (or »houses of stones« in Shona language) occupy the plateau, vestige of a civilization dating from the fourteenth and fifteenth century.

The project of greedy extraction of resources from the African continent is for the settlers the occasion to write their own reading of history. These parallel stitches manifested through two drawings, one by Karl Mauch, the first German geologist to visit the ruins of Great Zimbabwe in 1871 and publicize them to the Western world, which illustrates settlement activity around great Zimbabwe, and the second by Percy Wagner, which shows Pre-European Mine Workings and Settlements in 1929.

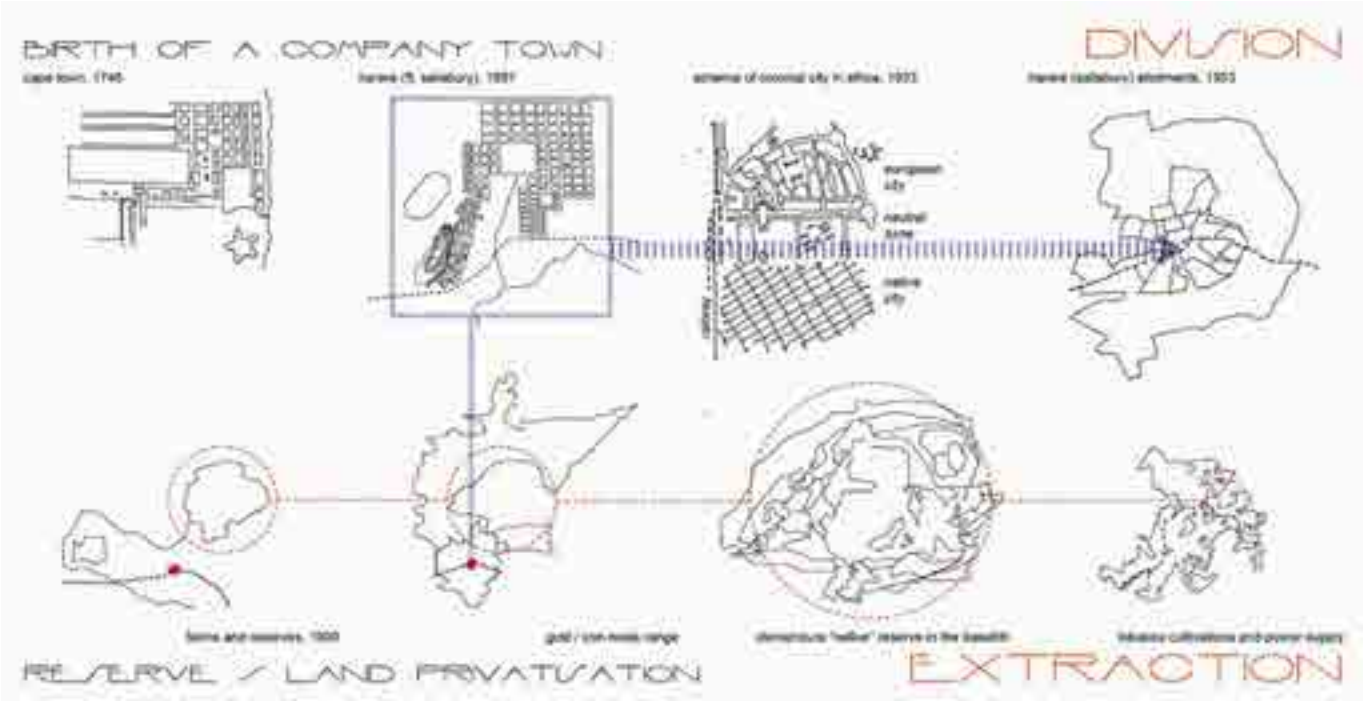
The punctual graphic of the maps is intriguing when combined with the linear arrival of the railway tracks. Railway infrastructure is customarily alluded to as the permanent way in reference to regular cadence of its composition: a pair of parallel rails laid firmly on sleepers or ties that are embedded in ballast, which repeat unvaryingly across any landscape. But the lines, again here a reference to Foucault's definition of *dispositif*, can be crossed, bend back, meander, go underground, turn back on itself, act/affect itself, break.

However, in Harare, as in many other African cities, railway lines represent a division, a barrier. In this they act according to the scheme well illustrated by René Schoentjes' drawing »Schéma d'une ville congolaise« published in the Bulletin des Séances Koninklijk Belgisch Koloniaal Instituut, Brussels, in 1933. What the architectural engineer from the Ministry of Colonies draws is a grid where, for »hygienic reasons« a »neutral zone« separates the »European« and »native« areas. With a total width of 500 metres, this was, according to its designer, the maximum range of a malaria carrying mosquito. Through multiple iterations across continents, this will become the blueprint of a segregated city, where healthy and technocratic measures become nothing other than a divisive racist tool.

Much like the measurement of leagues travelled by seafaring colonisers, the pace of land colonization and issues of land ownership were derived from the proliferation of infrastructure such as roads and railways. In other words, shifting railway gauges informed the cadastre of land privatization appropriated from Indigenous communities, which parcelled large arable spaces to white settlers and small units of arid land was left for local Black laborers.[4]

In between the parts of the divided city lies the hole of the railway yards, the site of our investigation. To question and read it we borrow from De Boeck and Baloji' conceptualization of the hole »to express the dismal quality of living in a city in today's postcolonial urban context.«[5] Looking at the traces of the void left behind by the extractive process, our research traces stratigraphic investigations into Harare, an ontological paradigm analogous to other artificial African agglomerations.

By manifesting how the city was built on farms, promoting subdivision and dispossession, and forcing native housing in hostels, the analysis points to African ideas about landscape (nyika) as holistic. In this regard the establishment of neighbouring »reserves« (ruzevha n., plu: mar-, Tribal Trust Land), where white settlers relegated black inhabitants, – in connection with the land tenure process and concentration of means of extraction/production/cultivation leads is a clear strategy. When looked at from the sky, both the Chimandura »native« reserve in the basolith and the railway yards emerge as examples of a hole.



These outline traces of the African Company Town reflect the archetype of European cities separated from Native townships by »neutral« zones using Harare, Zimbabwe, as an exemplar. Courtesy of the authors

Part 2 – The Confrontation – The voyage of the white body on the railway, his imagery and experience, versus the toll of the black bodies laboring.

»Stimela« is a famous 1974 track by Hugh Masekela.[6] The lyrics in Zulu tell the story of the Steam Train, onomatopoeically »Stimela,« which travels on coal (sihama ngamalahle), Across the porous borders of languages the onomatopoeia of the song title suggests a different mental experience akin to the banality of shongololo, the centipede. Masekela's words »speak about local history and the migrant labour system on the mines, reminding everyone that South Africa's wealth and infrastructure was built on the back of labour from all over Africa.« In doing so his perspective echoes that also conveyed by Dorothy Masuka, whose 1993 recording »Hamba Nontsokolo« recounts the journey from Zimbabwe to South Africa by train in search for gainful employment, which further divided the typical African city from its local inhabitants.

The atmospheres and sentiments evoked by the tracks must be read in contrast with what Jeremy Foster explains in a 2005 piece,[7] focussed on how white travellers enjoyed the rail journey northward from Cape Town, seen here as both the origin of the company town model and the point of departure towards the veld, the unknown plain inhabited by savage animals and hostile populations. Foster writes about »travel accounts and memoirs (...) extolling the pleasures of train travel in South Africa, sometimes described as ›the best in the world‹.«[8]

In this regard, the discordant rhythms of the railway manifest as parallel realities. Firstly, the dominant imaginary of unimpaired colonization marked by steady and ordered exploration that led to equally ordered company towns with gridded streets. Second, the conquest of the »unknown« through the act of laying down the tracks. The overture to Sydney Pollack's 1985 film version of Karen Blixen's »Out of Africa,« is a quintessential representation of this regimented journey across an occupied landscape.

Which brings up the question of the railway yards in Harare as *lieux de memoire*, or indeed »power-scape.« Reference is made here to Innocent Pikirayi's archaeological work that demonstrates how particular narratives are used to silence the stories and narratives of certain pasts. In this case power-scape refers to how past cultural landscapes on the Zimbabwe plateau exercised political power.[9] Whereas in Europe decaying abandoned railway buildings have mostly led to increased public consciousness about their heritage, in the African con-

text, we find it useful to reframe western-based notions of heritage and to appreciate its place in this discourse. »Of(f) the tracks« plays deliberately with the ambiguity of the physical artefact – and the need of bare (i.e. free) ground on to which build foundations, crushed stones, wooden sleepers, and steel rails.

The aim is to illustrate how operating in, and upon, segregated terrains – compounded by the complexity of conjuring post-pandemic life – calls for geographical imaginaries that go beyond tectonic artifice and asymmetrical land-use planning. It requires exploration, re-representation, and restorative justice that challenges the neoliberal, Modern urban form, and the role infrastructure still plays in seeking fair distribution.

Aerial photograph of Harare, Zimbabwe, taken in 2018 showing the central railway terminal and exclusionary zone between the historical white central business district (CBD) and the low-income residential neighbourhoods in the foreground. Photo: Eyal Bartov.

Part 3 – The Resolution of the story and its subplots. Brushstrokes for a futuristic vision.

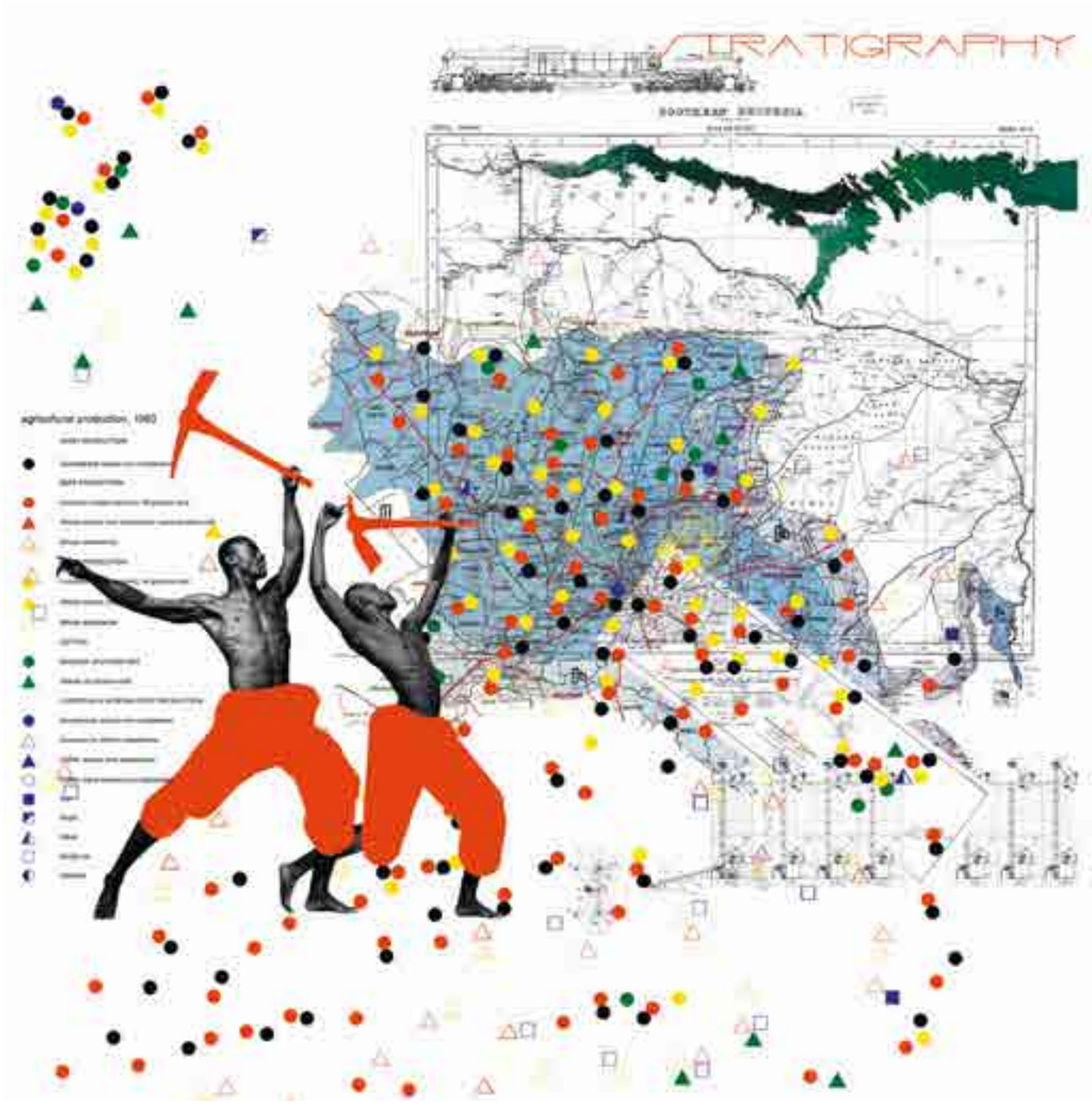
The operations of identifying the site as a hole, proposing the stitching of reclaimed infrastructure, and connecting the common reaches its climax, that is intended as a derailing.

