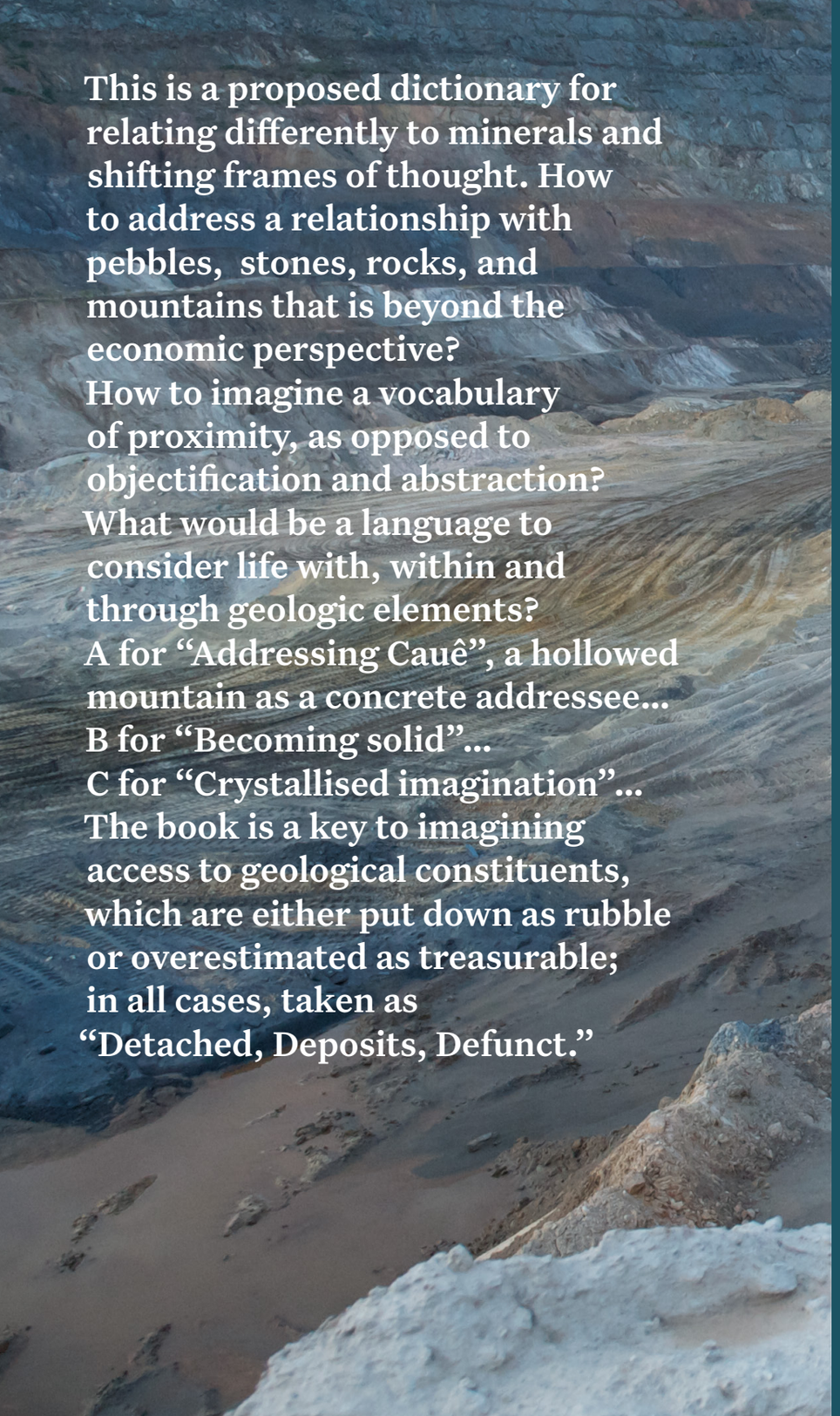

Missing Words for Considering Stones, Rocks, Pebbles and Mountains:

A Vocabulary of Proximity

StoneStatements Editions

StoneStatements Editions

in collaboration with ESAAA éditions

Acknowledgements

Missing Words for Considering Stones, Rocks, Pebbles and Mountains – A Vocabulary of Proximity is one of five book titles presented in five announcements, which form an installation at the main exhibition ‘How will we live together’, in the frame of the Biennale Architettura 2021, in Venice. Under the title *StoneStatements Editions*, the project departs from the interrogation of how to incorporate the thought that stones and rocks are components of Earth’s life, belonging to an overall living system. The work takes the form or the gesture of an editorial concept that acts like a “geomediator”.

The development of this volume was possible due to a collective effort, while the other four titles are still imagined books to be produced with the desire to change the majorly extractive relation humanity has developed to stones. The other four titles are: Human Invasion in the World of Stones; Conscious Rocks – Thinking Minerals with the Body; When Stones Collect Diggers, Robbers, Queens and Kings; and Geoimaginaries – A schoolbook as a Toolbox. A journal, ‘Manifestations’, build exclusively with slogans of manifestations against mining, is also part of this launching project, – it was printed as a single copy, to be seen in video format at the Biennial.

This volume was only possible with the generous participation of the writers contributing to develop the *Vocabulary*. I am thankful to each one of them; our exchanges were a rich learning process and amidst confinement, reaching from distant places, the collective effort was encouraging, reassuring at each step of the making.

The *Vocabulary* is available online, indicated by a QR code in the exhibition and it will be printed with the support of the École Supérieure d’Art Annecy Alpes [ESAAA] within the research project ‘Effondrement des Alpes – Inventer un Nouveau Patrimoine’, financed by the European Union through the Program Interreg

France-Switzerland, in a partnership between ESAAA and the Centre de la Photographie, Genève.

I thank Elaine Ramos for the cover design of this volume, which was the starting element of this book, as much as all other designers contributing for the launch of the StoneStatements editions: Enrique Fontanilles, Gilles Eduar, Nadja Zimmermann and Skander Najar from NASK, and Jônio Bethônico – also for designing the interior of this volume besides making it available online, with his generous patience, as always after years of collaboration.

My thanks to Roi Salgueiro and Gabriel Kozlowski, curators assisting Hashim Sarkis for the Venice Biennial and to Emily Scott for the exchanges in the very beginning of the project. My appreciation to Maria Eduar for her accompaniment and to Gisa Bustamante for insights, communication solutions and for developing the logo for the installation. I remark the essential cooperation of Rodrigo Martins, and thank for his thorough help for the spatial visualisation of the display in the Giardini. I thank also the City of Geneva for the subvention to accomplish the project.

Thanks to the greatly competent Anna Iatsenko, Anthony David and Regina Stocklen for their works of translation and correcting the texts. The contributors are presented in *mini-biogeographies*, a term suggested by Luísa Azevedo, the first person with whom I spoke about the wish to develop this book and whose enthusiasm and supporting feedback was a great stimulation for its construction.

I am grateful to colleagues at ESAAA – in particular Emilie-Cerise Pelloux, Sonia Pérez, Arthur Paley, Gaël Paradis, Philippe Thaize, and especially Camille Garnier for her editorial counselling and Stéphane Sauzzede for the support and invitation to take part of the school's exceptional research project *Effondrement des Alpes*.

StoneStatements editions derive in great part from our actions since 2018 towards considering the mountain as a living organism. In front of the school sits the Alpes across the lake of Annecy. Used to deal with the extracted mounts of Minas Gerais, pulverised for economic exploitation since colonial times, the Alpes seemed a stable, solid permanent rock. But affected by global warming, changing its structural forms and the lives it holds, the mountain presents itself as organic, as much as it is geologic, – sensitive. Its endurance is imaginary, deconstructed within our project, as nothing in the planet is indifferent.

In addition to his collaboration to the book, Edwin Gnos has guided me, with Aurélie Strumans and Meret Knobel, into the history of the geologic formation of the Alpes, using samples from the Natural History Museum, where he is conservator. My appreciation to him and to Pierre-Alain Proz for that very special narration. Images of this moment between shelves inside the collection constitute the sneak preview of the project for the biennial. I thank Victor Galvão for editing this video, and also for participating in the construction of the journal 'Manifestations'.

I am especially grateful to Joerg Bader for the work discussions that make part of our daily life and for his curatorial counselling and reading of my texts. Finally, I thank Lara and Tomás for their curiosity towards my work, for their helping hands and for being who they are, driving our challenging life each day with affection and humour. I dedicate this book to my parents. Although the pandemic drove us very distant during the development of this work, they are both a continuous support. Their trust is solidity in the back of the mind and constituent deep in the heart.

Mabe Bethônico

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Addressing Cauê

Mabe Bethônico

There was once a mountain in Minas Gerais, Brazil, that went by the name of Cauê. Over the last eighty years Cauê was depleted into becoming a hole as deep as its height once had been. What is left of Cauê today is a balancing wall that surrounds its own negative form. One day it was decided to be the world's greatest deposit of iron ore and then, it became a testimony of ferocious extractions. Its horizontal scars, like unsatiable mouths lacerating the landscape, resulted from a long history of open-pit mining, which fed markets in the country and abroad. Cauê has been moved by hands and displaced by machines, travelling across the country and the oceans and back, fabricated, re-fabricated and manufactured. It makes for a scattered disfigurement, a deposit of dust kept down by water showers, which stop grain tempests from invading Itabira, its hometown. It would have much to 'say'[1] and it should be referred to as an emblematic standpoint from where to articulate questions of geological and biological systems, labour, social injustice, urbanism and power linked to extractive economy.

Cauê can be seen as a *reflexive* monument. Its shining, rich in ore surface used to reflect light, making it visible from afar. With extraction, its silver powder covered Itabira, its paved streets and houses used to really shine. Today considered 'exhausted', it stands like a figuration or a *voice*, for considering human's dominating relationship to earth's geology. The excavation of Cauê and its neighbouring deposits was justified with arguments of expansive development, generating employment and profit for the municipality and the country. While a part

1 Part of this text was written as contribution for the project Future Assembly of Olafur Eliasson and Sebastian Behmann for the 17th Venice Architecture Biennale, 2021. I proposed a speech to be read by a 'profound' Cauê, delivered in a sound piece made in collaboration with Hannah Stewart, who also gives voice to the mountain.

of community accepts the arrival of enterprises, those who resist often have no power to overturn conceded licences that give full access of use. How to make visible the evidence of loss and injustice in order to empower the community and avoid environmental disasters? Which means could be activated to make people aware that extraction is a political choice, precluding a sustainable and independent economy? Can recognition of loss of a geological monument be a tool for resisting extraction, by acknowledging its cultural value tied to collective memory, and to psychological, affective damage? Can Cauê become a claim?