By confronting infrastructural colonialism, and its stories of rapid urbanization, the project proposes a hack. The intention behind revealing the geographical constructs leading to the railway yards in Harare is borne out of what Kerry Bystrom and Isabel Hofmeyr[10] describe as the »necessity of recalibrating the geographical hierarchies consolidated through intertwined Western imperialisms« thus opening new modes of reading landscapes and imagining futures.

Mindful of Mbembe's reminder that what Foucault calls a line in his definition of dispositif is nothing linear, we use it to engage with the so-called African practices of everyday life. Improvisation, open-endedness, and desire to subvert are all incorporated in an alternative to the more Baloji' conceptualization Visions 2030 or 2050 so common for the African state or city. Borrowing again from the great work of Zimbabwean archaeologist, we make Chirikure's suggestion that »what is required is a way of exploring the sedimentation of the past into the landscape to form the past rooted in African ways of understanding time and chronology«[11] ours.

This is why the research process, and its representation in both words, images, maps, and models is conceived of as a careful stratigraphic investigation of railway landscapes that questions binary distinctions – urban and rural, non-Indigenous and local, rich and poor – to understand territories or ecosystems of discriminatory human settlement, in an effort to redress environmental, economic, and racial injustices, offering alternative contextually-driven, holistic future cityscapes in which all people, especially historically marginalized people, will be able to thrive.

What hopefully emerges from looking at the centre of Harare in our projections is the intersection of the railway project and its transformation as an armature for shaping substantially different futures, aimed at producing social equality and environmental justice. By stitching together fragments of landscapes, languages, sides, and lives, what we offer is a new horizon of possibilities across temporalities, and the imaginary dislocation both physically and mentally through the postcolonial hole. Of(f) the tracks...



Stratigraphy of agricultural production sites in Zimbabwe, 1962, overlaid above the map detailing the construction of rail and hydro infrastructure throughout the XXth century. Courtesy of the authors

1 For example see Bassey Andah, Alex Okpoko, Thurstan Shaw and Paul Sinclair (eds.): *The Archaeology of Africa: Food, Metals and Towns*, London, Routledge, 1993.

2 Edward Said: *Culture and Imperialism*, New York, Vintage Books, 1993.

3 Achill Mbembe: Notes on Techno-Molecular Colonialism. Keynote speech, Coloniality of Infrastructures conference, University of Basel, January 15, 2021.

4 Rémi Jedwab, Edward Kerby, Alexander Moradi: »How colonial railroads defined Africa's economic geography,« in: S. Michalopoulos and E. Papaioannou (eds.): *The Long Economic and Political Shadow of History*, Volume 2, London 2017.

5 Filip De Boeck and Sammy Baloji: »Positing the Polis: Topography as a Way to De-centre Urban Thinking,« in: *Urbanisation* 2(2), 2017, pp.142-154.

6 For a reading of the song's importance see https://theconversation.com/the-best-anthem-for-workers-day-stimela-a-tale-about-apartheids-migrant-labour-system-95794 (accessed April 27, 2021).

7 Jeremy Foster: »Northward, upward: stories of train travel, and the journey towards white South African nationhood, 1895-1950,« in: *Journal of Historical Geography* 31, 2005, pp. 296-315.

8 Ibid., p. 300.

9 Innocent Pikirayi: »Great Zimbabwe as Power-scape,« in: J. Beardsley (ed.): *Cultural Landscape Heritage in Sub-Saharan Africa*, Washington D.C.: Dumbarton Oaks Research Library and Collection, 2016, pp. 89-109.

10 Kerry Bystrom and Isabel Hofmeyr: »Oceanic Routes: (Post-it) Notes on Hydro-Colonialism,« in: *Comparative Literature,* 69:1, 2017.

11 Shadreck Chirikure: *Great Zimbabwe, Reclaiming a ›Confiscated‹ Past*, New York: Taylor & Francis, 2021, p.12.

Long Wait On
A Parallel Street

Valerie Asiimwe Amani

V: »Do you ever think of the sacrifices you made to become a mother?«

Mama: »Why?«

V: »You could have stayed and advanced your career and achieved so much.«

Mama: »I couldn't have stayed away from you, besides, looking at you right now, you are by far my greatest achievement.«

My mother and I had a conversation reflecting on what it meant to be black and African – how to her, sacrifices were seen as a part of life, assimilation done so subconsciously – because without assimilation there is no success.

I made this artwork as a dedication to her – pictured in her clothes – trying to capture the visual essence of a »great achievement.« I transform into a magical genie, manifested by her but yet our lived experiences are never touching. She stands on the parallel street, unseen – I hold the keys of education, of global opportunities – of apparent boundless possibility.

The long wait refers to Samuel Beckett's existential play, »Waiting for Godot;« the act of waiting in itself although being a powerless act, is still a transformational one. How long has my mother waited ... how long must I wait? I am at the bus stand, disappearing and reappearing into myself – a half of two worlds, and somewhere in between. I hold the key, not only for myself, but everyone else who was waiting here before me.

We are histories. We are hybrids.

We are futures.

Interrogating Digital Platform Workers, Dark Kitchens, and the Right to the City

Motorcycle couriers waiting at the intersection of Buitenkant Street and Mill Street, Cape Town, South Africa.
Photo: Maxwell Mutanda

Maxwell Mutanda

Dominant Silicon Valley corporations and mobile telephony define the choreography of daily city life. The following text reflects on the interstitial spatial practices of low-wage, itinerant workers in the Global South – particularly motorcycle couriers in Cape Town, South Africa, who facilitate online food orders via delivery platforms – and questions the role of twenty-first century sociopolitical, technological, and design practices. Much like the Internet of Things (IoT), cities amass power structures, intentionally or not. This hegemony, a new monohumanist Imperial Gaze, perpetuates structural violence, social inequality, and environmental injustice.[1]
In this regard, the reciprocal exchange between human and technology or the physical and the virtual within present-day urban design or placemaking, is blurred – marketing professionals refer to this as a »seamless transition« for customers between virtual and real spaces. The places for human inhabitation or space of human settlement are increasingly delimited by our access to the digital. In this sense not only do social apps like Facebook, Foursquare, or Instagram broadcast our preferred places: public meeting places, private dwelling places, or communal social spaces to other people as highlighted by researchers such as Tim Creswell or Mark Graham.

Geographic information systems (GIS) predetermine the use of space. This change in the built environment is hidden from the users of most mobile applications. However, it is increasingly apparent in the everyday lives of those who facilitate these apps. The labor geographies of digital platform workers express how algorithmic control reaches beyond the screen.

This paper considers the invisible workers of the so-called »gig economy« as a means to analyze the collective city – the commons both digital and physical – and the design of everyday things in keeping with Rudofsky's argument against architecture »of merchant princes and princes of blood.«[2] Labor geographies in the city offer a nonwestern, nonstereotypical approach to spatial injustice and augmented reality as a redress to »White Monopoly Capital« and the colonizing gaze of the »Dot-Com City,« which perpetuates historic land appropriation, discrimination, displacement, and containment. Thereby magnifying Henry Lefebvre's notion of »the Right to the City« and bidding »farewell to an idea« of benign capitalism, modernism, or utopia as defined by neoliberalism (neocolonialism).[3]

In »The Order of the City,« Diana Agrest states, »a design practice must take the city as a point of departure for the development of new critical concepts, which reveal the limits and weaknesses of both the urban ideology of the Modern movement and the simple reversal of this ideology. The city is the source of a new vocabulary, and a more powerful syntax of architecture.«[4] However, whether power remains in the hands of established systems is an important consideration in developing any new concepts. As such, how the spatial implications of digital technology in urbanism is seen: that is to say distributed, networked, fragmented, or splintered (to borrow the nomenclature put forward by Steve Graham and Simon Marvin), it reproduces feudalistic divisions that separate the haves and the have-nots. The city is experienced via separate digital dashboards as well as segregated spaces.

Shared Data

The fact that digital technologies have significantly impacted the way in which urban placemaking has developed is not in question, particularly regarding digital platforms that redefine the choreography of daily life and labor geographies. Platform urbanism is a direct result of the increased distribution of internet-enabled mobile telephones, so-called smartphones, and the proliferation of digital infrastructure. Both have changed the way communities engage with established forms of transit, and commercial or recreational spaces in cities. As Susan Leigh Star points out, digital platforms also reflect how digital technology is built on top of existing foundations.[5] For example, when you perform a Google search, its algorithm sits upon an existing archive of electronic information. Equally, we cannot use food delivery platforms like Uber Eats or Deliveroo without there being an established network of restaurants in a pre-existing community. Nevertheless, the city today is increasingly dominated by Silicon Valley corporations, such as the e-commerce website Amazon, which together with the use of mobile technology in communities, delimit everyday places in new ways. Platform urbanism – the collective name given to this new hegemony of private enterprise – is nevertheless not immune to the Imperial Gaze or »structural violence« that has thus far defined the inequality of the urban condition or human settlement in large part due to the price of smartphones or an internet connection.[6] As the digital systems that we rely on multiply, proliferate, and become increasingly ubiquitous, the built environment in turn becomes increasingly connected to an augmented reality: as e-commerce adoption in communities rises, footfall in shopping malls decreases, leading to vacancies and eventual dereliction; as ride-hailing proliferates, public transit system usage readjusts while road congestion increases; and as the use of transnational »home-sharing« via platforms like Airbnb, or flexible workspaces like WeWork increases, so too do the disruptions to local real estate and housing markets.[7] In other words, every individual user on a digital platform is a participant in urban planning. For better or worse, through the collective decision-making or wisdom of the crowd generated online, communities are upvoting urban design changes with every click-to-buy on platforms.

The ostensible speed, accuracy, and efficiency experienced by the privileged users of digital platforms belies the lack of consideration in urban planning that relegates digital platform workers to fend for themselves in cities ill-prepared to cater to their spatial requirements.[8] Although the Covid-19 pandemic has seen a renegotiation of streets and sidewalks to accommodate shifting perspectives on shared mobility, the legislation of space still favors a minority elite class. Moreover, within the communal spaces of what are known commercially as shared kitchens and colloquially as dark or ghost kitch-

ens, restaurants are increasingly streamlining to service off-site customers.[9] These so-called virtual restaurants are increasingly never-seen spaces without dining rooms, or even a dedicated commissary staff that are shared among many desperate restaurant cuisines and brands.[10] The full-service restaurant segment isn't predicted to recover from the pandemic until 2025.[11]

Shared Spaces

The drive to co-opt digital technologies in city making is not limited to the relationship between private individuals and private corporations. Paralell to the rise of platform urbanism, local municipalities and national governments have also been consumed by a state-sponsored appetite for the boldly titled, elusive »smart city,« wherein the day-to-day operations of city life such as asset management, resource distribution, and service utilities are wholly operated electronically through interrelated networks of big data collection and analysis systems similar to those that routinely define digital platforms.[12] In this light, smart urbanism is akin to postwar planning principles. Overwhelmingly, most city fathers in sub-Saharan Africa subscribe to the orthodox interpretation of smart cities (as well as platform urbanism), which presupposes that digital technology infrastructure is the progenitor of reordered cities that develop synchronously with the alleviation of social and economic inequality. Particularly in the wake of the 2008 Global Financial Crisis (GFC) where investment in, and instructions for, making cities »smart« indiscriminately pervaded policy and enterprise, as evidenced by the production and delivery of landmark digital infrastructure such as the South Atlantic 3/West Africa Submarine Cable/South Africa Far East (SAT-3/WASC/SAFE) undersea high-speed, fiber-optic cable system and a panoply of fourth generation long-term evolution (4G LTE) cellular base stations.[13] This infrastructure network has transformed the urban geography of cities so much so that traffic management for roadworks to facilitate underground cable and duct installation is now quite ordinary. Real-time, location-based systems and services, one of the main properties of smart cities, have affected these investments. However shared data does not automatically result in ideal shared spaces.

This development during the pandemic, as in the Before Times, is a harbinger of nonplaces: spaces for automation, wherein automation is a euphemism for human exploitation. More than just liminal spaces on the sidelines, or rather in the background, this data-driven development of architecture is responsible for what Ian Buchanan describes as »designed and intended for the frictionless passage of a nameless and faceless multitude.«[14] Spaces for machines: wherein machines are low-wage laborers or rather the human infrastructure of electronic spaces and urban places.

Urban governance in this regard is still overwhelmingly bounded by capitalism and greed, replicating the development of colonial infrastructures. As Sylvia Tamale highlights, »companies like Facebook and Google are the twenty-first century's equivalents of the nineteenth-century chartered companies such as the Imperial British East Africa Company, the Royal Niger Company, or the German East Africa Company. All these worked to establish control of different parts of the continent on behalf of imperialist states.«[15] A sentiment similar to what Achille Mbembe calls »an explicit kinship between plantation slavery, colonial predation and contemporary forms of resource extraction and appropriation«.[16] Therefore, in the fight for urban space, this relationship is still defined by the extraction of human-driven data and the appropriation of human labor.

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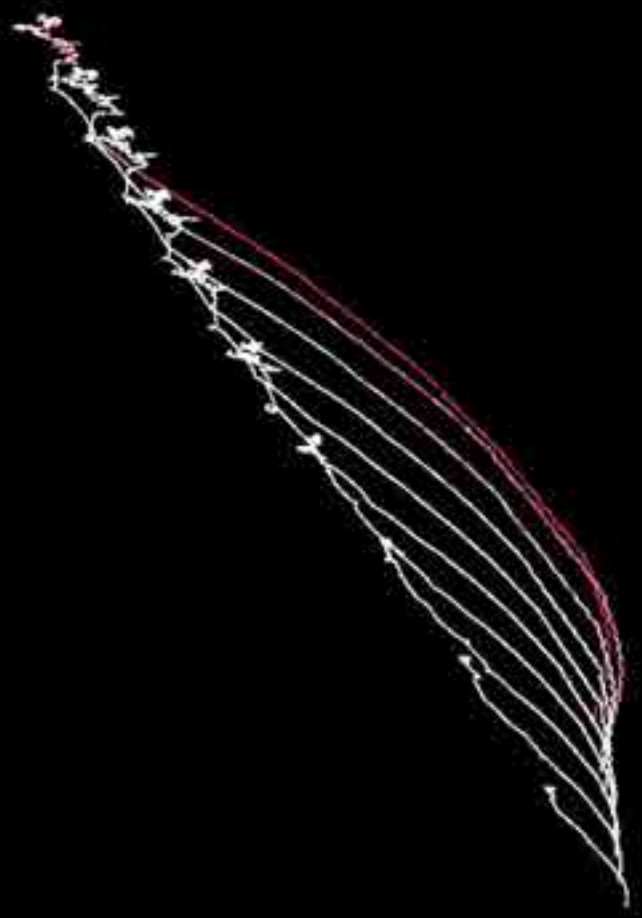
Lapis
Hakeem Adams

This is a story about »Lapis.«
A sequence of splinters.

View full audio-visual
work online:



Articulation

A salt, a fracture, a rift in an ancient core, that grows to death. This sequence reveals a snapshot along a fatal journey of splintering. To splinter – to rupture: in slits of sharpened stress.

Each etching is the product of growth, a force acting to expand and contract the core. They are signatures of a tenacity that is erratic, chaotic, yet persistent.

Production

Lapis results from a variable rule set. A matrix is filled with a thousand stars, each affected by a similar desire to resolve to the next, yet actively disrupted by a waving effervescent force. The stars dance along the wave, as fragmented splinters of a persistent form, resulting in a calligraphy of etched webs.

Vocabulary

The Iron Masters of West Africa, expressed this waving force in practice. The Iron Master's role is one of transformation, they take on a responsibility of finding stresses in materials to construct form. They negotiate with the earth, the trees, the stones and sands, engaging in various meditative ceremonies. Where the forge is fed, the bellows put to work, and the ore massaged. The vocabulary of this ancient science is stress. The expression of the Masters, like »Lapis,« reveals the effect of controlled fracturing.

Hakeem Adam is a Ghanaian digital artist and freelance arts and culture writer exploring the power of narrative. He is the founder and creative director of DANDANO, a Pan-African cultural platform for African film and music criticism and documentation. Hakeem has exhibited internationally at the CHALE WOTE Street Art Festival in Accra, Ghana; Many Studios in Glasgow, Scotland; Okay Space in New York, USA (all 2018); and SPACE10 in Copenhagen, Denmark in 2019. He has participated in the British Council's ColabNowNow Residency, Maputo in 2018 and the Cryptic International Artist Residency, Scotland in 2019. He is currently pursuing a master's degree in Digital Media from the University of the Arts, Bremen.

Valerie Asiimwe Amani is an artist, writer, curator, and art educator born in Dar es Salaam, Tanzania. Her multi-disciplinary approach incorporates textile, poetry, moving image, and digital collage; experimenting with notions of memory, hybrid spirituality, and the complexities of the body. Her work has been featured in various international exhibitions and publications; including The Main Complaint at the Zeitz Mocaa and Magician: Black Bodies and Portraiture at the FFCA in Los Angeles.

Tomà Berlanda is professor of architecture at the University of Cape Town. He has co-founded asa studio and astudio.space, two practices that have produced internationally recognised design work. His collaborative projects are the result of an engagement with the role of quality design for underprivileged communities: including schools, early childhood development centres, and health facilities.

Maxwell Mutanda is a pluridisciplinary researcher and visual artist whose data visualization and architectural practice investigates the role of globalization, climate, and technology within the built environment. Maxwell studied Architecture at the Bartlett, University College London and is the 2020 MSc in Sustainable Urban Development Sheehan Scholar at the University of Oxford. Maxwell Mutanda is also supported by a 2020 grant recipient of the Graham Foundation.

Sunniva Viking is co-founder and managing director of astudio.space architects and recently consulted in supporting participatory design and building processes for early childhood development centres in eastern Zambia. She exhibited in the Oslo Architecture Triennale in 2019 on the theme of Degrowth.

O

Edited by Sabina Hyoju Ahn

Perceptual Mutation
as Environmental Sonic Chemistry
Sabina Hyoju Ahn and Yussef Agbo-Ola

Perceptual Mutation as Environmental Sonic Chemistry

A poetic essay on the physiological effects of sound through architecture, medicinal sonic traditions, and molecular research from a wide range of cultures around the world. How does sound connect the human and non-human in ways that can stimulate conversations between the two, in order to move different species to a more connected and symbiotic understanding of the tones, rhythms, and messages expressed through their sonic language?
This essay will consist of poetry, sound theory, and the mystical and scientific understanding of sound. It is accompanied by an artist conversation between Yussef Agbo-Ola and Sabina Hyoju Ahn, which highlights the complexities and inspirations of how they create sound based on these questions.

water mutates
birthing ice
through concentration,
becomes sound.

Sabina Hyoju Ahn
and Yussef Agbo-Ola

The Architect as Composer

Here I sit looking at a home made of mud in a Nigerian forest. As I watch the sun expand its skin, heat cracks appear on the mud's surface. A day passes and night presents new light. The moonlight turns the home into a brownish-blue color in contrast to its red clay color during daylight. The home once again welcomes the morning sun with a layer of sweet rain that washes all the heat cracks away from the previous day's sunlight. By mid-day those cracks appear again, and the cycle repeats itself. For as long as I can remember I have had a deep fascination with how architecture, environments, and music all have similar qualities. Each has a profound connection to form and rhythm. As I think back to my architectural research experiences in different cultures, I can still hear the dynamic orchestras that each culture composes through its architectural structures. To me, these structures seem to sing. They vibrate and express their environmental rhythms through the effects of weather on their outer and inner skins. It is the coldness, or the glue between ice and air that allow the igloo to dance on the white skies of the Arctic, constructed by the Inuits. Or if we look at architecture that animals make, the world of sound, design, and environmental elements once again make music. The birds of paradise in New Guinea are a distinct example of an architect as composer. These birds are masters of music, and compose their architecture using three key elements. The first is their distinct sound, which is used as an important role in creating an atmospheric sonic space that can attach the perfect company into their design. Here they use sound as a form of unseen, yet heard, assemblages of an external atmospheric facade. The mixture of sounds, rhythms, and tones sung by the bird vibrates for many miles, which expands the concept of architecture being a static or non-moving structure. The second is their attention to the organization and arrangement of acute environmental details, such as the clearing of the physical space in which they design to entertain their company. Every broken or damaged leaf is thrown out. Every broken stick or unwanted flower is placed outside their design. Every ant, beetle, vine, or piece of bark that is undesired is taken away from their design. This form of spacious yet minimal design can be rhythmically interrupted by the slightest rain, or wind breeze that destroys, or knocks more debris onto their clean foundation. A constant movement, adaptation, and degree of patience is required from these birds to finally design their space in collaboration with uncertain environmental conditions. This is similar to a musical composition. A giving, taking, waiting, readjusting, and so on. The third and final is a connection to light. For the birds of paradise, there is a reason for every step in the process of composing a physical and sonic architecture. The sound vibrations acted as an external facade. The designing of a minimal interior acted as an internal balance or musical composition with weather. Finally, sunlight allows them to dance. Once the space is clean, sunlight begins to penetrate their architectural space. Once there is enough sunlight, the bird then stands directly in it, and the animal shines the hidden ultraviolet-colored feathers under its neck into the light. This reflection of sunlight on the feathers is highlighted and reflected on the birds' company, which has just arrived on the nearby trees to watch. This completes the architecture, and allows the composer to begin to uniquely dance in its perfect constructed theater. There is something quite beautiful and poetic about the balance or rhythm that animals and humans have with the natural cycles of nature that we exist within. Every movement, thought, emotion, form, and so on is a form of sound in which makes music when all experienced together. As an architect and artist, I find this very fascinating when I'm designing spatial structures. If everything produces some form of sound through vibration, architecture is then the art of arranging vibration, in collaboration with environmental elements to produce compositions of living music.

Yussef Agbo-Ola: *When did you find yourself moving closer to sound as a medium to express your ideas? Is there any other medium in the future that you would like to experiment with beyond sound?*

Sabina Hyoju Ahn: I think there are some sensations we can perceive better with auditory perception instead of using our eyes to understand visuals.

This is true. I agree with you, but I want to know more about how you started to work with sound. Were you into music as a child, or did you just decide one day to try to work with it? Or was it something you studied in school?