Cauê is essential for the birth of Itabira, which has grown around its extraction, and for Vale, once state-owned, now one of world's largest mining multinationals. Vale is responsible for the deaths of over 300 people in 2019 in the tragedy of Brumadinho, a few kilometres away from the contemporary art park Inhotim, where excessive waste caused the rupture of a dam, contaminating the whole valley. The criminal practices of Vale include another dam rupture in Bento Rodrigues in 2015, which took away lives, affected an entire ecosystem and the river Doce, flowing along its 550 Km to the sea, and a fundamental biotope for the indigenous people inhabiting its banks. A great part of Cauê's extractions and its neighbouring mines, which mend, forming a single vast scar in Itabira, can be found all the way to Switzerland. Vale's European office is in the city of Lausanne: a black and white building with indiscernible windows and doors, protected from public eyes. The office overlooks the Alps, from where runs clear water and trees blossom, despite also being affected by global warming, but in Switzerland, the Alps are clearly a symbol and preserved heritage. In the end of 2020 Switzerland held a nationwide referendum on the Initiative 'Responsible Multinationals', a vote to make enterprises headquartered in Switzerland legally responsible for what happens in their supply chains. The initiative hasn't been approved, despite

the small difference separating the two sides. But the future on Earth depends on the realization that we are all connected, interdependent, and that the South is not a garbage place with some oasis spots for exclusive wealthy leisure.

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Becoming solid, becoming human

Xavier Ribas

Extracting minerals from the earth usually starts with a BLAST that bursts open the surface of the land, a detonation that breaks apart in an instant the earthly matter underground structured over millions of years, deposited, layered, compacted, slowly becoming solid; solid and still. The BLAST initiates a chain of transformations and displacements during which solid matter in one place is fragmented and processed, loaded and transported, and finally dematerialised into numbers on the financial market, a share price somewhere else. But for minerals to become extractable, an image of a future needs to be projected onto the land beforehand. It is through technologies of mapping and imaging, and through the passing of legislation, that investors, speculators and politicians project a future onto a land which is not theirs. This image of a future that 'prepares' the land for extraction sets the value of minerals against that of humans. For local, indigenous communities onto whose land this image of a future is projected, an image in which they are made invisible, the land is not something foreign to their becoming. The becoming solid of the earth underneath is entangled with its becoming their bodies. The morphology of the land is not only something related to its geology, as the 'extracting' image might want to suggest. The morphology of the land, the way the land 'looks', is the result of human labour and human habitation. Thus, a different image of the future emerges from this entanglement between the land and the human body. It is an image that emerges from the land itself, and with the voice of the people who live in it: there is no such thing as solid earthly matter which is not at the same time a thing of the human body.

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Crystallised imaginations

EDITORIAL

In this collaborative volume the 26 letters of the alphabet are triggers for developing short essays about real and imaginary stones, rocks, pebbles and mountains. The authors are artists, theoreticians, scientists and poets, who often use multidisciplinary approaches or have minerals as subjects of their practices. They have been invited to contribute to this endeavour and to explore the geological within the human.

The title of this book, Missing words for considering stones, rocks, pebbles and mountains – A Vocabulary of proximity, proposes ways for 'considering' stones. I have chosen this verb as it points to a *careful thinking* about something. In the case of this book, the title also points towards actions to discuss, research, observe, reflect or narrate – with and about minerals. The group of texts presented here brings a wealth of perspectives, indicating the complexity of our relations to these… elements, *living* solid forms. They are present here as research material in science and in fiction, tied to affect within experience, to matter of inquiry in a biographical note, like a speculative tool, or elements in literature and poetry. In the book's very construction too, stones have been facilitators, bringing together people who have generously contributed through the many exchanges and encounters that led to this volume.

In Western cultures, stones and rocks are usually seen as inanimate or lifeless, static although potentially emanating particular energies, permanent and endlessly available, long lasting or eternal, complex and beautiful, but, above all, useful, economically interesting and viable. Read as signs of fertility and prosperity, linked to power as much as poverty, to human development and misery, stones and rocks are taken as extractable elements at large and simply available for use.

Dispersed as dust, fragmented as pebbles, united, solidified, pressed, compacted and overlapped as relief [or strata], dug, excavated or piled up: in multiple mineral combinations, definitions, chemistry, aspects, properties. But how can we speak about the not-so-accessible and visible life of stones? If humanity assimilates the geological, becomes sensitive to the fact that rocks are an integral part of the living world, beyond human cultural appreciation weather as resource or symbol, then could we reduce the aggressive extraction?

This 'Vocabulary' was developed as a response to a description written for a book jacket of an inexistent, empty book, which was a prototype or a prospective, wished-for book. The book jacket was made to appear in an announcement. Titled and shortly described presenting its imagined content in my own words, it was designed by Elaine Ramos[1]. What was made to be presented only in a photograph was later developed in its contents, constructed by multiple voices. It is a title amongst other four (yet to be written) titles presented in the installation *StoneStatements Editions* shown at the 17th International Architecture Exhibition – Venice Biennale. The accomplishment of this present volume makes the editorial house *StoneStatements Editions* less fictional and the title no longer functions as a prototype-title within a photo series: the book is fully accessible online. After this inaugural volume, *StoneStatements Editions* may house some previous tangential projects, like the saga Extraordinary Mineral Stories, begun in 2017 in the frame of the biennial exhibition Sesc_Videobrasil. This way, it will incorporate past and future works associated to publishing about minerals.

1 Elaine Ramos used a photograph of the Cauê Mine in Minas Gerais, Brazil. Usually the mines are controlled spaces, rarely authorised for photographic visits, but this was taken on a research trip during which I studied the presence of women workers in the mines (Women in the Mines of all Kinds).

In a generous effort of expantion, the texts accompany lists of references proposed by the authors as resources and for inspiration, hoping it may catch onto the generative potential. Along with referencing the texts, the compiled lists point to minerals as matter, as invention, as historical artifacts, as life components, as food, as spaces and ecossystems, as residue, related to the body and the social body, poetic, scientific, digital and editorial constituents.

Mabe Bethônico

Displaced, discovered, displayed

Christian Kosmas Mayer

Mats Israelsson, aka Fet-Mats; who died in an accident deep in the Falun copper mine in Sweden in 1677; who was found accidentally in 1719; whose body and clothes had not decayed in all those years; whose body turned hard as stone when he was brought up to the surface; whose former fiancée identified him when nobody else could remember; whose petrified body was put on public display in a glass vitrine for thirty years; whose body was buried under the floor of Stora Kopperberg Church in 1749; whose mortal remains were moved to the cemetery in 1816; whose bones were uprooted again in 1862 and stored in a wooden box in the church attic; who was then forgotten about; whose remains were rediscovered and put back on display in the church in 1900; whose bones were buried in the consecrated grounds of the churchyard in 1930; whose grave can still be visited today...

Summary of a body's fate after the person's death, not decaying, but petrifying instead. Seemingly transformed into a stone, the body becomes an oddity, something to stare at, something put on display. Before that, the body needs identification; possible only due to the remarkable encounter of youth and old age, of a petrified body and a breathing one, of two bodies that were once connected through love. In the petrified body, the old lady recognizes her lost lover, as time has not changed his appearance in all these forty-eight years, while she hardly resembles the young lady that she was when she gave him her last goodbye kiss. Margreta Olsdotter, the lady's name, wanted Mats' body to be buried, but it was too famous for that already. People travelled to see the petrified miner with their own eyes – even Carl von Linné came. The transformation from the organic into the inorganic world had to be studied, scientifically. But the results were disappointingly rational, the mystery was unravelled by explanations of copper salts hardening the body

and temporarily stopping its decay. A century passed until German writers from the Romantic period put the mystery back into place by their different versions of the story about Mats and Margreta. In it, they found everything that a good romantic story needed: a mysterious death deep inside a mine, dark and forgotten years, a corpse that apparently defies the laws of science, and an immortal love. Through their words, Mats finally became immortal as the petrified miner, while his real body was allowed to dissolve.

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Ethic against extractivism

Eric Maeder

Extractivism designates a mode of drawing out and exploiting ‘natural resources’ on a massive scale. In this context, every year more than ninety-two billion tons of minerals, fossil hydrocarbons and biomass, but also living organisms (such as fish, in the case of industrial fishing) are ‘extracted’ and channelled into the processing and consumption chains of globalised markets.

By analogy with ‘productivism’ and ‘consumerism’, with which it is intertwined, the journalist Anna Bednick describes extractivism, as ‘a superlative, obsessive, even ideological stage of extraction activity’. A modern-day ‘gold rush’ launched by governments right and left, as well as multinational corporations and their shareholders, extractivism is the real backbone of globalised production chains that divide territories according to their ‘comparative advantages’.

Tied to a short-term linear logic (‘extract > produce > consume > throw away’) and advocated in the name of ‘the general interest’, ‘progress’ or ‘development’, extractivism is the fruit of an economic thinking that emerged in the 1980s, and which promotes, for some countries of the global South, the extraction/export growth dynamic as the only model of development. In the binary model of centre versus periphery, this dynamic feeds the centres of production and consumption, while sacrificing the peripheries to the worst forms of human-rights violations and environmental injustices to structure globalised capitalism. It exerts unprecedented violence on the most vulnerable populations (indigenous peoples, small farmers, rural or working-class communities, women, miners, migrant workers) and on the living environments. Moreover, since most of the victims of this exploitation come from the global South, which manifestly does not enjoy the same

consideration and protection as consumers and shareholders at the other end of the chain, extractivism takes on the form of what is known as racialised capitalism. Another manifestation of racialised capitalism, to which extractivism is linked, is that these resources, once consumed, return to the peripheries of the global South in the form of electronic waste or CO_2 emissions.

A blind spot in consumption, extractivism makes us – consumers of smartphones or other minerals, rare or otherwise – accomplices. Everyone understands that this predominantly North/South exchange is fundamentally unequal because it indicates that the rare minerals in one's own smartphone are worth more than the lives affected and territories sacrificed to obtain them. However, in this immense web of international exchange, the chains of responsibility are complex and often broken. Who amongst us can claim to understand a 'production chain' in its entirety? What about the 'fragmentation of the value chain'? Who can grasp that an ill-conceived or poorly regulated market produces 'negative externalities'?

So, what can each of us do ethically in this context? Just as there can be no ethics of looting or slavery, there can be no ethics of extractivism. For extractivism is excess and violence by definition. Yet ethics raises the question of limits and justice. But ethics is never at the expense of the most vulnerable. Can we abstain from producing value 'here' while destroying value 'there'? Through the writings of Donna Haraway and Edgar Morin, we have come to understand that there is no being whose way of life does not affect that of other living beings. So, to be responsible, each of us must acknowledge the scale of impact and understand how the global South is disproportionately affected. In consuming we must understand how our imprint collectively affects our planet. This implies asking ourselves how we want to make room for others, the

living and the non-living. And seek to integrate them into a way of being in the world that is more sober and fair.

At the political level, everyone can, for example, support the recent legislative developments on the duty of vigilance binding multinational firms, or commit to ensuring that public policies and international agreements adopt 'strong sustainability' objectives. In contrast to 'weak sustainability', which seeks only green growth (where increased energy efficiency comes at the price of increased energy consumption), 'strong sustainability' sets absolute limits on environmental impacts and considers the interests of those most affected by them.