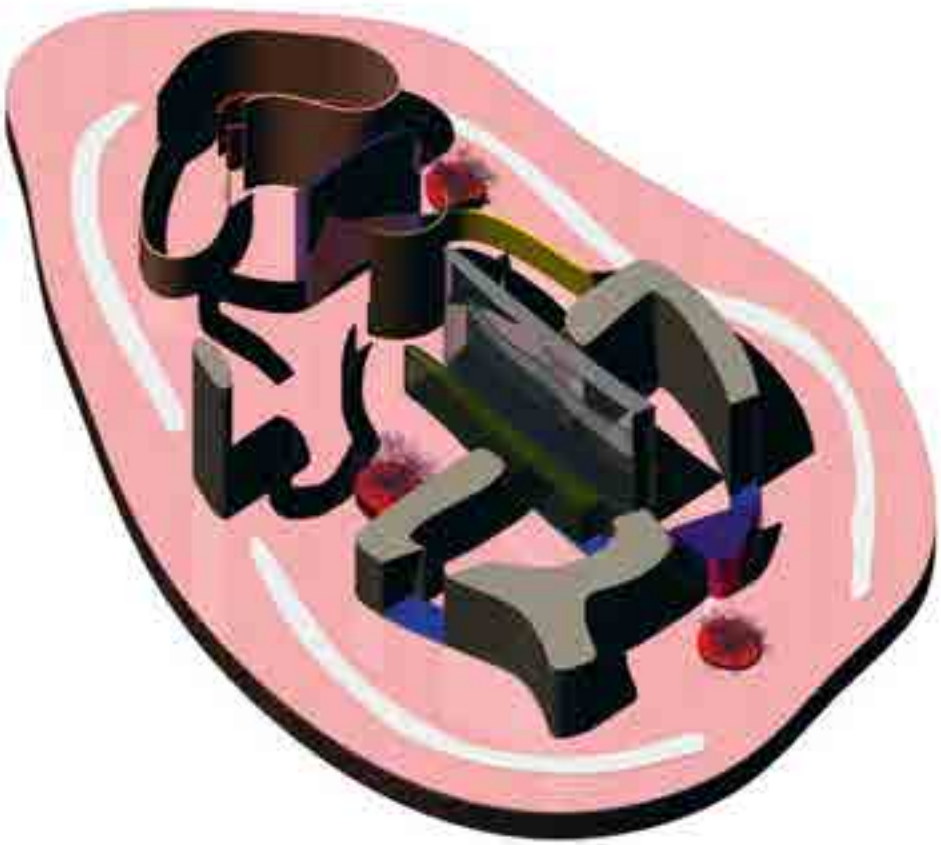
When I was young I never imagined that I would be an artist or musician. Well, actually, I'm not a musician. I make artworks that are often represented through and with sound. I like doing it. Of course I have loved music since I was young, and played some instruments such as piano and guitar, but I never dreamed of being an artistic musician. I started making sound in 2013 or 2014 by using feedback between old video cameras and speakers. Then I became more interested in making experimental perceptual transformations in 2014 after researching for an M.A. program at Goldsmiths in London. I was interested in transforming the perceptual effects of the visual into sound. This is called sonification, which is achieved by using many computational processes. Once the coding is complete, I then work on adding some kind of physicality in my works. I think physicality is important for human perception; it could be an interface, installation, or instrument, but I like to transform data into something more tangible, which includes sound. I don't limit myself to only using sound as a medium. I am open to any medium and actually recently I am very interested in smell; olfactory sensations.

As an architect I find myself deeply connected to music and its spatial or rhythmic qualities. Sometimes I can look at a structure and say it has a musical quality, a sense of spatial balance, and harmony that connects to a deep place within myself. Have you ever had a musical experience within a place, only from the spatial qualities and not from the sounds inside it?

Can you give me some examples?

Well, one would be the light in a space. For example, there is a musical quality of light that reaches or highlights the space at different times of the day. Daylight or night light. Each of these has a different musical feeling or atmosphere. Or you can look at the shapes. Are the corners sharp and angular, or are they rounded, and more curvy in a space? For example, if the windows are all the same, there is a level of rhythm, or symmetry, that makes the wall sing a unique tone. If some windows are smaller or asymmetrical, they will let in more or less light, making the music of the space have a different quality. I'm just curious if a space has ever sung to you, through the visual music embedded within its design or architecture?

I have never thought of space in that way, especially in relation to modern buildings such as apartments, the cube-like architecture in urban life. However, when I think about traditional Korean architecture, it has some kind of melody, envelope, tones, and rhythms, depending on time and space. I think this is a very creative way of seeing architecture, but it depends on how trained the viewer's eye is to hear each melody!



Yussef Agbo-Ola, *Architectural Apparatus / Dancing Bark PAVILION (x).=1011*,
Digital C-Print. © Olaniyi Studio

Sabina Hyoju Ahn
Untitled, 2021

We live in a world that is surrounded by a variety of sounds. When mixed together, these sounds make a form of abstract music, or the music of living itself. Is there a difference between the actual vibration of matter which is sound, and the essence of energy which is produced through composing music? From your perspective, what is the difference between sound and music?

Music is the language of the sound. Sound is like a noise around you, but to be musical requires learning how to compose the noise. Music is also based on the perception of the listener or species.

You mentioned species: have you ever attempted to make music for another species, or in collaboration with them? If so, what was your design process?

I never made music for another species, but maybe I collaborated with them: I work in collaboration with species (bacteria, algae) to make sound. From my perspective this is collaborative, but maybe they don't actually like me working with them for my art practices! Each of my artistic projects vary, depending on the concept of the work; but in recent years my work has been about trying to measure signals from them and translate this into other perceptual experiences.

Sabina Hyoju Ahn, *Sonomatter*, 2017

Sonomatter is a sound installation and performance that transforms the bioelectrical signal from microorganisms to sound. The work starts with building a Winogradsky Column, making a small ecosystem with mud and water – generating the electric signal with a Microbial Fuel Cell (MFC), and measuring voltage from microorganisms that are formed in mud. As time proceeds, the microbes will create electricity and eventually die when they lack nutrients. The designed »Bioelectricity-Controlled-Oscillator« circuit consumes the (bioelectrical) energy to control the sound of the oscillator. This process illustrates a circular relationship between life and death, as life and death share the same material (mud). Interaction between organic matter and natural phenomena – such as soil, water, respiration and oxidation, symbiotic relationship in a microcosm – imply poetics in the microbial sphere. The project is thus not only a metaphorical exploration of the interaction between living matter and natural phenomena, but it also explores the domain of energy harvesting and generating clean energy. The audience is invited to experience the sound from real-time microbial data with handmade »bioelectricity-controlled-oscillator« circuits.

Decay and Growth as Music

Evolution of fungi,
A fruiting body, unseen.
Decomposing fungi, the beat of life,
Interconnecting, to eat death.
Hyphae, a tree root, to speak.
Through this frequency,
one knows many,
one becomes all.

The valley nurtured by the unseen relations, textures, and geometries of the molecular world shapes and carries the beauty in which we experience life and death all around us. It is through a deep introspection as a composer that I have learned to question human perspective and connection to scale in search of an unseen elegance found in infinitesimal architecture. What do we find when we look at the geometric diversity, atmospheric compositions, and structural complexities found in a microscopic world of entropic matter? Using a glass slide as a living and environmentally responsive apparatus, this image composes these elements into visual architectural soliloquies that depict the musical qualities of entropic matter. Life is death, and death is life. All energy exists on a conscious and unconscious plane that simultaneously complements each other. This connecting, and propelling, system allows everything that exists to claim a state of equilibrium when living, decaying, and even in a deceased form. The movements and transformations in nature are all around us, but are many times overlooked because of their distinct speed, color reactions, acute smells, and quiet tactile changes. There is a rhythm in this organic form of systematic subtle metamorphosis.

For example, listen with your eyes.
A tree burns, A stick falls.
For example, listen with your eyes.
A bird born, A nest made.
For example, listen with your eyes.
A sun shines, A tree burns.

Being that your practice often uses many forms for recordings of non-human material, do you consider soil to have a voice or a sound that can mutate or change based on the organisms that live within it? If so, based on your experience how do you listen to soil, and what types have the most beautiful sound in your opinion?

I don't know if soil has a voice! I think they are signals. I think soil has its own communication based on its environmental and elemental composition.

Can you describe your creative thought process when it comes to the way you choose or compose elements in soil to make different signals?

When I was making Winogradsky columns for one of my works, *Sonomatter*, I collected mud from different places in South Korea, Austria, and the Netherlands. I didn't analyze the soil samples in a laboratory, but I think the signals were developed from the variety of different bacteria, depending on where the muds came from. I didn't really intend to change the soil composition, I just wanted to listen to it.

All the soils made different signals, but this is a result of many factors such as sunlight, temperature, and how much organic matter is contained in the mud. Once I was working on making a sound performance with these soil bacteria and I wanted to make dramatic sound changes. I injected 1.2 milliliters of Clorox into the column and instantly the sound changed (dropped) and didn't get back to normal for a day. However, I decided not to use it this way, because I feel so bad for them.

Yussef Agbo-Ola, *Entropic Architecture Archive 28xi [-Mag:33.73nm]*, Palm Acid Crystal C-Print , 108 x 72 in., 2021.

This image is a depiction of one drop of Nigerian sea water and acid, which has been frozen in brine and iron mica for 22 days. The frozen mixture was then photographed under a microscope while being magnified 27,000 times what the eye can see while it turned from a solid to liquid. Photographs were only taken within a twelve-minute period of exposure to heat before the mixture evaporated.

During one of our conversations we spoke about how environmental elements (temperature, smell, time of day) all have an effect on the ways the listener (human) perceives sound. Do these environmental factors also have an impact on the sound itself, via the way the sound waves can fluctuate when exposed to different environmental parameters etc?

I think all sound will vibrate differently if our environmental condition changes. Sound is a very physical phenomenon, so how we hear it depends on interactions with physical surroundings. For example, in the universe, there is no gravity, air, water, or temperature. All of these conditions make it a very different place from Earth. So we hear things differently in outer space, and our perception sense will be confused if we try to compare the two sonic vibrations.

Well, yes, but because sound in the universe is different, and maybe not understood fully, I now see Earth's sound in a more concentrated and unique way. This would mean that any sound created on Earth would not sound the same anywhere else in the universe. It's almost like the Earth itself is limited to the sounds it can hold or harmonizes with. What do you think about the idea that sound continues to vibrate endlessly? For example when you throw a rock in a pond, the ripples of the sound of the rock hitting the water gets bigger and bigger. At some point they stop at the shore, even if the ripples have become invisible. Do you think that the sound, or music made on Earth, can escape Earth's atmosphere and therefore become universal sound?

You are so poetic! I think sound will vanish at some point. Maybe ultrasonic frequency could travel outside of the Earth.

What is ultrasonic frequency?

Ultrasonic sound is very high frequency, which is higher than 20 kHz. Some research says that human ears can detect frequency between 20 Hz to 20 kHz. If you are an infant or very young, you might hear more, but most adults barely hear more than 16 kHz.

Sabina Hyoju Ahn, *Sonomatter*, 2017

This image is a Winogradsky column fermented for four months. A Microbial Fuel Cell (MFC) model is implanted in this column to measure electrical energy from soil bacteria in the Winogradsky Column. In the project Sonomatter, soil bacterial activity demonstrates the self-regulation between different kinds of bacterial growth based in anaerobic zone and aerobic zone. The whole fermentation process in the mud shows a significant amount of life activities that can illustrate a prosperity of the microscopic world.

The Art of Listening to the Mental Ecology

If you are asked to listen, what does this imply? Does it imply that you have control over what you hear? If the speaker is speech itself, then is the listener also the speaker, or the essence of sound, through listening? What is the geometry of this exchange in relation to listening, or observing? Listening connects us to all sound. We cannot close our ears. They were designed to be open from birth, even if sound does not penetrate them. Meaning that listening can be interrupted without the intention of the listener, by the very nature of the design of the ears. They are meant to hear everything within their sonic awareness. What is listening? What is hearing? These are two words, but what do they mean? Can we explore this as writer and reader, as we both become the sound of reading? If we listen, does this imply that we know or have understood something? Meaning that if we hear something, one does not need to know what it is as the sound heard implies that only a sonic sensation, or ear recording, has occurred. As with listening, this is unclear, as one normally says, »I'm listening« and when asked »to what,« one could say, to »nothing.« So what is listening, if it's possible to hear »nothing?« What is hearing when what is heard doesn't necessarily mean it was listened to? Does listening also connect to choice? To say one is listening insinuates that there is attention to some form of vibration to the ears. Can one listen through the cells of the skin? Can one listen through the bumps on the tongue? Is one listening now? Can you hear the sound of the cracks of electricity in one's frontal lobe while reading? Do you hear the beating of the heart, or the motion of heat? The more you have read, the more you have listened to what was mentally heard while hearing what is read through reading. What do you listen to while you hear? To question the art of listening.

Sound has been considered to be formless, or an essence that one can experience through the experience of emotion. As a composer, do you ever question this idea? Do you see sound as a solid form of expression or do you also consider it to be formless?

It depends on how we define form! What is the definition of form?

I believe the forms in music are what stimulate emotion in the listener. Why do you think different music provokes different emotions? I think emotions also have a form. It's beautiful to see the combination of musical form and emotional form. I think they work in parallel. They can be enhanced or contradicted based on the perceptual sensitivity of the listener or composer.

Do you think vision has a form? Does smell have a form? I don't know if sound has a form or is formless. I think it could be both. It depends on the perspective of the listening.

Because our main sense of perception is regarded as sight, do you think vision distracts us from seeing the spatial form of music?

It can depend on many factors, such as age, gender, species.

I once went for a walk in the desert. It was the type of walk that one prepares for with an enthusiasm for the experience of listening to silence. Normally we consider the desert to be a silent place, but this is not true. There was a spatial musical gradient or form that I heard in the silence. Similar to the movement of air brushing against the sand. This sound required a certain type of very attentive listening. Have you had any experiences like this,

where you were required to listen deeply? From your perspective, what is the difference between listening and hearing environmental sound?

When I am staying in my studio alone, or some places where I can be alone, and usually in the night, I hear this kind of spatial silence. Sometimes, if the place is too quiet, I feel like my ears hurt more than when I'm in noisy places. I think listening is picking up certain sounds I am looking for, or what I know already. When I'm listening, I can find some kind of information, or pattern, based on my experiences and knowledge. However, environmental sound is not really heard by ears unless we pay direct attention to it.

This is very interesting. Can you explain what it feels like when your ears hurt while listening in silence? What is that sensation like?

Maybe my ears are too used to listening to noises in urban life. I remember that when I stayed in a temple on a mountain: it was too quiet because usually monks go to bed at around 9 pm. In the night, I couldn't hear anything that I usually listen to in the city and I felt like my ears hurt from the silence. Maybe the wavelengths in the mountains were very low, like infrasound, and what I hear everyday is tuned in the wavelength higher than 60~100hz?

Some yogis say that there is no such thing as silence. Being that even the breath of inhalation has a rhythm, or tone, and therefore we can never experience a complete silence? Do you agree with this?

Can you explain more about this?

In my opinion I believe that internally there is always the music of the mind and body that the human listens to. Something like the sounds of digestion, thoughts, and the musical forms of emotional movements. When we breathe in and exhale out, just listen to the rhythm. Sometimes when I'm observing myself, I can feel the music of this rhythm, similar to dance. For example, when you have an insight or a creative idea and you begin to »move« or »dance« toward it mentally, I believe the mind and body are then dancing or making music together. It's like being in a creative flow. The mind is the conductor, and the body becomes the violin that makes the sound that produces the music that the world will experience. This is internal music. A form of living music that every person makes all the time. One of the most beautiful things in life is to find internal musical harmony with others. When we say a relationship is positive and beautiful, I believe we are really saying that the music in which we are both creating internally is in harmony. When we say a relationship is negative I believe what we are saying is that our internal music is disharmonic. What do you think about this from your perspective?

I have read a paper about Chinese medicine and acupuncture. It says that every organ has a different sound/frequency. For example, the liver sounds like »Do.« The heart sounds like »Mi.« And they use this in the process of finding the cure. I don't agree with this 100 percent, but in Korean, we say that the body (human and non-human) is a small universe (소우주). It means, the whole universe is in our body. Our body is like a miniature of our universe. Somehow I agree with this. In a scientific view, an example would be an internet network system similar to a human's neural network. Indeed, the human body makes sound even if I want it to. Our heart beats all the time, regularly or irregularly; otherwise, it's death. So I think all life forms have their own movements, and moving things makes

Sabina Hyoju Ahn, *kHz*, 2017

kHz explores the relationship between life and sound and explains how sound waves affect the microorganisms' environment. I use inaudible frequency as a physical phenomenon rather than an audible frequency. In this work, bioluminescent algae, *P.fusiformis,* visualize frequencies higher than 28 kHz, which cannot be perceived by human ears. When the frequency of inaudible sound penetrates through the bioluminescent algae, each cell visualizes the inaudible sound by glowing itself. At the same time, the moment of shining also means the death of the cells. This is because the ultrasonic waves travel through the water, which contains the plankton, and the frequency works like a sonic weapon, easily breaking the cells.

sound regardless of its size, how big or small. If I can hear my internal sound deeply and truly, I would be a Buddha who can understand our universe from the other world, to this world, and beyond.

Beautifully stated, »So I think all life forms have their own movements, and moving things makes sound regardless of their size, how big or small.« What about nonliving or non-moving? There seems to be an aspect of sound that also exists, or comes into existence, in stillness or non-movement. I agree with your statement above, but would like to also speak about sound from a frozen or nonmoving perspective. An example of this would be color? Even if a wall is static, and not moving, its color gives it a certain sound in its stillness. What do you think about this?

When you feel the color of the wall making sound, isn't it totally based on your personal experience? Or mind, imagination, patterns stimulating your brain? If you can think of music from a color, it can be synesthesia. Non-living objects also make sound through wind, rain, or human, along with many other factors. But if you think about what the non-living objects consist of, from a very microscopic level, for instance, there are many small creatures that live on the surface of a rock such as bacteria and moss. If you look into them even more, from a nanoscopic level such as atoms, electrons, particles, etc, everything is constantly moving.

Let's do a mental sound experiment: I have sonic combinations that I would like you to choose from. Try to visualize and listen to each element in your mind and choose which sound you like best out of the pair. Based on your selection I will compose a poetic architectural interpretation of a musical mental ecology space. Are you up to it?

Yes, let's try it out.

Ocean algae or pink air?
Pink air

Cough or sneeze?
Sneeze

Your liver or your lungs?
Lungs

Black or brown?
Brown

Blue wall spotted with seashells or gray wall spotted with dried plant roots?
Blue wall spotted with seashells

A jungle's laughter or a mountain's voice?
A mountain's voice

Running or swimming?
Swimming

Ice or fire?
Fire

Three eyes or eagle wings?
Eagle wings

Decayed apples or decayed peaches?
Decayed peaches

Snake skin or fish scales?
Snake skin

Volcanic lava or volcanic ash?
Volcanic ash

Internal or external?
Internal

Like or as?
Like

Strings or percussion?
Percussion

A lemon covered in dust or a whale covered in oil?
A whale covered in oil

Sound signals from living matter or sound signals from dead matter?
Sound signals from dead matter

Orange juice or cranberry juice?
Cranberry juice

Listening to a hurricane or listening to a tornado?
Listening to a tornado

Poetic architectural mental sound space.

From volcanic ash, eagle wings sneeze fire.

Listening to internal sound,
a tornado signals, air percussion.

Blue snake skin spotted seashells, covered brown
cranberry juice walls.

Dead matter with a mountain's voice,
decayed peaches, like a pink whale lung in oil.

Yussef Agbo-Ola and Sabina Hyoju Ahn,
Mental Ecology Sound Space – Pink Whale in Oil, 2021

Yussef Agbo-Ola is the founder and creative director at Olaniyi Studio. His multidisciplinary artistic practice creates interpretations of natural energy systems through interactive experiments. These experiments focus on depicting the multilayered connections between an array of sensory environments. http://yussefagbo-ola.com

Sabina Hyoju Ahn is an artist engaging with various media represented through auditory perception, tactile sense, visual elements, and a mixture of digital and analog technology. Her research seeks to find hidden rules and patterns in natural elements and multilayered relationships between human and non-human sentient beings by translating imperceptible data in natural elements into different perceptual experiences. Her website is http://sabinaahn.com

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Edited by Clara Jo

Never the Same Ocean
Images by Ittah Yoda
Text by Gary Zhexi Zhang

Rhythmic Exertions
Beny Wagner

Stills from »De Anima«
Clara Jo

Wilf Thust »Where is the Gaiety?« (1973)
Freya Field-Donovan

+42.60 / Space in Space
Images by Lucas Gutierrez and Robert Lippok
Text by Natalie P. Koerner

Never the Same Ocean

Images by Ittah Yoda

Text by Gary Zhexi Zhang

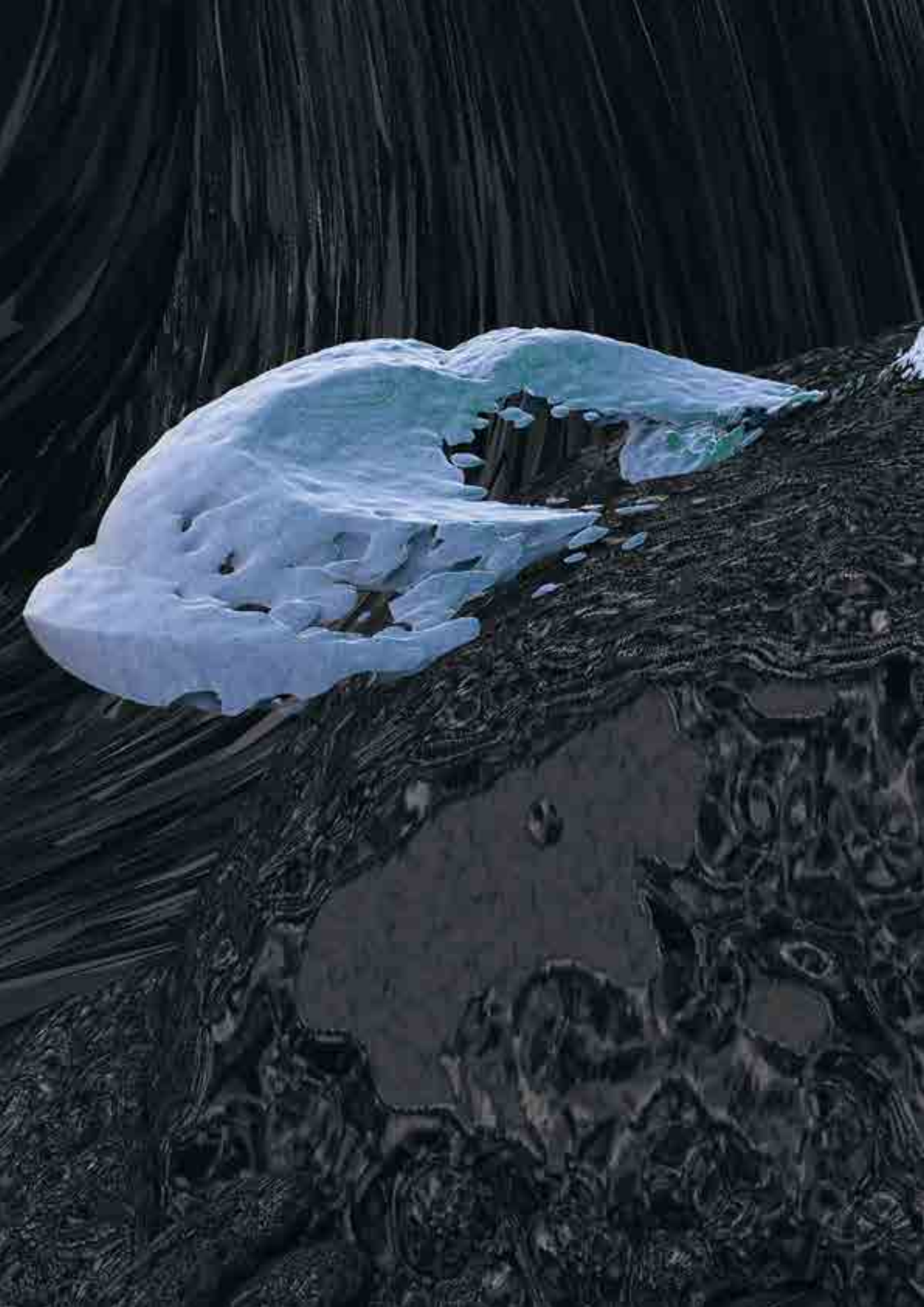
View live virtual reality enviroment of
body alights – a fragmented memory
on TwitchTV:

Sodden from the waist down, breathless as the red queen, a weary Heraclitus is in the creek doing fieldwork. The brackish water courses past his thin legs, foaming against great rocks which will one day be pebbles, a blur.