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Flowering stones

Daniela Zappi

Flowering stones or living stones are amazing succulent plants from South Africa, mostly from the genus *Lithops*, included in the botanical family Aizoaceae. N.B. these are living plants, not to be confused with 'Chrysanthemum stones' or 'flower stones', which are mineral formations made of aluminium silicate resembling multiple petals.

Amazing mimetism takes place in the case of these plants, as they are adapted to disguise themselves as pebbles and merge with stones in their natural habitat. They do this to avoid the unwelcome attention of herbivores that might predate them. It is a real case of now you see me, now you don't, and most species are visible only when they are flowering, when their delicate, colourful flowers appear level with the ground. To the careless observer, the flowers seem to come from nowhere, just sprouting directly from the soil!

These strongly adapted succulents consist of paired, truncated leaves that flower from the centre. After flowering, each leaf wilts, forming a dead skin that makes them look more lifeless than ever. The rain in the deserts where these plants grow is erratic and they may remain dormant for months. When spring rains finally arrive, two brand new leaves appear from inside the dead husk. Where you had two leaves, now you have four. The pebble-looking leaves come in a variety of colours and patterns, from green to brown, grey to pinkish, either spotted or smooth, depending on the species. For this reason, the plants are eagerly collected by enthusiasts. These patterns are part of the plant's disguise, but they are also what makes them precious to the eye of the beholder.

One interesting feature of these truncated leaves is the fact that the succulent plant tissues below the leaf surface are transparent,

forming what we call a window. Sunlight hits this window, and photosynthesis is carried out by the tissues located deep below, thus increasing the surface that uses the light to produce the sugar that feeds the plant.

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* These refer to the text "Nursery", another contribution of Daniela Zappi.

Geophagy

Masha Ru & Alain Chaney

> She went back to eating earth ... little by little she was getting back her ancestral appetite, the taste of primary minerals, the unbridled satisfaction of what was the original food. She would put handfuls of earth in her pockets, and ate them in small bits without being seen, with a confused feeling of pleasure...
>
> Gabriel García Márquez (*One Hundred Years of Solitude*)

Geophagy is the practice of eating earth and soil-like substances, such as clay, chalk and soft rocks. Since ancient times, people have believed in the sacredness of earth. The importance of touching or eating earth is present in many cultures, as in Africa, South America and Asia, where it is still a common cultural, spiritual or healing practice. Regardless of religion and country, the earth is an embodiment of nature as the mother. It symbolises female, life-giving forces, fertility and the continuity of lineage. In some cultures, eating earth is a spiritual practice of reconnection with one's origins, with oneself and with the invigorating power.

In the North Lombok Regency in Indonesia, in the area of a lost legendary kingdom, Lembah Sari of Dusun Bentek, we find the edible volcanic rock Batu Ampan. It is especially loved by pregnant women and it is supposed to help against stomach problems. People also eat it after meals as a snack. The cooking traditions of the Batu Ampan involve its grinding into a fine powder which is transformed into a liquid by addition of water/sauce, and then grilled bananas or tofu chunks are dipped in it to create a tasty crunchy-earth envelope for the food.

Masha Ru founded the Museum of Edible Earth and has been organizing 'Earth Tastings' as a way of sharing the practice of geophagy. These are rituals based on having an earth snack together and sharing thoughts on its meaning, the taste of soils

and other issues linked to geophagy, such as cultural differences conveyed through diverse food systems. Eating earth as a snack is quite a common practice in countries like Ghana, Indonesia or Suriname, where earth can be bought at the markets as a nibble between meals.

The Museum of Edible Earth brings together a collection of edible soils from around the globe. The museum invites the audience to revise their knowledge about food and cultural traditions through creative thinking while addressing the following questions: What stands behind earth-eating traditions? Where does the edible earth come from? What are the possible benefits and dangers of eating earth? How do the material properties in the earth affect its flavour? Its goal is to constitute an extensive collection of soils suggested for oral use from as many countries as possible and so – through their different cultural uses and histories, allied with cross-disciplinary partnerships, workshops and collaborations – redesign and reconsider the earth.

In the Château Rouge neighbourhood in Paris, if you know where to look, you can easily buy a plastic bag of kaolin (white clay). Especially consumed by women from the Western African community, it is eaten on the street or on public transport as chips – even though their consumption remains quite discreet because it does not bear the same meaning in France as in their country of origin. As from the Western perspective eating earth is associated with the mental disorder Pica, organising soil tastings for a public unfamiliar with geophagy is a way to facilitate the discovery of a traditional habit still practiced today and to reflect on our relationship to earth through a transnormative dialogue.

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Hugging rocks

Quentin Lazzareschi

The monolithic face of a very compact quartzite of about forty metres stands out clearly from the rest of the greyish sedimentary mass around it – a super dense limestone slowly chiselled away from the mass, accumulates continuously, piling up and maintaining the scree in a semi-mobile state. It is vaguely identifiable in the static silence of these quasi-assembled stones solidary with gravity in their meta-fall, which compose a delicately hostile general environment.

The all-rock partition clearly locates physical movements that the surface induces – the peak has a beautiful, varied profile of a rather long and clearly demanding track, which is immediately aesthetically distinguishable – the porosities of the wall speak through a projection of precise gestures to be executed, in order to remain on this metamorphic materiality.

To identify more precisely what the rock feels like, fingers move over the abrasive surface, brushing the razor-sharp wall, causing micro-fissures to form from the slightest contact with the dry skin of the hand, half closed in its resting position. The epidermis is already visibly sanded from previous efforts on holds and it brings on a spontaneous vision of a strange organic representation of X kilos of pressure per square centimetre, exerted on phalanges and joints, to lock in place a pebble, like an articulated hydraulic cylinder, supercharged by high blood pressure.

Choreography: As the section gets difficult, it starts with the right foot on a small grip to get to an inverted right-hand ruler, arching like a patient with an arm locked in a ninety-degree position, as the only way to throw the left foot far left against a slight jump. Placing weight equally on both feet should avoid swinging and allow tension until the left hand arrives at a

horizontal arch that holds well but must be tightened because it will shortly take all of the weight. The right foot aligns with the centre of the body. The left foot lands, meticulously precise, on a good grip a little higher, a little further to the left of the hand's axis. There, with the left hand locked in place, the right leg is sent a-flagging, now behind the left, before throwing the right hand to catch an obvious hold, SUPER far to the right. All tissue GRIND to hold while the left leg is in hyper-extension and the whole body tightens from the pain of not letting go, akin in intensity to an aesthetic experience. Then pulling up both feet as gripping in the best way possible, and bringing back the left hand, crossing barely above to a much better hold than that of the right one.

Once released, the capstan knot keeps the weight of the body in tension, while handling the relay with two expansion eyebolts linked by a chain. In the event of one breaking, the other will secure the weight. All dried up from the harness and exertion, as if drunk on pain, all pieces held together by an absurd quantity of endorphins, alert to the slightest physical sign that the meta-scenery screams in all directions. Topped with the tip of a blueberry thumb and roaming the hostilities of the milieu to find something to hold on to, the hand there really looks like a mouth of a dusty pebble.

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* These three books are topoi. We tend to confer little aesthetic value to these narratives, as their primary function is that of transmitting information, providing descriptions, identifying sections, difficulties, routes and other mountain paths for itineraries. In 2020, during the month of August, following the crossing of the Ailefroide Valley, I had only these to read and soon I began to see their poetic potential that emerged from presented facts, interspersed by anecdotes. It seems to me now that the best way of writing about mountains is through a tale of 'doing' within these landscapes, in order to catch glimpses of these experiences. Like for Jean-Michel Cambon, who died in 2020, while equipping a track in Isère. We owe him the existence and safety of about one thousand itineraries in the Alps, which makes him a bit of a legend.

Inselbergs

Luísa Azevedo

Some environments can be perceived as islands, even though they are not surrounded by water. Terrestrial and continental islands are ecologically isolated from their surroundings due to differences in geology, altitude, type of vegetation or land use. In this broader conception of islands, inselbergs emerge...

Inselbergs are isolated rock outcrops that stand out abruptly on the landscape, causing a real sense of mystery. Their existence is due to the resistance and hardness of their constituent material, mostly granite and/or gneiss. These guarantee their permanence in face of weathering and erosion, which are more intense in their surroundings. Millions and millions of years ago, inselbergs that were once buried became gradually exposed, like ancient witnesses of the landscape's transformation.

Naming is a cultural phenomenon of perception and interaction with the landscape. Most of the names attributed to inselbergs indicate some form of imagination-mediated metamorphosis. Usually, the names refer to a geomorphological characteristic of the rock, reinforcing their shapes and grandiosity. To name an inselberg is to let the angles of perspective and memories fuse into the rocks in an intramagmatic and creative way. It is to transform big blocks of rock into giant turtles, for example, moving slowly through space-time under erosion and tectonic processes, or into immensely heavy elephants and whales containing tons of minerals from geological eras of dreams.

Despite the attribution of names that belong to living beings, the gigantism and the inaccessibility of most of the inselbergs, given their steep rock faces, likely act as a preponderant factor in spreading the false idea of sterility. At first glance, these natural monuments look like bald, darkly coloured homogeneous

rocks,[1] devoid of plant cover. Most people do not even imagine their vegetation as made up of matted webs of life. Herbaceous and shrubby plants, and sometimes even forests, grow on their skin. The enormity of these rock masses turns the presence of any plant into a microorganism if seen from sufficient distance. It is necessary to climb, to get up-close, to observe, to touch, to find out.

Inselbergs are home to a diversity of species and life forms, associated with the multiplicity of rock outcrop habitats. Scars, fractures, depressions... Each microhabitat has microclimatic specificities, types and thicknesses of particular substrate, temperature and humidity. The plant cover is well delimited in small and discontinuous islands surrounded by exposed rock. Islands on islands, fragile and strong fractals of ecological and evolutionary events.

The inaccessibility of most inselbergs places them amongst the least directly modified ecosystems on our planet. However, they are widely exploited by mining activities and disfigured by lack of knowledge about, and connection to, their diversity.

On the top of a rock outcrop, you can be awed by the feeling of participating in the magnitude of geological events, the impermanence and inconsistency of matter, lithographically printed into geomorphology. The tip of the inselberg is the small, visible part of the rock. How little we know about stone-being and human-being, both states of geobiodiversity.

1 The dark colour of inselbergs is caused by the development of crusts of cyanobacteria.

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Jurassic Glaciation Mission 2839

Ismaela Zrydaoré

[Excerpts from the *Journal of Exploration*][1]

January 7th, 2839_ temp.-90_E. wind, 3 knots

Of the white glacier's exterior aspect

… The glacier's solid and massive appearance gives rise to the idea of a certain stability. Nothing, however, is more mobile and mutable than this hostile immensity, where we discover no other trace of life, except our own presence. Round and cracked like the back of an elephant, the occasionally transparent surface is crisscrossed by streams of water that disappear in swirling funnels.

Behind us, crevices form and open up, or close with sudden and disturbing cracking sounds. Everything here bears the imprint of movement of time under the pretence stillness of the dead. …

What evil spirit is toying with our perceptions? Are we in the white hell described in the old English manuscript, preserved in Timbuktu? Let's move on! We must get rid of this sinister thought and walk straight North. Let's move on! We have only been treading the lost continent for two days. But in this stifling climate, it is difficult to forget the words of the elders. Maybe we shouldn't have crossed the Frozen Sea and risked provoking the Gods. No one has been here since the Great White Exodus five hundred years ago. It is true, then: the West is no more than a shroud woven of icy crystals. …

1 Excerpts translated from a scientific manuscript of 636 pages in Bambara, published for the first time. (Translation to French: Mikola Keitadibé.)

February 21st, 2839_ temp. -120_n-E wind, 2 knots

Of colours of crystals and the luminous flux

The night was long. Too many inert and obscure thoughts away from loved ones whom I miss. The sun, at least, warms my loneliness. ... Together with my expedition companions, we approach a majestic pink mountain, holed by a white door. We had never seen this before. We took out our devices and measured it. I record Pink-Mount on the map. Hilairamadou whistles and proceeds fixing his structural survey inside a lumen box. ...

This morning, the atmosphere is iridescent with pink crystal. Is it the light or the matter that sparkles before our eyes? Without claiming to solve this question in any definite way, I believe the effect may be attributed to the slant of the crystals reflecting the luminous flux. I ask Nikssoko to collect some samples. ... But who would believe us? In the evening, at the camp, the hard white crystals begin melting in the heat. They become unrecognizable. This observation is fundamental, as it gives rise to so many questions that I am unable to fall asleep. Where has the white colour of the crystals gone? Will I dare drinking this colourless liquid? Or is it a deadly poison?

April 12th, 2839_ temp.150_wind

Of vision and knowledge of the world ...

A bluish fog has obscured our gaze for five days. We would be lost without GPT. The mind sets the pace of the walk, step by step, reverie after speculation. The mind weaves its silent maze that reveals the

tension of any traveller torn between the curiosity of seeing and the worry of entering the unknown. This ridiculous thought occurs to me: only he who wanders finds his way. But where are we heading? ... Here, away from it all, I finally understand why knowledge is opaque in our noisy civilisation, blinded by so many opaque screens and by so many false answers.

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Kryptonised Unobtainium

Alan Bogana

In the Middle Ages, the Philosopher's Stone represented and embedded a multitude of dreams and miraculous properties which, over time, science has progressively turned into reality, such as the remarkable extension of life expectancy or the transmutation of small quantities of lead atoms into gold in physics labs.

Each era has its own imaginary techno-magical materials and minerals. In the 21st century, Computronium[1] could, in my opinion, be one of the best successors to the Philosopher's Stone. Computronium consists of programmable matter that could take any form you want in your computer and, utopically, in the physical world. This speculative material, which would be invaluable, blurs the boundaries between virtual and real, and implies that reality is computational and deterministic (quantum computing might bring new ideas on this aspect and shed fresh light on its utopian stance).

In the field of engineering and in popular culture, Unobtainium designates any imaginary material that is extremely difficult or impossible to obtain. Computronium seems to be entirely made of Unobtainium, but one never knows.

Most imaginary and fictional materials have always been described as having unique properties and, more specifically, as serving unique functions and needs. Have you ever imagined a nonexistent mineral or material for the sole purpose of contemplating it? I think that our imagination is colonised

1 Computronium was described in 1991 in the article 'Speculating in Precious Computronium' by scientist Ivan Amato. Roxane Bovet brought it to my attention in the text 'Boganium, handwavium et les autres', written for my homonymous exhibition at the Musée de minéralogie des mines in Paris in 2018.

by a functionalist and capitalist framework, as even fictional and imaginary minerals must have a purpose, a function, even a fictional one, and consequently a financial potential.

I myself struggle with the idea of a purposeless imaginary material, but I feel I might need one. In 2018 I discovered Boganium – well, I invented it – but I still don't know much about it. I'm not sure what its properties are, or what it looks like. I'm still studying this mysterious mineral, speculating that one day it might be worth something.

Kryptonite was the first fictional mineral I learned about when I was a kid. The only thing I knew about it was that its unique properties weakened Superman's powers, but I had no idea what it looked like. The kryptonisation of Unobtainium is relatively simple, but the technical description of this process is beyond the scope of this text. Kryptonised Unobtainium has impressive powers: as soon as you hold it in your hand, you will feel the need to let go, to slow down, to look at things for what they are, and not for their potential purpose. This compound stimulates contemplation and brings you into a state of mindfulness, like living in the present continuous. Your thoughts are calm, your imagination lucid. You do not second-guess yourself. Paradoxically, you will lose the urge to possess this material straightaway.

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Lithic corporeality

Monika Bakke

Lithic corporeality as evidence of the on-going 'geologic infiltration' of life is also a crystalised reminder that 'bodies are inhabited as much by the phenomena of "nonorganic life" as by the more familiar phenomena of organic life.'[1] Minerals not only *become living* bodies but also *become with living* bodies through precipitation, accumulation and deposition. Minerals abound in living bodies: 'silicates in algae and diatoms, carbonates in invertebrates, and calcium phosphates and carbonates in the hard tissues of vertebrates'.[2] These entanglements of the lithic and the living are primarily manifested through different and often extraordinarily complex functions performed by myriad lithic bodies becoming living bodies. This kind of lithic corporeality assumes intricate forms and extravagant architectures comprised of endoskeletons and exoskeletons, spicules, teeth, mandibular blades, tablets, needles, coccoliths, shells, eggshells, microscopic ear crystals, etc. Yet, there is also a dark kind of bodily lithiasis – a harmful rather than helpful type – resulting in the formation of kidney, bladder and gall stones, which can form in urinary and gastrointestinal tracts and belong to human and nonhuman pathologies. This abject type of lithic corporeality is not celebrated but feared and described in terms of waste and pathophysiology.

The biogeological forces behind lithic corporeality display dual temporalities: one is the formation time, which operates on a time scale equal to the life span of a specific biological entity; the second is the entire duration of a lithic body, which succumbs to the slowness of deep time. ' It is the living material that

1 Manuel DeLanda, 'Nonorganic Life', in *Incorporations*, ed. Sanford Kwinter and Jonathan Crary, First Soft Cover Edition (New York, NY: Zone Books, 1992), 133.

2 'Biomineralization – Latest Research and News | Nature', accessed February 11, 2021, https://www.nature.com/subjects/biomineralization.

most easily petrifies, that most readily crosses the threshold back into the world of rocks. For that reason, much of the geological record is written with fossil bone.'[3] Yet these lithic entities are not all immobilised and buried awaiting paleontologists to uncover them; some actively influence the ongoing planetary life-mineral entanglements. Atmospheric dust blowing from the central African region, which fertilises the Amazon forest, is actually shell dust, containing microscopic skeletons of diatoms, which once inhabited a gigantic lake in the Bodélé depression of the Sahara Desert.[4] These lithic bodies of the deep past *become* and *become with* the present-day living world.

3 Manuel DeLanda, *A Thousand Years of Nonlinear History* (Zone Books, 1997), 26.

4 Richard Lovett, 'African Dust Keeps Amazon Blooming', *Nature*, August 9, 2010, news.2010.396, https://doi.org/10.1038/news.2010.396.

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Mining machinery as hybrids in between worlds

Anika Schwarzlose

Slow movements in the darkness of a tunnel. Dust rises in hazy clouds and blurs sharp metallic features. Instinctive awe, this particular mixture of dread and wonder slowly gives way to analytic thoughts: Mining machines have been built to get hold of mineral resources, as harvesting equipment, essentially. Their shape and design are informed by this purpose. But the same principles that make them efficient for smashing, drilling and digging, also lend them a mysterious creatural aesthetic. Teeth sharp as fangs, wheels and arms like claws, rotating gears moving like a prehistoric insect: altogether their appearance has an otherworldly character.

Those machines are at work in Bereznicki, a mining area in the Russian Ural region. Looking at mountain ranges and rock formations in the Urals, one can see them strangely rhyme with the shapes of digging-machine parts. As if the engineers who designed the machines had absorbed those landscapes into their aesthetic vocabulary, just as they had absorbed the laws of physics and mathematical formulas.

In the lobby of a Moscow hotel, a young Russian 3-D animator sits in front of me for an interview for my film *UNEARTH*.[1] He has crafted digital models of mining equipment for the marketing of heavy-industry product lines. I am curious about his stance on technology and ask him about the machines. To my surprise, he describes them as 'domesticated monsters', as 'dragons that serve people'. He continues to claim that 'Just like domesticated animals, machines also want to go back to the place they came from' and that 'Machines might turn against their humans'. His description of a human/machine relationship

1 Anika Schwarzlose & Brian McKenna, *Unearth – In Between States of Matter* (2020).

based on adaptation, training, subservience and potential uprising is a lot for me to take in. However, it is indisputable that human-made technology has always created (often unforeseen) conditions as by-products of its invention and existence. Just as the invention of the ship is simultaneously also the invention of the shipwreck.[2] Systems that grow in reciprocity with technological creations are surely not always congruent with the goal that motivated their invention. 'The tools we take up always modify the goals we have in mind.'[3] Latour also refers to machines as 'monsters' and 'hybrid objects' that 'violate modernity's categories and guarantees'.

In the case of the mining machines, we look at excavators and harvesters as agents that forcefully traverse the realms of humans and minerals. They connect the world above with the world underground. The mythological journey to the underworld is part of their life cycle, which often ends with them being left in the cavernous dark depths.[4] When a resource deposit is exhausted and the mine closes, the costs of bringing even sophisticated machinery up and trying to decommission or reuse it elsewhere are so prohibitively high that machines often end up being sealed underground.

One can speculate about their future existence as technofossils. Will they be discovered and interpreted as tools, or as weapons? As

2 Paul Virilio, *The Original Accident* (2007).

3 Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (2005).

4 In the work of Bernard Stiegler for the book *Machine*, the word 'technics' takes on a particular meaning. He uses 'technics' to refer to what he calls 'Organized Inorganic Matter'. That is something which mining machines distinctly have in common with the minerals they excavate. Unlike humans, minerals and machines are not classified as biological life. But what are the specific delineations of life and nonlife? What precisely distinguishes the animate from the inanimate? Long-standing definitions use such characteristics as: metabolism, growth, reproduction, and response to stimuli or adaptation to the environment. Observed over nonhuman geological timeframes, minerals have all of those characteristics. If we think of developments in AI, machines are also on their way to fitting those categories.

evidence of a human 'war on the world'? Or will the corroding machine parts fuse with elements that surround them and cause new mineral species to emerge?[5]

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5 *Smithsonian Magazine* describes our time as an era of rapid evolution influenced by human activities, when changes in the near-surface environment create new chemical niches in which new minerals can form. There are minerals that only occur in mine dumps or acid mine drainages, or on the timbers of mine supports. In the region I visited for *UNEARTH*, new mineral occurrences have been registered – fragile red salts settle in the cracks of slag heaps and crystalline substances form out of gases rising up from below. How might this human mineral co-evolution unfold?

Nursery

Daniela Zappi

Nursery is the name given to the microenvironment where seedlings are nurtured so that they are able to grow on seemingly inhospitable rock.