For now, a young herring lays 30,000 eggs behind a rock to save them from hungry predators. Its genitals have recently grown to over a fifth of the animal's total weight. The eggs sink to the riverbed, where they stick in layers or clumps to gravel, seaweed, or stones, by means of their mucous coating, or to any other objects on which they have a chance to settle. Soon, they will hatch into transparent larvae. Incubation time is about 40 days at 3 degrees Celcius, 15 days at 7 degrees, or 11 days at 10 degrees. Eggs die at temperatures above 19 degrees.

Michel Serres offers an image of *homeorhesis: one always swims in the same river, one never sits down on the same bank*. The flow of the river is not news, but the erosion of its shores that shapes the structure of its movement will inexorably alter the river and the life that surrounds it. Meanwhile, movements in other, distant flows will introduce levels of salinity intolerable to its plant communities, further deconstructing the fragile binds that hold this entity we call a river in its discreteness, temporally as well as spatially. Serres invokes kneading, folding, weaving, and braiding in his image of time, eschewing linearity for the reforming of relations through embryological involutions.

View excerpt from
body alights – a fragmented memory:



More than mere change, mutation is also a question of coming to terms with the loss of identity, species – whether political or genealogical – in terms fixed over the centuries by naturalists and statesmen in a war against the pollution from outside. Mutation, after all, is an »error« from the perspective of the gene, in which background noise overcomes the self-replication protocol, a failure in the persistence of structure that leads to speciation: sometimes at the sudden cost of a function, other times over a gradual genetic drift. There are multiple ways to slice up a structure, just as it takes many hands to build one up. Even in the era of genetic sequencing, species are curated and recategorized as taxonomists demur over the difference that makes a difference.

Lewontin's Paradox, named after the American evolutionary biologist Richard Lewontin, describes the unexplained observation that while genetic diversity ought to increase with population size, this is not the case. While population sizes vary widely, the range of genetic diversity remains narrow. This phenomenon is particularly pronounced in populations of *Emiliania huxleyi*, a microscopic phytoplankton that forms incalculably vast blooms covering more than 100,000 square kilometers, so populous as to be visible from space, owing to the reflective plates that cocoon its body. And yet, despite rapid mutation in such abundance, genetic variation amongst its populations is low, perhaps owing to selective sweep, the spread of a dominant mutation that »purifies« the genetic population in its wake. Along with its phytoplankton cousins, *E. huxleyi* accounts for more than half of global oxygen production, as well as the release of aerosols into the atmosphere, seeding clouds over the oceans in which they bloom, reflecting solar radiation in the process. Half a century ago, it was this planetary metabolic role that partly inspired James Lovelock and Lynn Margulis's Gaia hypothesis, which proposed that the earth was a self-regulating, geobiophysical organism. Today, it remains little known how *E. huxleyi* will evolve under warming temperatures; over the past two decades, blooms have already drifted towards the poles. Earthly conditions continue to be shaped by its capacity to persist.

1 *1009A* (detail), 2020, Polyurethane, thermal pigment, polyamide, 24×28×38 cm © Damian Griffiths

2 Still image from the VR artwork *body alights – a fragmented memory*, 2018–2021, interactive VR, LED screen, VR headset, 151×42×2 cm © Ittah Yoda

3 *Inarou IV* (detail), 2020, casted aluminium, 41×33×31 cm © Hiroshi Yoda

4 HR render of the interactive VR artwork *body alights – a fragmented memory* merged with a phytoplankton 3D microscopy from IMARIS © Ittah Yoda

View a digital sketch of a sound sculpture by Ittah Yoda:

Rhythmic Exertions

Capstan sailors. An original print of seamen working at a capstan, 19th century.
Public Domain (Wikimedia Commons)

Beny Wagner

I've been watching a lot of TikTok content on Instagram recently. I still haven't brought myself to open an actual TikTok account. The little social media I do still engage with stresses me out enough to make me hesitant to fully enter a new platform. But as I peak from the outside, I find myself increasingly fascinated by the new forms I see emerging. The fact that half of the content I now encounter on Instagram is from TikTok makes me feel like I'm not the only one acting as a cross-platform voyeur. From this external position, part of what I think makes TikTok so engaging is that it is physically hyperactive. Even the logo vibrates, signaling a particular relationship to movement and energy that is different from other social media. As I watch more and more, I am struck by how intensely people exert themselves. The platform's entire purpose seems to be in making people move, jump, push, and shake. On top of the physical exertion on display in dances and skits, there seems to be tremendous effort involved in designing, staging, and editing much of the content.

Older social media platforms are still generally committed to the idea that content posted represents a window. The idea that media produce a window onto something is based on the pretense that the people, places, or events being mediated preexist the moment of mediation. This idea is of course false in a way most people are hyperaware of. We're aware of the selective and often staged lifestyle representations that Instagram has thrived on producing. Nevertheless, the platform's unspoken language of value creation tends to obscure the labor involved in staging the content, so that the premise of having been granted a window into some moment that preexists its capture is continuously reinforced. Without this basic premise, there would have been no value to Amalia Ulman's *Excellences and Perfections* series. Or if we think about the synchronicity between the Kardashians and Instagram and how well they were able to use the platform's particular language to leverage their brands it is because Instagram shares something of the tension involved in reality TV. Viewers are aware that they are not watching reality but a highly orchestrated version of a person or an event. The viewer keeps watching precisely by occupying the nuances of that artifice and playing a participatory role in identifying the cracks between the staged product being presented by people we know are real, somewhere beyond the layers of mediation.

TikTok seems to have abandoned the premise of the window. On TikTok, it's much less about the gesture of disclosure – an act of revelation involved in opening a window onto a preexisting space – than about the display of active, deliberate production. If Instagram thrived on staging a life so that the life itself – glimpsed here and there through the windows of content – appeared valuable beyond the platform, on TikTok value is produced directly on the platform itself through a more immediate display of physical labor that all takes place within the frame. On TikTok you have to sweat for the likes.

To use another analogy, it now seems, retrospectively, like Facebook and Instagram were something like the early days of Airbnb where people could make passive income on their spare rooms with minimal effort. The room (or maybe their home when they were away) preexisted the Airbnb platform and Airbnb allowed people to convert that preexisting asset into additional cash flow. On Facebook and Instagram, it was possible to convert various aspects of one's life that would otherwise remain private into public expressions that added value to a person's overall brand or marketability. Building on the analogy of social media to Airbnb, TikTok, in contrast, is like a building bought for the sole purpose of renting out flats on Airbnb. If Instagram *represents* value, TikTok *produces* value. If Instagram acts as a factory's PR department, TikTok is the factory itself. The rise of collab houses or TikTok mansions, where young influencers live together full time to produce content, exemplifies the shift toward making the labor of production central to the content. While these kinds of houses existed before TikTok for influencers linked to Youtube and Vine, TikTok has accelerated the trend exponentially.

When the value of labor is in decline, laborers have to exert themselves more for the same returns. At a

moment where resources are increasingly scarce, the passive income that could be enjoyed within certain labor relations recedes and greater exertion is required to extract value. This is how I read the hyperactivity and amplified movement on TikTok, whose global popularity has soared during the pandemic and the accompanying financial crises. In the overexertion necessary to attract attention on the platform, TikTok content produces a physical expression of the declining value of labor. On the one hand, TikTok *describes* what is otherwise not directly perceptible: it takes more effort to get what you need. On the other hand, it *prescribes* a new set of norms: if you want what you need you have to work hard for it. If the perverse global economy that shaped the world I grew up in made it seem as if things simply appeared out of thin air, TikTok might be guiding us through the new world of scarcity where the lack of resources reminds us that value has always been tied directly to physical labor.

Moving image media has always performed a reciprocal act, simultaneously describing and prescribing the body's position in relation to labor structures. The history of cinema can be seen as a record of those shifts over the course of the last 125 years, TikTok being the latest manifestation of the ever-evolving relationship of moving image media to the laboring body. Along this lineage, we encounter the scene in Charlie Chaplin's *Modern Times* where Chaplin, unable to keep up with the pace of the conveyor belt is swallowed into the machinery, or the famous episode of *I Love Lucy* set in the chocolate factory, where she is forced to eat the chocolate herself in order to keep up with the impossible pace. Both of these now iconic scenes derive meaning and comedic effect from the body's desperate negotiation of a new production landscape. They show the brutal incompatibility of industrial time with the body's time. But in the absurd exaggeration of the machine's logic, these scenes allow for a moment of resistance to the increasingly inhuman demands made on industrial laborers.

If we accept that both early cinema and TikTok are media constellations that emerge from labor relations, it seems to me that the important difference between the early cinema producers described above and today's influencers is that the latter lack the same awareness toward the conditions within which their labor takes place. Is TikTok content the absurd exaggeration of today's labor conditions, or simply the expression of their well-oiled logic? I'm not entirely sure. When someone looks at the work left behind by influencers a century from now, they might well read subtle gestures of awareness or even resistance that from my vantage point still seem like the forfeiting of agency.

In mid January, at the crest of the second covid wave and the third national lockdown in the UK, a TikTok meme went so viral that it even reached the global mainstream media. Initially, a Scottish postman in his mid-20s posted a video of him singing a nineteenth-century sea shanty called »The Wellerman.« As the post grew in popularity, other people started adding to the original video by layering harmonies on it. Like so many other people, I found these videos mesmerizing. I internalized the melody almost immediately and over the next week I constantly caught myself humming it silently.

Sea shanties are work songs that grew from the labor performed by sailors on ships. These songs, which are closely linked to the tradition of slave work songs and industrial folk songs, perform a dual function. On the one hand they synchronize the work being done by multiple bodies. In learning to sing the lyrics, workers internalize their rhythms in order to push and pull as a unified force. But the function of these songs

is not only disciplinary. They also serve to make the experience of hard labor less punishing, to find in it a flow that allows the burden of labor to be shared and for some kind of camaraderie to be formed as a result. Work songs point to the difficulty of determining where the body begins and ends; the songs are rhythmically carried along the continuum that links bodies to other bodies and to machines.

The viral success of sea shanty TikTok (it has become its own subdomain on the platform and the guy who started it was offered a record deal and quit his job as a postman) points to the clear position of TikTok within a lineage of media technologies and the ever evolving labor relations from which they emerge. While sea shanties fused the laborers' movements to the masters' tools, they also synchronized their bodies with those of their fellow workers. In that act of synchronization that relinquishes personal autonomy in favor of solidarity with others, there is always the potential for resistance to the terms delineated by those in power. The pulse that travels through TikTok, momentarily taking residence in user's nervous systems, likewise carries the sea shanty's dual function, disciplining the body according to the demands of a specific set of labor conditions, but simultaneously containing the potential to relinquish the boundaries of the self and create unique forms of rhythmic solidarity.

Stills from »De Anima«

De Anima is an ominous prelude set in Myanmar and Kenya that unveils how gendered, racialized, economic, and metabolic ecosystems embedded within the global health crisis drives fear of contamination from the nonhuman world.

Clara Jo

Clara Jo, Stills from *De Anima*, 2021. Courtesy the artist

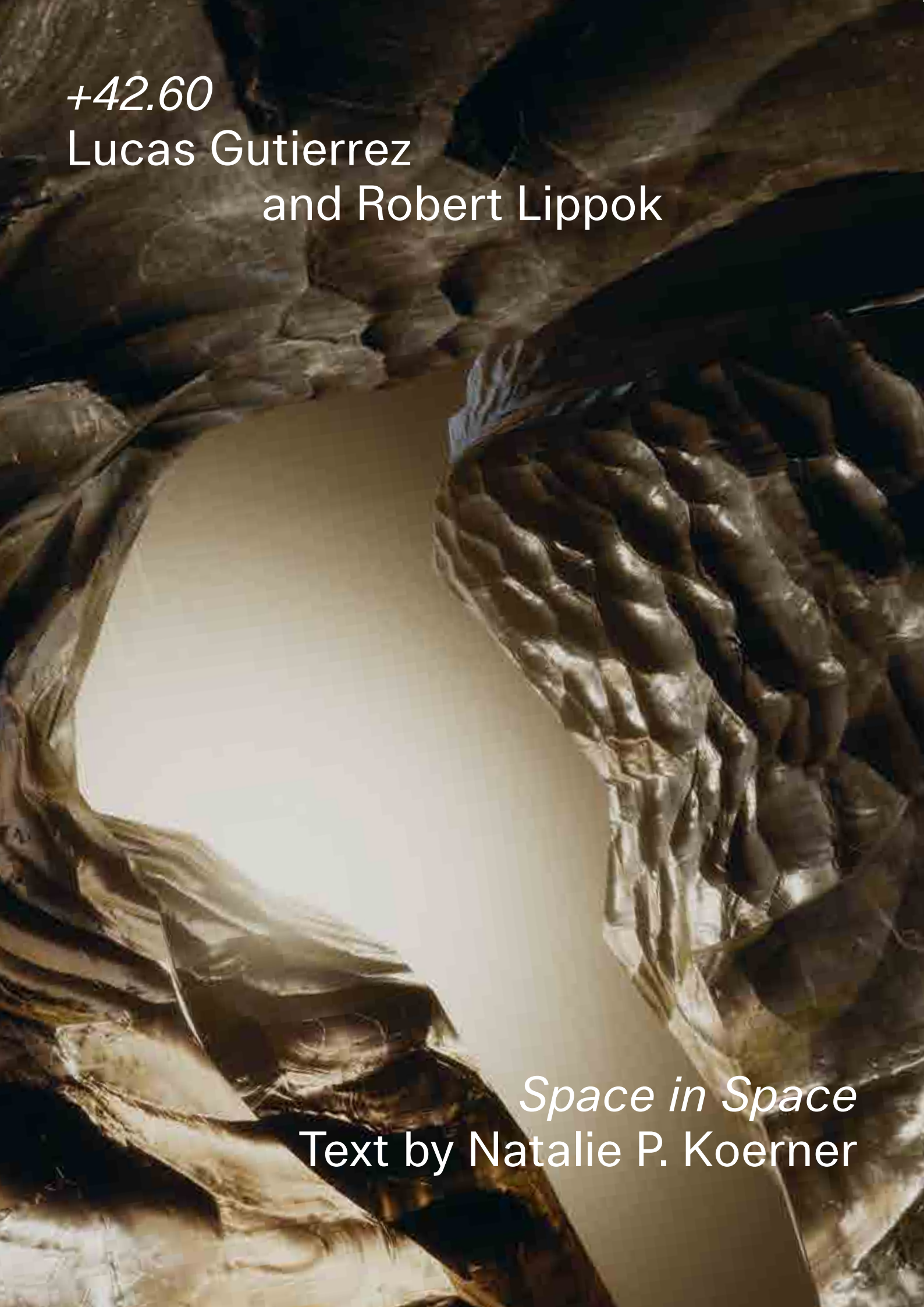
Wilf Thust »Where is the Gaiety?« (1973)

Wilf Thust, Still Images from *Where is the Gaiety?*, 1973. Notting Hill Gate. Inside the Adventure Playground. Deposited with MayDay Rooms by Wilf Thust. December, 2013.

Freya Field-Donovan

Not all enclosures are restrictive. Some hold space for protection, for measured lessons, for the supervised experimentation that allows someone to set boundaries in themselves, and between themselves and others, for learning – having too much pleasure and pain, but then learning to temper both. Institutions can offer this; so can the home, friendships, various iterations of holding spaces and patterns within which relationships between oneself and the world are formed. Some of these are considered natural, like the childhood acquisition of movement and language, or social and sexual bonds. Others are seen as unnatural, like the various manmade institutions designed to administer the legal, political, and economic functions that reproduce society at large. The natural and the unnatural form one of the foundational binaries used to navigate the value and category of experience. Childhood, in its idealized form, is related to innocence. Innocence at its most simplified is metaphorically coded as natural, related as it is to a lack of experience, unqualified or unacculturated judgment, to the sweetness and virtue of simplicity. An un-innocent child is one who has seen too much, or knows too much about the adult world, about violence, cruelty, or complicity. These un-innocent childhoods are related to those administrative functionings. Having no access to resources, money, or formal education, legal and political institutions make those supposedly natural bonds and units harder to hold together.

In 1973 the filmmaker Wilf Thust made a work about an experiment in anti-authoritarian education. The film and the photo albums that make up the work are experiments in education themselves. By giving us the distance we need to see these workings, they teach us that pedagogy is a reproductive apparatus. Through the formal means that Thust chose, naturalized behaviors, attitudes, and social capacities are unpacked and denaturalized, and shown to be acquired through repetition and habit. The work teaches us that race and class unevenly distribute access to the value of innocence and to the intuitions that hold up this virtuous fantasy. We learn that we need to be able to have distance from our habits and attitudes to be able to recognize their historical dimension. We must give up our own fictions of innocence to stay open to learning. We must learn to denaturalize and renaturalize different habits of perception to create pedagogical environments that allow all people to feel themselves as both spontaneous and political beings.



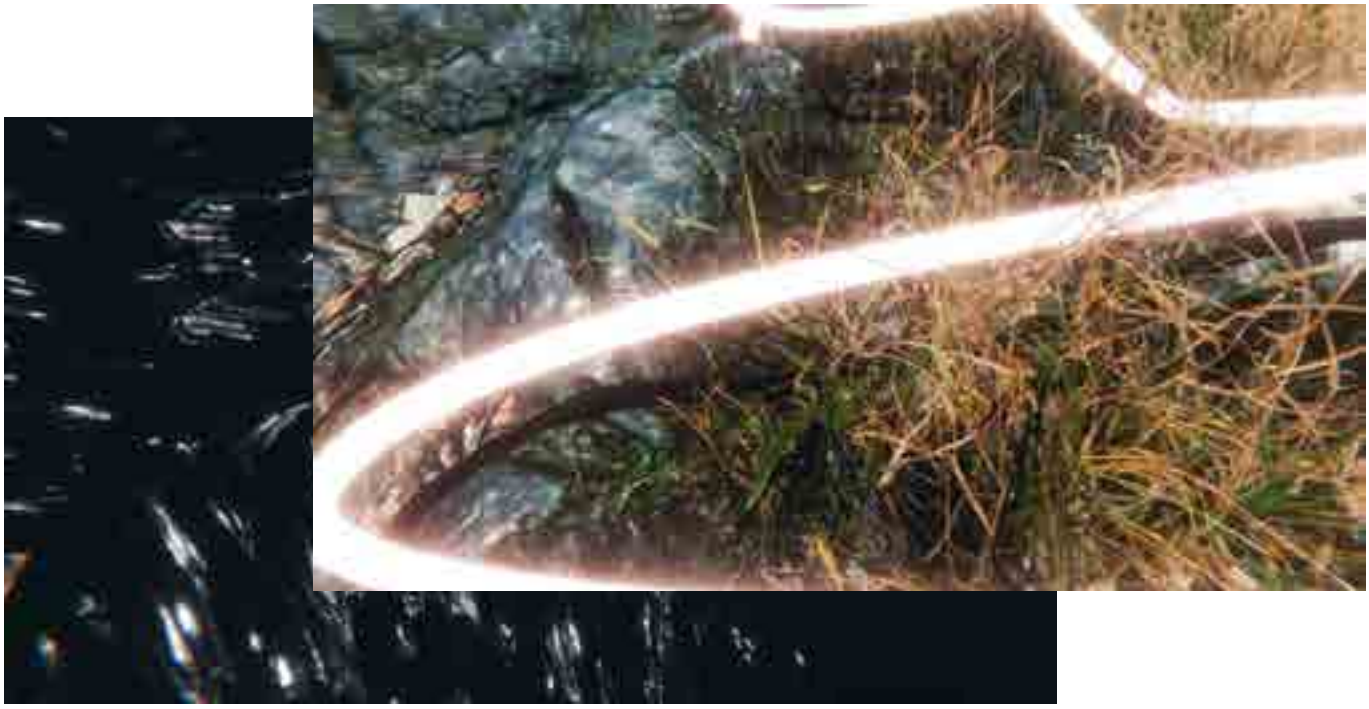
+42.60
Lucas Gutierrez
and Robert Lippok

Space in Space
Text by Natalie P. Koerner

+42.60 is an artistic reading of an architectural project by Lucas Gutierrez and Robert Lippok. Digital artist Lucas Gutierrez and sound artist Robert Lippok imagine further mutations and transformations of a tower that used to house the former GDR graphite factory, EB Elektrokohle Lichtenberg. Parts of this building complex have already been transformed by the architect Arno Brandlhuber in collaboration with Georg Diez, Nikolai von Rosen, and Christopher Roth. Their project San Gimignano Lichtenberg converts the remaining industrial towers into studios to generate an architectural catalyst for the surrounding urban fabric.

Graphite in Space

Apparently, graphite has a greasy feel. Greasy like billions of years of history, whose traces you cannot quite wash off. *Graphite is literally used in lubricants*. It's one of the three most ancient minerals in the universe. Far beyond our temporal horizon, graphite emerged from the explosion cloud of a supernova or from the discarded outer layers of near-death, small- to average-sized stars. Then at some point it must have been swirling about in a giant interstellar molecular cloud out of which, following gravitational collapse, our solar system formed 4.6 billion years ago. During the Big Bang and its aftermath, graphite made its way onto Planet Earth, and more recently settled into pencils and electrodes. Under high pressure and exposure to heat, the mineral transforms into diamond. So, if some of the epic energy events that shaped our planet had mutated in slightly alternate ways, our (now) blue planet might have been – or maybe it is still becoming – a sparkling one. Or, thinking in the opposite direction of minimum pressure, it might have been an interstellar cloud.



Space like the weather

As we traverse the tower unhindered by walls or spatial obstacles, I think of these molecular, outer-space clouds. Like here, in this point cloud, particles in interstellar clouds form clusters of higher density. These are the so-called clumps, where more dust and gas cores congregate. From the clumps, stars can form if the gravitational forces are strong enough to cause the dust and gas to collapse.

I imagine myself inside the space in these clouds. It's moving around me, more than I'm moving through it. Sometimes the cloud is denser, like wafts of mist passing by. Maybe it's like the weather that shifts and transforms: clouds darken the sky, and the wind picks up. A sense of foreboding. A ray of light breaks through the sticky clouds.
In space that's like the weather, all boundaries are temporary. Configurations are infinite. Thresholds are endless. With every shift, the atmosphere adjusts, and the new situation seems unprecedented and familiar at once.