Looking into the crevices of exposed bedrock, you may observe an ecological succession involving the establishment of microorganisms, such as cyanobacteria, followed by lichens and mosses, forming a soft, nutritious nursery for the growth of newly arriving seeds. Little cactus, bromeliad and orchid seedlings are fostered by this microhabitat, where there is just enough humidity and fertility for their development.

However, it is all a matter of environmental balance, as its disturbance may favour the introduction of invasive grasses to the rock face, and these become rampant, taking over and stopping the development of the unique plants that are only found in these habitats.

The uniqueness of the combination between certain plant species and the rocks they grow upon is known as endemism, hence the removal of the rock endangers the livelihood of the plant. Examples from Brazil are the iconic cactus *Arrojadoa marylanae*, which only grows on an outcrop of white, milky quartz that is being quarried in the Serra Escura, near the small mountain town of Sussuarana, Bahia. In Minas Gerais, another cactus, *Coleocephalocereus purpureus*, only blossoms on top of pink granite that is a popular cladding for luxury skyscrapers in São Paulo and elsewhere. The removal of their bedrock is the end of the line for these plants.

On ornaments of occupation [1]

ὑφή

1 Endolithic relations | ἔνδον, endon ‘within’; λίθος, lithos ‘stone’.

fig. i

Locality. – 85° 0′ 0″ S175° 0′ 0″ W Antarctica / somewhere in low earth-orbit

Species. – *Buellia frigida*, *Rhizocarpon geographicum* and *Xanthoria elegans* on sand and dolerite rocks (subvolcanic basalt) and granites in the Antarctic Dry Valleys

Notes. – Blind, but with great insight, the soft fungal filaments of the lichen penetrate the granite of the highest arctic mountain, gently drilling a glacial refugium whilst leaving only their fruiting bodies embroidered on the rock. A colourful intricate dance of algae or bacteria and mycobiont-fused individuums with the stone.

Buellia frigida communities spent 480 days outside the Russian Zvezda module, on the International Space Station, placed under ultraviolet Mars-simulating optical

filters. An attempt to hitch a ride, to colonise virgin territories – as so often with humans, a tale of unbalanced associations.

Lichen trailblazers defying radiation and flourishing fearlessly across the ruined landscapes of our civilisation and extraterrestrial environments. Extremophiles, occupying the most inhospitable and unlikely habitats, often to become habitats themselves. Migrants in resistance, whose spores are carried by the wind or other creatures to new latitudes.

fig. ii

Locality. – 13° 24′ 47″ N 103° 52′ 04″ E Ângkôr Vôtt

Species. – *Cladonia homchantarae*, *Cladonia recticaidis* and *Cladonia rudis*, once-blackened arenite with quartz inclusions takes on a biscuit tone

Notes. – The deities' bodies begin to flake. At night, the clay particles

of the sandstone absorb the moisture of the surrounding jungle and the washed-up excrement of the temple bats compacts them with salty crystals. Water evaporates through the dense heat of the noon; the salt crystals crack the stone and the statues are left to crumble.

Beneath the relief depicting the Churning of the Ocean of Milk, our symbiotic agents fold around the surface-layer grains of the sculptures, gently caressing the falling skin of sand, licking the deep bullet wounds of the genocide by the Khmer Rouge. They are holding the temple in a ravelled knot, enwrapping the mineral granules with a biogenetic matrix, an intimate relationship of destruction and protection, yet another symbiosis.

fig. iii

Locality. – Between 34.958°N 134.069°E 34.958°N 134.069°E and unknown / an abandoned mine site

Species. – *Stereocaulon exutum Nylander* and *Acarospora*

rhyolite, andesite, sandstone and mudstone, containing pyrite and chalcopyrite with quartz and calcite veins

Notes. – Like dirty snow, it sits on the contaminated slag, etching patterns into the surface with lichen acid, dissolving, breaking down into components, assimilating, digesting. Binding themselves to the substrate, they absorb heavy metals and arsenic which settles like crystals in the cells and on the outside of their hyphae. Who occupies whom?

Meanwhile they store particles, creating an echo of time, like sound recordings on audio tapes produced with the iron oxide mined here, coloured by the minerals they ingest – verdigris from copper, rust red from iron.

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Pedagogy of stones

Marcos Reigota

Emanating from Angicos, in Rio Grande do Norte [in the Northeast of Brazil], the pedagogy of Paulo Freire encounters, on backcountry paths, the poetry of João Cabral de Melo Neto, present in the homonymous poem and book *Education by the Stone*, published in 1966. Pedagogy and poetry intertwine in the wind and, in the shade of the angico trees (*Anadenanthera colubrina*), they are read by the wandering travellers who arrive from Guadix, in the sweat-damp hands of anonymous Diadorins, Severinos and Riobaldos. This reading brings to light:

– That the ocean tides learn from the buriti groves (*Mauritia flexuosa*), the carnauba palms (*Copernicia prurifera*), the sugarcane fields (*Saccharum officinarum*) and vice versa;

– The shattering noise made by rocks thrown, precisely, upon cave paintings and drought-tolerant plants;

– The crevices and crossings that lead from the womb to the inselbergs, and the tangled rocks that narrate the nothings and the emptiness of Homo sapiens, as if they were gardens of Kyoto or Seville;

– That commas, parentheses, semicolons and ellipses are a precious aid in confronting the mobilised vultures, which wander about their subaltern roles (as unrepentant agents of oppression).

In practising pedagogy with poetry, one exercises breathing after the full stop. From inside out. From outside in:

– With dust and grit in the hair of bare faces under the sun, one inquires: 'Who knows what these surrounding rocks are

keeping warm and might soon transform from within their hard surfaces, like newborn birds?'[1] A Laughing falcon (*Herpetotheres cachinnnans*), a Chopi blackbird (*Gnorimopsar chopi*), a Manuelzinho-da-Crôa collared plover (*Claradrius collaris*)?

Like stones, which have rolled on the roads, dusty people know the bleeding caused by an indigestible grain, when this breaks the teeth of the unfortunate. Like rivers that are becoming puddles while trying to escape death, they are incapable of not expressing themselves as stones, without wasting precision. This is why they speak little and slowly (on existing in the world) with words from the depths: stones will curb silence. In pedagogy (as the practice of freedom), roosters weave the dawn and, here and there, amid the rustling roots, cries are heard, along with crowing, old songs, and the voices of stone-coloured trees. The landscape of sounds and silence and stones destabilises the dinners of the officers and transmutes into narratives of resistance embedded in skin: Until all turns to dust...

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Quasicrystals

Brian D. McKenna

Quasiperiodic crystals are a curious animal. We've had to unpack our definition of crystals to make room for these recent discoveries. Our knowledge of their existence comes, as is typical, through a lattice of serendipity. Their accidental synthesis and observation in a laboratory in the 1980s was recognised with the help of theoretical foundations – solidifying from a flow of algorithmic puzzles and recreational mathematics. The pentagonal tiling strategies arising from a paper called *The Role of Aesthetics in Pure and Applied Mathematical Research* were later projected into multidimensional space; and simulated diffraction patterns of heretofore impossible states of matter arrived just prior to their discovery.

Icosahedrite, the first naturally occurring quasicrystal to be observed, came from a rock labelled 'khatyrkite'. Found in the vast mineral collections at the University of Florence – Museum of Natural History, its provenance could be traced back to a gem dealer in Amsterdam. With the help of the dealer's widow and some secret diaries, the Institute of Platinum in St. Petersburg was identified as a stepping-stone for the two known samples of khatyrkite – the other housed at a St. Petersburg museum. A search through Russian mineralogy journals led to contact with the finder of the rocks, who could then pinpoint their source on a map.

The resulting 2011 quest to the Koryak Mountains of Chukotka was followed by investigating if icosahedrite was a stable and naturally occurring mineral, or a more recently evolved phenomenon – for instance, the result of molten-cored slag heaps where hundreds of new minerals have been found, or other by-products of human endeavours. Several lines of inquiry concluded that the khatyrkite samples were extraterrestrial in origin. The small meteorite fragments found on the 2011

Chukotka trip containing icosahedrite and a host of other newly discovered compounds are dated at 4.5 billion years old.

Until the mid-1980s, the fivefold symmetries of biological life were thought to be strictly forbidden as fundamental to the shape of any self-organising states of inorganic matter. Quasicrystalline structures are nowadays being applied to the study of viruses. And what's more, a possible role in the nature of consciousness: the pentameric shape of neuron neurotransmitter receptors form biological quasicrystals. Quantum effects are theorised to be underwriting quasicrystal formation, plant growth, brain function.

Quasicrystals exhibit interesting fractalization properties in that their shapes repeat as one spatially zooms in or out in scale. Their mathematical expression is cumbersome in 3-dimensional space, but as 6-dimensional or higher-dimensional objects (as in the case of icosahedral symmetries), the math starts to behave more like traditional crystals, where everything just fits. Apparent higher-dimensional resonances, a kind of 'parent crystal', are thought to project down to our familiar Euclidean 3-D space.

The potential moral implications of these discoveries is anyone's guess. In some sense, the physical gaps between observable quasicrystalline units come to represent gaps in knowledge; scientific and spiritual enticements rush in to fill the vacuum; aesthetic considerations permeate.

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https://physics.aps.org/articles/v12/31#c4

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Rocks (Lost)

A Published Event
[Justy Phillips & Margaret Woodward]

An accumulative event of mineralogical, metaphysical and metallurgical telling, *Lost Rocks (2017–21)* is a unique library of forty-two books composed by forty-three contemporary artists from around the world. Created by Australian duo A Published Event, *Lost Rocks (2017–21)* is part artwork, part curatorial platform and part experiment in publishing as art practice. Released twice yearly over a period of five years, *Lost Rocks (2017–21)* is a slow-publishing artwork that gathers in increments of absence – sediments and upwellings of unstable ground. Love. Grief. Relation.

At the conceptual heart of this ambitious project sits a discarded geological specimen display board, found by A Published Event at a junk shop in the northern suburbs of nipaluna/Hobart, Tasmania, land of the muwinina people. Forty of its fifty-six rocks were missing (the forty-first came loose in transit three years later). At once, the rock board is both a decomposing geological taxonomy and a proposition for new mineralogical recomposings of body, duration and event.

Lost Rocks (2017–21) replaces the missing rocks, not with geological specimens, but 'fictiōnellas', a term drawn from the 19th-century 'fictioneer'. Commonly defined as a 'writer or inventor of fiction', the idea is reinvented here through 'fictiōneering' – a process of making-with the events of lived experience. A bringing into language of the living experience of the event.

Returning to its Latin root of 'fictiō', meaning to make-with rather than to make up, this process of fictiōneering, or making-with, is itself a process of 'speculative eventing'. Through the fictiōnella, A Published Event takes the printed novella back to its roots as a process of storytelling based in lived experience – a

form borne through necessity to transmit the events of everyday life, which is a process very much activated in the oral tradition. Critically, the fictiōnella is a gesture of experiential and imperceptible telling.[1]

The artists participating in this geological event in-the-making are drawn from a wide range of relational practices – dance artists, filmmakers, landscape architects, sculptors, painters, writers, prospectors and poets. A conglomerate of sorts, each activated by a common desire to meddle with the matter, language and geology of absence. *Fossil*, for example, becomes an investigation of radically altered brain tissue, a script, a breeding ground for stromatolites and the insurmountable grief of a daughter and her mother separated by the Atlantic Ocean. Beyond the sedimentary, igneous, mineral and metamorphic, seams also run through the cruise-ship industry. Industrial salmon farming (affects) the body as climber, dancer, chronic illness – as the diamond-hard darkness of the Eastern Seaboard. Frail shards of acid red Crocoite from a solitary mine on the west coast of lutruwita/Tasmania pave the way for silver, rhyolite, copper, petrified wood and the as yet unidentified 'crystal bone'.

Since 2016, this unique library's missing rocks and the artists they each found along the way have expanded and intruded in ways this collaboration might never have imagined – were the lure of absence less familiar, less curious and less open to invention. With each publishing, the library is distributed through live events, site-specific performances, readings, online gatherings, art book fairs,

1 When speaking to Justy and Margaret about the sense of *imperceptible telling*, they answered that part of what they are doing with their work is 'drawing practice into new language – and language that does not need to be fully understood or descriptive. The idea of an "imperceptible" telling is something like this idea of an experience in the making-already made felt. It is something felt for the first time but also not quite felt. It is another way of speaking to our investigations of absence what is known and also, at the same time, unknowable'.—Ed.

residencies, fieldwork, limited editions – and most important of all – collaboration. Our project is presented in detail and some Lost Rocks are available for download at www.lostrocks.net.

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Solid but empty

Mônica Meyer

The natural state of a mountain is that of a solid, compact body. When dynamite comes on the scene, what was solid and compact shatters and bursts apart. A whole ecosystem is blown sky high. The diggers and other heavy machinery then violently, clangorously obliterate and devour the rock. The noise is deafening! They extract minerals to depletion, breaking the rock into chunks, into shards, until they hit the motherlode of some billion-year-old asset.

All that remains of the mining operation is a hole, or rather a monstrous crater, a gigantic sore on the face of a brutalised terrain. A frightening, gaping wound. The geological memory of planet Earth – previously heritage, landmark, landscape, home – is splintered and pulverised in mere minutes, hours, months, years. The cries of the plants and animals that once lived there echo far and wide.

Extraction mines expose the porosities of the earth's body, cleaving through to the groundwater, to the entrails that filter and store that precious liquid. The crater then begins to fill from this torn well, a trickle at first, but soon a gushing sob from the depths of the earth.

Yanomami cosmology warns that the White Man will destroy the pillars of the earth with all his digging, and this will cause the planet to list and the sky to fall down.

The body of rock contains other treasures. In tiny openings, mouths, the most intimate folds we find a thriving biodiversity. An interior sculpted by water over thousands of years, hewing great halls, carving speleothems in so many shapes and colours, echo-chambers for the wind, the animals, and humankind. The porous rock bears the marks of living beings and rupestrian

paintings. In the darkness of the cave, discoveries shed light on history. The hollow is the non-place that safeguards, protects and harbours the ancestral legacy of beings and the geological history of the planet Earth. The atrium in the mountain shelters the silence needed for the exercise of listening.

The destructive action of the mining companies shatters the symphony of silence. The roar of the machines goes beyond the limit of mineral extraction, as they rip out more and more. Millions of tons of metals transported by train, exported on ships. Mountains of money, of exorbitant profits. Ailing, mutilated workers. Ruined and polluted cities.

And on this disfigured landscape, the gouge denounces the extraction of precious metals and stones considered 'beautiful', 'treasured' – the hallmarks and references of cultural roots. And from those mines comes a yearning, an immeasurable sadness. The crater occupies the place of a used-up mountain, rendered barren beneath the open sky. A hole full of dust, of terraced destruction. And beside it sits a mountain of tailings; a dam-pit full of sludge.

In the silence of the night, I gaze at the craters on the moon, visible and distant, and as I admire that satellite, I discern the same scars seen worn by so many mountains in mines of every sort. In the darkness of that emptiness, I mine for hope, in a cry that can still echo loud and clear in the replies of so many voices.

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The transport issue

Christophe Rey

Some stones found along the paths did not get there by rolling down the hills on their own. They were once displaced, transported and put there. This is what we can judge by looking at them. We could even be quite certain of the correctness of our judgment, if we were asked… but no one ever did. Successively, a second question surfaces: how does the fact that I am able to recognise a stone that has been displaced, transported by human hand, matter to me? The displaced stones fall into two categories. One category holds the fallen stones, those naturally set in movement by erosion, the retreat of a glacier or during storms. The other is further subdivided into two subgroups: stones that can be carried by hand – by our own strength or the strength of a peer; and stones that require numerous helpers, like machines with hoisting winches, mechanized transport vehicles, etc. In short, colossal energies.

…

It is possible that the primordial movement of an artefact that today we call art was a displacement of a stone, but, above all, its transporting – long before stone carvings, incisions, engravings and cave paintings. Or, say, a primordial question arose for a Homo sapiens who, when faced with a displaced stone, was left wondering whether the stone had been placed there by a friendly hand or that of a foe. We could even imagine that the question of reading this obvious sign was Humanity's first attempt at questioning. Meaning and questioning both arose from the same moment in time and they were viscerally linked. A displaced, transported stone, however, will have taken a long time to elicit a question, because questioning is a slowly acquired mental process. It is possible that one day, finally, this stone that has been intentionally placed did not signify any apparent threat. Already in those days, stones

had been questioned since a long time, but threats or promises of friendship meant by their positionings were displaced onto a more complex meaning. And then the questions multiplied, creating the very reason why, in art, the fact of asking questions about a work's meaning links back to the original depths, invoking retrospectively – and as a paradoxical counterpoint – an improbable and dizzying moment: the time when there were no questions yet.

In contrast, an opening into the future occurred when a *Homo sapiens* purposely placed a stone in recognition of intentionality: we place a stone and, at the same time, we raise a question. It took many gestures of this kind for art to gradually find its way in the first stone engravings. Since then, the objects shaped using manipulated tools have multiplied to such an extent that this very important question of displacement, of transportation of a stone and its positioning, has been deflected away from us, beyond the knowable and the memory of memory. (This, of course, with the exception of garden design that cultivates, as such, significant displacements.)

With piled-up, accumulated stones, we gradually became like birds. When birds land on them, they know nothing of the low walls and stone houses ever being there. They simply land and, like us, they always see many stones transported and arranged into constructions.

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Under the pavement

Wellington Cançado

Next time you're walking through the city, take a look down. There's a forest growing beneath your feet. Literally. But the forest, both the one hidden under the pavement and the one still just about hanging on out there, should not be taken in the naturalistic sense, which insists on dehumanising 'nature' (between quotes) and naturalising the city (without questions). This living soil, gravid with foresticity, has long since ceased to be an environment and became, instead, a constellation of worlds intent on inventing a cosmic policy, rather than any new natural contract. It should not surprise anyone at this stage that the forest – in the Amazon, the Congo, the Arctic, in Australia, on all the continents – is more than a natural biome, having long since become a multispecies artefact coproduced by its human and nonhuman tenants. It is also a metaphysics; a way of nourishing spatialities and an umbilical regime of visibilities ontologically related to the modes of existence of its autochthonous peoples.

It is in the forests, these spaces paradoxically outside a boundless and sprawling condition – the urban – and today restricted to 20 percent of the ice-free terrestrial surface, that the intestinal bases of planetary urbanisation are being redefined in cosmopolitical terms. Two billion people currently live in the world's forests. That's twice the number crammed into the globe's 'semi-slums, slums and super-slums', and a number that hardly pales against the 3.5 billion residing in all the cities encrusted upon former forests and living each day under the paved illusion of a soil-less life, in which the e(E)arth doesn't exist.

Soil is the most important biotype on the planet, and the most endangered. The use of pesticides and fertilisers, heavy metals and other chemicals, not to mention mining, deforestation,

extensive urbanisation, and various other processes besides, have together driven our soils to the present and extremely worrying state in which they are. And this critical condition of the planet's soil, as a layer of life's infrastructure, can be understood as a necessary revelation of the catastrophic messages popping up all over. It took tens of thousands of years to form those 15 cm of living surface soil, in which a whole underground ecology fixes the nutrients that make that layer hospitable to the plant life that replenishes it in turn. Soils leached by the rains and baked by the sun – as typically occurs after monoculture, mining and other devastating anthropic actions – become nutrient-poor and gradually harden, erode and die. If we speak of the Anthropocene, it is largely because we manipulate the land on such a vast scale, extract materials from the subsoil and invent another geology by adding new human and urban layers to the earth.

Thirty trillion tons. That's the combined weight of the whole paraphernalia humanity has produced thus far, and it's five times greater than the total biomass of all living humans, itself already estimated at twice that of all other terrestrial vertebrates put together. In other words, from a geological perspective, our cities are now the most striking feature of this planet we inhabit. Though cities are not normally considered part of geology – by either geologists or urbanists – if we consider them as rocks and minerals 'effectively organised into particular patterns by natural organisms', then the 'urban stratum' of the earth is, indeed, one of its most notable geologies. In the words of the geologist Jan Zalasiewicz, a few thousand years from now 'the cities of today will form gigantic and spectacular technofossils visible from the coastal cliffs of some new ocean'.

But if cities are the most concrete marks left by the process of geological reconstitution brought to bear by the human project upon

the configuration of this urban stratum, extensively paved on a planetary scale, recombining limestone, gravel, sand, clay and mud in a dynamic system of material flows (both live and sterile) and energy cycles, we cannot allow ourselves to be blinded by its dazzling gleam. Nor will we fall for the cityism that is colonising our tomorrow, because anti-anthropogenic sentiment and the contra-colonial and multi-specific possibilities of other futures, at this very moment and all over the world, are germinating under that cement, cracking the asphalt, resisting urbanisation, and they will surge anew beyond the city's ruins.

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Valuing stones

Anne-Sarah Huet

Although working with the most sophisticated game theory and a touch of cryptography, there is no article in contemporary academic literature that has struck me as much as Marx's *Capital*. Let me describe the effect: it has rainbow undertones, and it starts with anger. The anger of being forced by an author to decipher his obfuscated text…. When the obfuscated text is modelling, it forces the reader into a finite exegetic activity, meaning that it is predicated on a promise of a resolution, of a complete ordering of the author's content. In Marx, the obfuscation shows all the signs of a voluntary disqualification. Not a dishonest obfuscation, nor a translation problem, but a monetary obfuscation (and here is my point). So here is a transparent but iridescent puzzle: I have to make sure that this piece of sentence here (p. 86) relates to that concept over there (p. 1971), that these two terms are used by the author as equivalents, to isolate the surplus parts. Sometimes, I fall back on the collective exegesis (*How to understand* Das Kapital: *12 steps*, on wikiHow), its lexicon and its mechanism, consensually stabilised, until the moment when I can see how all the terms of all the volumes work together. I, then, live my best life with my new favourite book: I can apply the model to any object around me and, most importantly, I can apply it to Marx's *Capital* itself.