Space like a waterfall

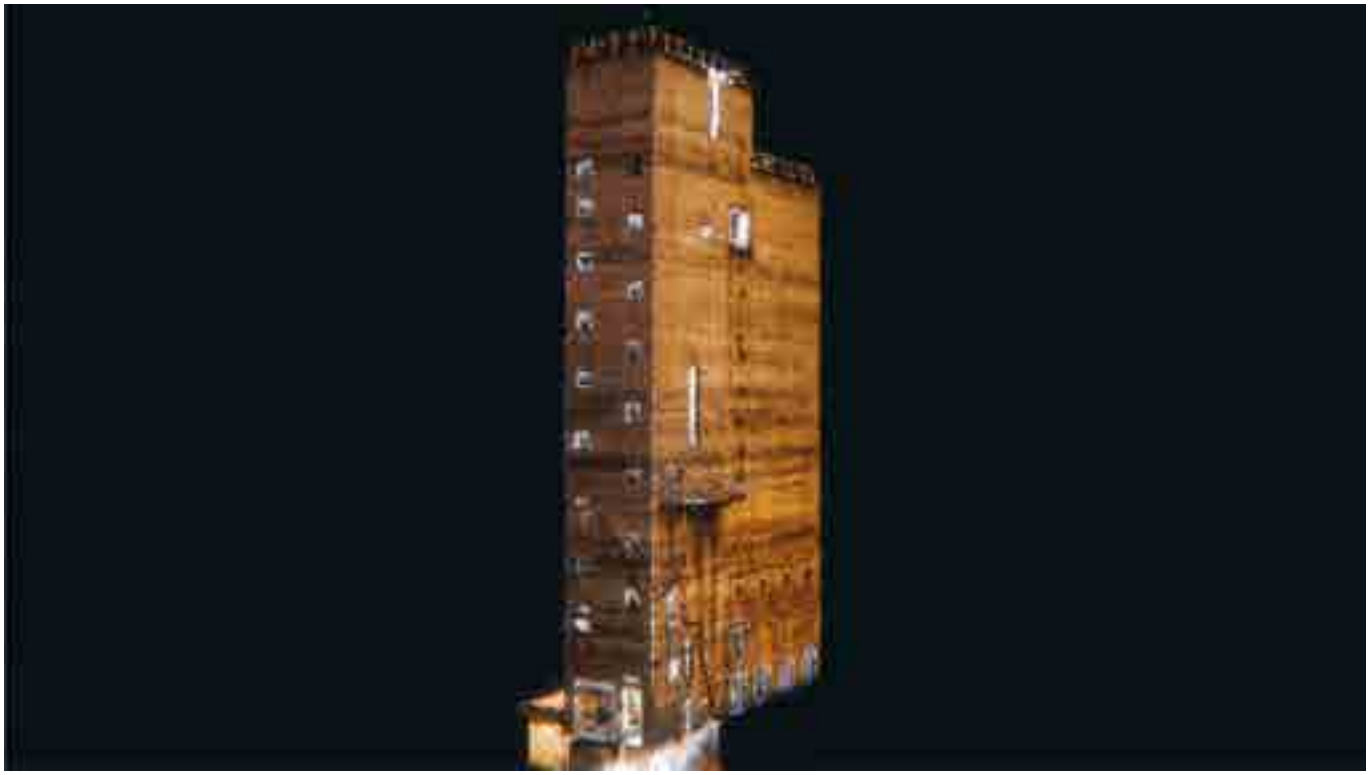
Now the soundscape changes and begins to rush through the void like a waterfall.

Spatially, this tower could contain a waterfall. Around forty meters is also the height of the world's tallest indoor waterfall at Singapore airport, the Rain Vortex. It looks like a rain hurricane stopped in its tracks, forced to stand still. The space taken up by a waterfall is as inaccessible as a void (or an empty tower), unless you can defy gravity, like a salmon with its unstoppable reproduction instincts. For the salmon, the river is a kind of extended threshold: the ocean at one end, and at the other, the place where the salmon hatched, will spawn, and will die. It's not a threshold that begins in one place and ends in another. Instead, it's rather like a loop.

Similarly, as I am immersing myself further in the digital tower, I am guided along several loops–up- and downward, past coils of neon light, through foliage, and into a grassy patch with thin long leaves that emerge from the black bottom of the void in looping squiggles.

Space like a ghost

There it is, the tower object, closed up and complete, as if it were finished and final. Just like the beech leaves we encountered on our way down through the void, which were absolute and sealed, in contrast to the permeable point cloud perimeters. The tower's inner life of light tails, surreally tall beech trees and grass breaking through mossy rock, now seems like an imaginary memory. From this new distant view, the tower might be like a ghost coagulating around a point cloud of phantom graphite particles, workers, political realities, objects we no longer know, and unimaginable energy events billions of years ago. Some of these traces leave persistent marks, like graphite powder that nestles firmly into the finest pores.



View excerpt of *+42.60* by
Lucas Gutierrez and Robert Lippok:

Freya Field-Donovan is a Ph.D. candidate in the History of Art department at University College London. Her Ph.D. is titled *A Strange American Funeral* and focuses on dance and technological reproduction in 1940s America.

Lucas Gutierrez is a digital artist and industrial designer based in Berlin. He has been engaged in various disciplines, from lectures, workshops, and audiovisual performances to video art projects focused on digital culture's new paradigms.

Clara Jo is an artist and filmmaker whose work reengages historical and ontological narratives through interdisciplinary collaboration.

Natalie P. Koerner is a researcher and an architect based in Copenhagen. Besides running her architectural practice, she is assistant professor in architecture at Copenhagen University and the Royal Danish Academy.

Robert Lippok is a musician, visual artist, and set designer based in Berlin. Since 2017, he has taught at New York University Berlin. He is a member of the curatorial board at the Spatial Sound Institute Budapest and the Institut für Raumexperimente e.V.

Beny Wagner is an artist, filmmaker, researcher, and writer. Working in moving image, text, installation, and lectures, he constructs nonlinear narratives situated within the ever-shifting threshold of the human body.

Ittah Yoda is an artist duo consisting of Kai Yoda and Virgile Ittah, living between Berlin, Paris, and Tokyo. Their practice combines traditional processes with digital technology as a vector for cross-cultural creative collaborations, with a focus on deep time, archaic heritages of humanity, and the collective unconscious.

Gary Zhexi Zhang is an artist interested in unstable knowledge. His forthcoming solo exhibition, *The Long Run*, explores operative fictions of land, nature and speculation, and will open at Bloc Projects and Arts Catalyst, Sheffield, in June.

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Edited by Ana María Gómez López
and Joana Quiroga

Epistemological Capital
Sticker insert

»Mutations« – A Lecture Series

»It is time to focus beyond logical systems and to utilize the potential of an inter- and transdisciplinary approach to (artistic) research in order to critically rethink the concept of ›Mutations‹ and, consequently, life.«

From March 22 – May 10, 2021 »Mutations« – A Lecture Series brought together a dynamic group of researchers, artists, thinkers, curators, and scholars. Curated by the fellows of the interdisciplinary artist residency »Mutations« the lecture series is both an outcome of the program and a source of knowledge for further discussion. Find access to all lecture series online at mutations.akademie-solitude.de, akademie-solitude.de, and .kfw-stiftung.de.

JoAnn Kuchera-Morin
»Using the Creative Process as a Computational Framework for Unfolding Complex Systems«

Moderated by Sabina Hyoju Ahn

In her lecture, JoAnn Kuchera-Morin talks about »Using the Creative Process as a Computational Framework for Unfolding Complex Systems«. Kuchera-Morin is a composer, the director and chief scientist of the AlloSphere Research Facility (www.allosphere.ucsb.edu), and a professor of Media Arts and Technology and Music at the University of California, Santa Barbara. Her research focuses on creative computational systems, multi-modal media content, and facilities design. How can one find patterns in complex information and work with the information creatively and intuitively leading to new and unique innovation? Using the compositional framework within the AlloSphere, one of the largest display devices in the world for multi-modal data representation and an ideal platform for designing our n-dimensional sketching system, she and her teamhave developed a series of prototypes and solutions for immersive multimodal mappings of complicated scientific data.

Heather Davis
»The Queer Futurity of Plastic«

Moderated by Angela Anderson

Heather Davis' lecture examines the networks of queer kin that are inadvertently being birthed by the proliferation of plastic. The microorganisms that are appearing as a result of plastic's proliferation — the new bacteria that have evolved in order to eat plastic — invite a reconfiguring of categories of kin making, not only to extend beyond normative family units, or even to the more-than-human world, but also to these slightly abhorrent technobacterial becomings. Davis is an assistant professor of Culture and Media at The New School. She is the co-editor of *Art in the Anthropocene: Encounters Among Aesthetics*, *Politics, Environments and Epistemologies* and *Desire Change: Contemporary Feminist Art in Canada*.

Eben Kirksey
»Who Owns the Future of Gene Editing?«

Moderated by Grayson Earle

In anthropologist Eben Kirksey's latest book *THE MUTANT PROJECT: Inside the Global Race to Genetically Modify Humans*, he visits the frontiers of genetics, medicine, and technology to ask: Whose values are guiding gene editing experiments? And what does this new era of scientific inquiry mean for the future of the human species? His research sheds light on the fundamental questions about science, health, and social justice that are at stake. Kirksey is an American anthropologist, writer, storyteller, and associate professor (Research) at Alfred Deakin Institute in Melbourne, Australia.

Marcia C. Castro
»Covid-19 in Brazil: A Mutating Virus in a Mutating Society«

Moderated by Joana Quiroga

Marcia C. Castro is Andelot Professor of Demography, chair of the Department of Global Health and Population at the Harvard TH Chan School of Public Health, and co-director of the Brazil Studies Program of the David Rockefeller Center for Latin American Studies (DRCLAS). Her lecture discusses the many transformations that Brazil has historically experienced that have provided both challenges and opportunities to contain the pandemic. It reflects how opportunities were lost, leading to a catastrophic scenario of exacerbating inequalities and excess mortality, and how the SARS-CoV-2 virus is now mutating, triggering further transformations in Brazil.

Natasha Ginwala
»Matters of Mutation«

Moderated by Clara Jo

Natasha Ginwala is an Associate Curator at Gropius Bau, Berlin; Co-artistic director of the 13th Gwangju Biennale and Artistic Director of COLOMBOSCOPE interdisciplinary arts festival. Her lecture »Matters of Mutation« explores organic and inorganic modes of intelligence in the framework of the 13th Gwangju Biennale »Minds Rising, Spirits Tuning«, co-directed with Defne Ayas.

Andres Lepik
»Small Scale, Big Change: 10 Years of Architectures of Social Engagement!«

Moderated by Maxwell Mutanda

Andres Lepik is director of the Architecture Museum TU Munich and professor of Architectural History and Curatorial Practices at the TU Munich. His main focus is on the history and theory of architecture exhibitions and contemporary developments in the field of architectures of social engagement and participatory architectural structures.

Sophia Roosth
»And Say the Fossil Responded?«

Moderated by Ana María Gómez López

Sophia Roosth is an anthropologist who writes about the contemporary life and earth sciences. She is the author of *Synthetic: How Life Got Made* (Chicago 2017), an ethnography of synthetic biologists that documents the profound shifts biology has undergone in the post-genomic age. Her next book, *The Quick and the Dead*, will offer a historically and ethnographically informed travelogue into the worlds of contemporary geobiologists, scientists seeking ancient microbial life-forms fossilized in stone. She is currently a Fellow of the Dorothy and Lewis B. Cullman Center for Scholars and Writers at the New York Public Library, and has also been appointed Max Planck Sabbatical Award Laureate by the Max Planck Society.

Brenna Bhandar
»Racial Regimes of Ownership: Laws of Property and the Colonial Present«

Moderated by Rose Field

Brenna Bhandar is an associate professor at the University of British Columbia, Peter A. Allard School of Law. Her research and teaching broadly lie within the fields of property studies and legal theory, spanning the disciplines of property law, critical theory, colonial legal history, and critical race feminism. Her book *Colonial Lives of Property: Law Land and Racial Regimes of Ownership* was published in 2018 with Duke University Press, and the co-edited book (with Rafeef Ziadah) *Revolutionary Feminisms: Conversations on Collective Action and Radical Thought* was published in 2020 with Verso.

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