Children of the 1990s play with collectable media, some of which happen to be prismatic. Shapes are printed on an iridescent silverish sticker at the bottom of the token. They rotate them under strong light to catch the prism (a diamond-dealer gesture), while they cry out: 'rainbow juice!' Prismatic tokens are the most valuable, because they are rarer than the mat ones, but not only that. We also find these iridescent stickers on the first private currencies that preceded the bitcoin, the 'American Liberty Dollars'. They simulate security holograms and are reminiscent of the pearly inks used on government notes. The

holographic properties and the iridescence of the medium are a sign of both the anti-counterfeiting technology and the so-called intrinsic value, formerly ensured by the amount of minerals present in the medium.

Why is it that the rare minerals found in large holes are so precious to us? It is not the scarcity of the substance that is at the root of its value, but the efforts made to extract it and, indirectly, the loss of life associated with it. Cryptocurrencies have 'synthetically' reconstructed the idea of effort as a foundation for value (here, I refer to the notion of cryptographic 'proof of work'). There are also synthetic diamonds, made from human ashes and called 'commemorative diamonds', which will one day allow capital owners to invest in new safe havens. I wonder: now that it is enriched by my efforts to understand Marx's *Capital*, how much will the diamond made from my leg be worth and who will see 'rainbow juice' in it?

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Where and how meteorites are found

Edwin Gnos

When Beda Hofmann, curator of mineralogy and meteorites from the Natural History Museum of Berne, Switzerland, realised that meteorites had been found in Oman, on the Arabian Peninsula, he contacted me and Prof. Tjerk Peters, a prominent figure in the Swiss Earth sciences (1936–2009) to discuss the possibility of organising an expedition to search for meteorites. Having worked in Oman on different geological projects since 1991, we knew that permits were necessary. These could be organised during a geological congress that took place in Oman a few months later. We also asked an Omani student, who was incredibly good at finding rocks in the field, to join us. Unconvinced that any find would be possible, when we drove out to the flat plains of inland Oman and found three meteorites on the first afternoon, his opinion changed. In the following days, we found meteorites in different areas and this encouraged us to submit a research proposal that was approved for funding.

The Omani-Swiss meteorite project started in 2001, involving several master's-degree and PhD students. Research included classifying meteorite finds and studying in detail their alterations under different desert environments. Later, we concentrated on dating meteorite falls and correlating fall age with weathering grade. Eventually, this resulted in an improved way of dating meteorite falls with the carbon-14 method. Among hundreds of meteorite finds, there are rare Martian, Lunar or exotic types that demand a lot of study. This was always exciting, but what impressed me most was that it was possible to attribute meteorites found tens of kilometres apart to the same fall event. In some cases, we found thousands of stones on the ground belonging to the same fall, and in one case they were spread over a distance of more than fifty kilometres! Being able to document location, weight and shape of each stone in

such a strewn field (impossible in vegetated areas like Switzerland) enabled us to model a fall event (trajectory, speed evolution, mass upon atmospheric entry, as well as major atmospheric disruption events).

Over the years, we tried many technical methods (strong magnets, binoculars, metal detectors, drones, infrared cameras), but none of these matched the human eye for finding meteorites. However, knowing the geological formations on which meteorites accumulate was an advantage. We generally searched on foot or from a slow-moving car. We didn't dare search far away from a road in the beginning, but we now take ten days' worth of food, water and fuel, plus sleeping bags and field beds, and head off to search in remote areas. Security is an issue; one has to use several cars, and in the sand dunes of the Rub' al Khali it is important to follow predefined GPS tracks and to stay together. Each person must have a portable GPS for foot searches.

Before one can publish an article about a meteorite in a scientific journal, one has to submit data to the Meteoritical Society for evaluation. This includes chemical classification, data related to the finding and which public institution will store the type specimen (a defined part of the meteorite). Once this dataset is accepted, an official name is attributed to the meteorite, based on the fall location (e.g., Los Angeles 001) or on map quadrangles (e.g., Dhofar 001). This meteorite name will then be used in museum collections and publications. As I worked in Berne at the beginning of the project, we decided to store the Omani-Swiss meteorite project's finds at the Natural History Museum of Berne, while the remaining material went back to Oman.

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X-ray examination of a sacrificed zone

Ignacio Acosta

It's 2220 CE, and underwater archaeologists recover thousands of human remains on Mormont Hill. Nestled between the Jura mountains, the Venoge valley and the Orbe plain, in what used to be the – now flooded – nation state of Switzerland, Mormont Hill was a geographically unique place, marking the separation of the Rhone and Rhine hydrographic basins. Now, these hydro-geographies have been submerged for decades following the melting of Glacier CH3000, which succumbed to rising global temperatures.

Using X-ray nanotomography – a non-destructive 5-D imaging technology – archaeologists are able to fiction events relating to three different occupations of the site. It appears Mormont Hill was once home to a Celtic tribe, a cement company and a radical ecology group called the Zadists.

Archaeologists identify the first occupation, between 120 and 80 BCE, as belonging to a Celtic tribe known as the Helvetians. Fragmented objects, along with human and animal remains, are recovered from over 250 pits, with a depth of up to five metres below sea level. The remnants inform the reconstruction – not devoid of speculation – which suggests the Celts were living through a moment of crisis, perhaps linked to a Germanic invasion. Thus, they buried these offerings to the Earth in exchange for guidance through the catastrophe.

Two thousand years after the Helvetians, at a time when the planet was on the brink of global climate catastrophe, a multinational cement company took control of the sacred zone. From their opening in 1953 CE, marl and limestone were extracted from Mormont Hill, centering the second settlement on *taking* as opposed to *giving*. Intermingled with the remnants of the Helvetians, fully automated mining machines integrated

with artificial intelligence are recovered. These include remote-piloted flying devices, rock-breaking boomers, hammers, drill rigs, and haul belts and trucks used to transport the material from the extraction site to the hydraulic gyratory crushing station. Using forensic investigation tools, the crime is reconstructed; evidence reveals the company sacrificed the Earth in favour of economic development.

Finally, it appears Mormont Hill was occupied by the Zadists. Established between 2020 and 2021 CE, the radical community fought to save the nearby forest under threat from the expansion of the extractive endeavour. They created a parallel system to the capitalist economy that gave rise to a new type of ecological imagination. The research team recovers a network of drowned building structures: stone buildings, a communal kitchen, a round house for assemblies, a library and a museum engraved with the slogan *Orchids against concrete*. It seemed that there were also more than forty tree houses, with connected walkways that did not touch the ground. From stoves, pipes, fire plates, chimney grates, water tanks, saws, garbage bins, containers, and staplers, to headlamps, solar panels, sofas, armchairs, beds, bicycles, caravans and trailers – the plentiful recovery of Zadist objects paves the way for a rich analysis, allowing for the reconstruction of the material culture of the community.

In the company of bones, rocks, mining machines and tree houses, the site is presently occupied by nonhuman creatures, including a new variety of hydro-orchid, that rise defiantly as upturned sediment upon the exhausted land.

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Yellow stone

Guilherme Mansur

Orthorhombic iron-ore fluosilicate, of variable colour, forming dense irregular masses or prismatic crystals, is one of the strangest and most admired precious stones ever discovered. Long-lasting exposure to the eye can cause blindness and its handling at length can trigger delirium. This ultra-rare stone is found only in the Iron Quadrangle of the mountains of Minas Gerais, Brazil, and in a couple of poems by Minas-born poet Carlos Drummond de Andrade. [1]

1 Pedra Amarela: Fluossilicato de minério de ferro ortorrômbico, de cor variável, que forma densas massas irregulares ou cristais prismáticos, e que constitui uma das mais estranhas e admiradas pedras preciosas já descobertas. A longa exposição aos olhos pode causar cegueira e seu manuseio prolongado pode provocar delírio. Pedra raríssima, encontrada apenas no quadrilátero ferrífero, nas montanhas do estado de Minas Gerais, no Brasil e em alguns poemas do poeta mineiro Carlos Drummond de Andrade.

Zones of *ressaca*[1]

Simone Cortezão

Under the earth, the purple mineral – iron ore. The rock removed from the mountain is blown to smithereens. From the explosion, extraction and transportation, the waste lies all around. The market considers the debris just junk rock and earth. All that's left is the rim of the gaping crater, the ferrous dust, the stinking, shimmering tailings – chemical waste mixed with dead animals sunk in the rotting sludge.

There, wherever you look, the pulverised rock forms undertow zones. The stuff that comes just after the mineral extraction. The mineral waste sticks to the riverbank and is carried downstream in ebbs and flows, backwash and surge, in successive deposits of luminous sand and sludge. On the walls of the houses, the mud-line that turned to caked dust ultimately flakes and is breathed into the lungs. The undertow carries the mineral in an incomplete, impure state, like pestled wreckage, ground and sterile remnants.

The undertow zones are where the waste accumulates, where all manner of dross from industrial extraction processes pools and settles, molding and contaminating spaces and bodies; exclusion zones that carry the debris of elsewheres, and of millions of overlapping histories and materials. It's an altered borderland, a threshold, a boundary strip that retains the movements of consumption and of ways of life, everyone and everything that does not fit within the city limits; a place where the earth has been broken open and churned. You could call it a collection of borders – city, ruins, industry, productive forest, dams, machines and waste, where nature meets matter deformed by the economy and the processes of production and extraction.

The throb of stalled energy typical of undertow zones carries a violent and chaotic force, with points of attrition that cause

1 The title could almost be translated as Undertow Zones, but in Portuguese, the word *ressaca* can mean a hangover after drinking too much, or a feeling of regret after some incident or other; the lingering memory of something unpleasant. However, just as the term can be used to refer to this process of intoxication and the recurrence, reflux or regurgitation of something that makes us physically or emotionally unwell, it also describes the violent churning of water or other forces of nature. All of the above senses are drawn upon here in association with the mine-generated sludge that can be found clinging to the riverbanks and impregnating the whole terrain mauled and contaminated by mining operations.

real damage. As such, these undertow zones possess the weight of all that matter that could return to its origin any minute, just like the reflux of all the stuff that forms the economy. These zones lie somewhere between instability and the latency of a state created in both the churn of the rip current and the monotony of the coma, in a movement of backwash – a clash with a violent and still unpredictable power.

Undertow is a movement of return, the rollback of retreating water along the sandy bed. It forms in agitated periods of wind currents and cold fronts. It's the movement of discontinuous forces present in the flows of stationary energy. Coma is a state of unconsciousness, of obliviousness to one's own existence. As such, without vigil, these zones are not perceived, but function as grey areas – glitches, lapses of the unseen. They are samples of future environmental tensions, maximized by the constant by-production of waste through the expansion of productive landscapes, capable of generating disproportionate or even discontinuous effects.

These zones are the input, the vicious cycle of disasters, as sites of high intensity and low frequency, with extremely complex logics that deposit, each day, a powerful charge of unavailable energy.

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Biogeographies

Alan Bogana is a Swiss visual artist. His works take the form of installations, sculptures, time-based media, virtual realities and holograms. His research focuses on the real and speculative behaviour of light as well as on the emergence of organic shapes and patterns through technological processes. His interest in the interactions between light and matter led him to the field of mineralogy and imaginary minerals.

Anika Schwarzlose is an artist, researcher and lecturer. She received a BA from the Gerrit Rietveld Academy and an MFA from the Konsthögskolan i Malmö (KHM). Her practice often involves collaborative production cycles and focuses on the function of archives, the repurposing of images and reproduction techniques. Her work examines lens-based recordings and media, specifically the influence of dispersion, adaptation and composition of images on specific narratives. Presently she is investigating ideas on machine and mineral evolution, machines as technofossiles, human attempts of making kin with minerals and metabolic connections between life and nonlife.

Anne-Sarah Huet is poet, artist and economist and she places writing at the centre of her practice. Her texts are associated with objects and usages that she exhibits and documents. She constructs fiction as interfaces based on mechanisms of the exhibition space (or whatever the reception context is) and its modes of valorisation. She crosses theoretical or practical lexicons (for example, those of finance and motherhood about ‘reproductive money’) and exploits contemporary rhetoric that she deviates and extrapolates into the absurd. These crosses are comical cuttings, which can also give rise to results that she presents in the academic field.

Brian D. McKenna received a BFA in music and visual art from the University of Lethbridge and an MFA from the Sandberg Institute in Amsterdam, where he works as a researcher. His investigations question social structure and propaganda concerning technological environments, the spiritual components of all things technical and notions of authenticity in arts and sciences. Stones and minerals have appeared as technological components in his work. Through an ongoing

interest in the history of radio, he used DIY broadcast equipment in conjunction with pyrite and other minerals to manipulate sounds and images. Most recently, McKenna has been collaborating on short films focusing on the unexpected alchemy of mining industry trailings.

Christian Kosmas Mayer is a Vienna-based artist whose exhibitions and projects engage questions of memory, preservation and rediscovery. He is concerned with testing the methods with which these issues can be tackled in an aesthetically surprising way: techniques of reversal, of compressing and stretching time, of looking at things from both ends at once. His current field of interest spans a wide range of topics between old myths of immortality and recent technological advances like cryonics or digital immortality. www.christiankosmasmayer.site

Christophe Rey is a Swiss poet and photographer, author of *Claquettes et Ornithologie* (Geneva: Héros-Limite, 2018) and *237 haïkus* (Geneva: Héros-Limite, 2014), amongst others. He is interested in stones that he imagines existing. He thinks they are found in spaces where they give a kind of punctuation. And for him, to write a poem is like looking for one of those stones.

Daniela Zappi is a Brazilian biologist, specialist in cacti and other desert plants. Her botanical career started in the *campos rupestres* of Minas Gerais and took her to many different places, though the rocks always resurfaced in her science through flora and vegetation surveys. She believes that the moment of awe and magic is crucial for individuals to connect with nature, with art being at the heart of this process.

Edwin Gnos is a mineralogist and petrographer. During his five-year post-Doc at the University of Montpellier, France, and Stanford University, USA, he studied ocean-floor occurrences in Oman, the UAE and Pakistan researching the evolution of the early Indian Ocean. He then teaches at the University of Berne where he runs the electron microprobe lab. Since 2006, he has been the curator for mineralogy at the Natural History Museum of Geneva, where he is in charge of its collections and develops research on meteorites and Alpine fissure minerals.

Eric Maeder is an ethicist, professor at the HES – Genève (HEG), Sierre (édhéa), Fribourg (HEG) and consultant/teacher in ethics for different kinds of organisations. He is a specialist in the following ethic domains: environment, technology, artistic practices, deontology and organisation, governance and sustainable development, and animal ethics.

Guilherme Mansur was born in 1958 in Ouro Preto, a city in the state of Minas Gerais built on an iron mountain, where he still lives. A poet and typographer, he practices a kind of poetry that, beyond the verb, unfolds into visual poems, object-poems, performances and installations. Throughout the years, he has been composing a series of mineral poems, with the title 'Pedra-poems'. An admirer of the baroque-telluric poetry of Affonso Ávila and Maria do Carmo Ferreira and the steel sculptures of Amilcar de Castro.

Ignacio Acosta is an artist and researcher who explores places made vulnerable through the exploitation of ecologies by colonial intervention and intensive capitalisation. Over the last ten years, he has been devoted to understanding sites and landscapes that, although often neglected, are of global significance: places under pressure from extractive activity in South America and Europe. His most recent works explore the possibilities of drone technologies as tools of resistance within the struggle for decolonisation.

Ismaela Zrydaoré was born in Youwarou or Mali. After a Spatial Anthropovisiology Master at the Forest University of Townbouctou, she wrote the doctoral thesis 'Temporal coherence and potential predictability of intra-seasonal descriptors of south Mediterranean snow season'. This innovative research has obtained the Agassiz Prize. She participated in the 452nd rapport d'IPCE (Intergovernmental Panel on Cryospheric Extension) for The Embassy of Human Disasters. In the past seven years, she has been directing the Jurassic Glaciation Mission 2839, the first scientific exploration of the Northern Hemisphere.

Luísa Azevedo is a biologist and PhD student in Ecology, Conservation and Wildlife Management at the Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil. Since 2013, she has been dedicating herself to the relationship between plants and rock outcrops, especially inselbergs, through research, art and science communication. Her main interest is to inspire people to see rocks as seeds for biodiversity conservation, a hope spot in the Anthropocene.

Mabe Bethônico is a Brazilian artist working on issues related to memory and mineral extraction in Brazil, conveying debate over environmental destruction, economy and labour within the history of mining industries. She exhibits internationally and is member of the project World of Matter. She holds an MA and PhD from the Royal College of Art, London, and is presently researcher within the Franco-Swiss project Effondrement des Alpes at the École Supérieure d'Art Annecy Alpes.

Marcos Reigota holds a PhD in education from the Catholic University of Louvain (1990) and studied with Paulo Freire at PUC São Paulo in 1983. He has been a professor and CNPq researcher at the University of Sorocaba since 1998, working with the concept of an Environmental Perspective in Education. He is attentive to the stones lining the road, with which he constructs Zen gardens and sculptures, which the wind, rain and animals may modify.

Margaret Woodward and Justy Phillips are artists, writers and publishers based in lutruwita, Tasmania. They are founders of A Published Event (APE), making long-term relational artworks through shared acts of public telling, exploring chance encounters, constructed situations and the shared authorship of lived experience. They have been awarded the Ruth Stephan Fellowship at the Beinecke Rare Book & Manuscript Library, Yale University. Woodward holds a PhD in design from the Curtin University of Technology. Phillips holds a PhD from RMIT University, Melbourne. Woodward's interest in geology and place can be traced to an ancestral line of mineral prospectors, nineteenth-century fictioneers who traversed the west coast of lutruwita, Tasmania, looking for rare minerals, ores and

other interesting matters in the ground. For many years, Phillips has simply been looking for stable ground.

Masha Ru is an artist with a scientific background. The holder of a PhD in mathematics and graduation with honours from the Photo Academy Amsterdam, Masha's projects combine scientific research with a personal approach and various cultural practices. Masha's relationship to earth dates to childhood, when earth eating was a careless simple action. Later, in artistic and spiritual ways, geophagy has been a work subject observed in different regions of the world. Masha collaborates with **Alain Chaney**, a performer and drag transformer with a background in science. Chaney's work anchors in queer-fantastical narratives and takes shape through physical transformism and written stories. Working with Masha Ru for the past four years, Chaney has become a daily earth-eater. His relationship to earth stemmed from the need to heal stomach-related pains.

Mônica Meyer holds a PhD in the field of botanic education and was a professor at the Education Faculty at UFMG – Brazil, having directed its Natural History Museum and Botanical Garden. She crosses cities, rivers and mountains of Minas Gerais holding hands with the late poet from Itabira, Carlos Drummond de Andrade, attentive to literature such as *Canto mineral* and the travel diaries and all the writings of late João Guimarães Rosa. She approaches nature as a living organism, interconnected with the culture of the *sertão* in Minas. In this mosaic, she observes how minerals sustaining the body of the mountain also sustain our bodies.

Monika Bakke writes on contemporary art and aesthetics with a particular interest in posthumanist, transspecies and gender perspectives. Her curatorial work includes art exhibitions: *Bio-Reminiscences* (Poland), *Seeing the Forest Through the Trees* (UK) and *Boundless Objects* (Portugal). Currently, her research focuses on nonlife forces and new articulations of mineral presence in contemporary art.

Quentin Lazzareschi is an artist and mountaineer, and researcher at ESAAA, France. His minimal interventions divert objects, situations or systems to create disturbances within specific real spaces. He plays with the ambiguity that his sculptures and installations engage, bordering on fiction, in which the effective gesture meets with language and narration possibilities, where writing is also used to tell stories.

Simone Cortezão is an artist and researcher, with a doctorate in arts from the State University of Rio de Janeiro, with the thesis 'Remote Lands: Economic fictions and the zones of reflux'. Born in Timóteo, Minas Gerais State, a place that receives a great part of the iron ore extracted in Brazil, her work articulates experiences deriving from the personal field but taken to the public and political perspectives, especially related to transformations caused by extraction.

Wellington Cançado is an architect and urban planner, a professor at the Federal University of Minas Gerais (UFMG), Brazil. Cofounder of the Cosmópolis Group and editor of *PISEAGRAMA* magazine (www.piseagrama.org). He researches the relationships of the urban metamorphosis, the impasse of modern design, the anti-colonial images of Amerindian cinema and the cosmopolitics of the Anthropocene. His project is to unpave the cities to rebuild forests.

Xavier Ribas is a photographer and lecturer at the University of Brighton. His photographic work investigates contested sites and histories, and geographies of abandonment. His recent works take the form of large photographic grids, often including text, archive materials and moving images as multiple, composite forms of examining temporary settlements, sites of corporate development and exclusion, border territories and geographies of extraction. Since 2012 Xavier works in collaboration with historian Louise Purbrick and photographer Ignacio Acosta on the project Traces of Nitrate (www.tracesofnitrate.org). His work is also part of the collective World of Matter (www.worldofmatter.net).

[**ὑφή**] [1] was found in 2020 by Stepha Farkashazy and Natalia Philomena Jobe. In its artistic, speculative research, ὑφή investigates the traces of interweavings and intra-actions of (micro) organisms, historical and political topographies and constellations of appropriation. At the moment, their work is inspired by the symbiosis of lichen and their strategies of silent resistance. In fragmentary narratives, ὑφή tries to distil and translate into various forms of archiving – which has taken the shape of a series of perfumes, 'arôme entropique', and the artist book *loud ways of being quiet*.

1 Ancient Greek [yphi]: texture, fabric, web (ὑφαίνω – 'I weave')
hypha – branched filaments that form the mycelium and the mycobiont structure of a lichen.

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