

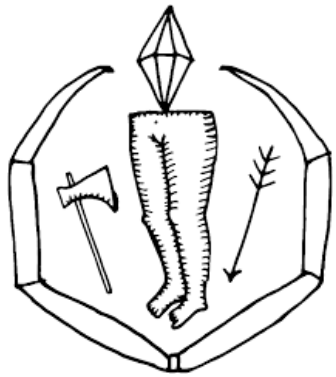
TINY MINING



A handbook for internal extraction.

V2_Lab for the unstable media

a mineral exploration co-operative and community committed to the open source exploitation of the interior of the human body for rare earth and other mineral resources



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Introduction

Martin Howse

Independent artist and researcher, occupied with an investigation of the links between the earth (its living creatures and geophysical phenomena), software and the human psyche through the construction of experimental situations.

Tiny Mining [TM] is the first open source mineral exploration co-operative and resource specialist committed to the potential exploitation of the interior of the living human body for rare earth and other mineral resources in the interests of human and planetary health.

The wider *Tiny Mining* community was founded in November 2019, and the initiative is devoted to exploring the culture of self mining through sharing knowledge, advocacy, discussion, tutorials and collective sweatshops. This open community consists of a diverse group of chemists, geologists, artists and alternative medicine practitioners.

This first electronic publication collects expert and critical reflections engendered by the community, alongside documentary material from the inaugural *Tiny Mining* sweatshop conducted in November 2020, and background research or source materials commonly circulated within the wider *Tiny Mining* community.

We collect here insights from the history of close bodily contacts between human beings and the geological, the discipline of medical geology, medical anthropology, speculative bio-fictions, and new dark ecological theory.

WELCOME TO THE
TINY MINING
COMMUNITY!

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Tiny Mining Mission Statement



In today's world, metals are in greater demand but are becoming ever scarcer. Tiny Mining aims to recover more than 20 elements including precious and other metals from a novel, sustainable and renewable resource: from within the living human body.

We believe that the earth should remain as pristine and untouched nature; we have no desire to carry on extracting resources from an ever depleted world, polluting and laying waste to the landscape. Saving the planet is now a matter of becoming sensitive to our own geological being. In mining ourselves we gain knowledge of our own bodies, our selves and the global environment. This is a final ecology for the end days. Nature will remain and our technologies will now be sourced from within; we will thus no longer be dependent on scarce and already polluted environmental resources.

Tiny Mining [TM] is the first open source mineral exploration co-operative and resource specialist committed to the potential exploitation of the interior of the human body for rare earth and other mineral resources in the interests of human and planetary health.

Now on to the most important parts. Here is my current conception of a Tiny Miner or m/user:

- Open source extraction, purification and citizen science
- We believe that the earth should remain as pristine and untouched nature. We have no desire to carry on extracting resources from an ever depleted world.
- "We" are mining for meaning. Know myself, mine myself. Mine my own bodily data and the body of the planet.
- Mining may not always be safe, but we (must) understand the risks and act accordingly. We must also not be persuaded to do nothing because there is a risk
- "We" need to get to know the doses - from deficiency to toxicity - how much to extract from ourselves and how much to ingest. "We" become bio-markers, indicators of earthly or planetary health. How much can we extract from the earth, and return to the earth? I offset what I take from the earth, and the damage I cause the earth, through this giving back. "We" try to get to know our own cycles, of excess, of regulation and of deficiency.
- "We" believe that our bodies are our own, to do with them as we will. We own our own mining right. Thus, no government or corporation can extract resources from someone's body
- "We" may be freaks, geeks, and outcasts but the scientific method is still vital to the development of functional technology and sound science

Tiny Mining: Theory of the earth from a sweatshop – on practising becoming cosmic

Agnieszka Anna Wołodźko

Lecturer and researcher at AKI ArtEZ Academy of Art & Design. Her research focuses on post-humanism.

1. T. Nail, *Theory of the Earth*, Stanford, California: Stanford University Press, 2021, 23.

2. G. Deleuze and F. Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, London etc: Continuum, 2004, 411.

Why should we continue to model our philosophies on foundations, our cosmologies on background space-times, and our geologies on Holocene uniformities, when the evidence is pointing us in the opposite direction? Our earth is not a ground, but a tiny metastable region of an unstable and dying universe.¹

Metallurgy is the consciousness or thought of the matter-flow, and metal the correlate of this consciousness. As expressed in panmetallism, metal is coextensive to the whole of matter, and the whole of matter to metallurgy. Even the waters, the grasses and varieties of wood, the animals are populated by salts or mineral elements. Not everything is metal, but metal is everywhere.²

In the Western mindset of mapping the problems and searching for the solutions that would respond to the many crises of the Anthropocene, the obvious is often forgotten – that we humans are not the sole agents who can influence the state of things, who can fix things as if no change has happened. In our self-indulging analysis of the human impact on the earth, in our never-ending scrutiny of identifying transformations, in our desire to find an ultimate cause of things, and in our exaltations upon new models of prediction and control, we treat

the earth as if it is a passive scenery for human actions – dumb and mute and in need of our response. In all of these narratives, humans are presupposed to be the radical other to the earth, to the non-living dirt which is deemed to be ungraspable due to its radically different “nature” than living humans. The earth, in order to be cared for, either needs to be bio-washed with vitalistic ideologies that subsume non-living matter into its own measure, or turned into a present-at-hand object as a prospect for infinite human use. In other words, it seems that we can care only for that which is described as living or that which holds some use for the human. Thus, in our despair over change and transformation, all that we value seem to be the theories and presuppositions of the ideologies of sustainability, stability and dualisms that lead us to this mess in the first place. However, as Thomas Nail pointed out, if we want to practise a theory and ethics of the earth that would respond to its radical unpredictability and mobility, we need to first dismantle these ideologies and habits where earth is perceived as static and outside human history³. In other words, we need theories and habits that would affirm transformations.

In order to not only address these problems but also practise earthly living, it is imperative to first dismantle any phenomenological assumptions that make it impossible for a human to know “the world”. As Nail argues, “we have access to the earth and the cosmos because we are them, albeit only a small region of them.”⁴ We humans can understand and have some form of access to other bodies not because we have control, not because we



3. Nail, 3–7.

4. Nail, 109.

5. Nail, 12.

Tiny Mining is a humble, mundane practice which is yet daring in its endurance of daily processes that escape fixation into one routine of a living and non-living relationality.

can equip ourselves with ever more sophisticated technologies, but because we are ontologically conditioned by these bodies. What is this conditioning element? In his theory of the earth, Nail points to the very etymology of the word *theoria* from the Greek meaning “movement, sending, or process.” The theory of the earth is thus about movement as the constitution of all existence and transformations, which Nail calls “geokinetics”.⁵

Geokinetics assumes “that humans and theory culture are continuous with cosmic and terrestrial processes of kinetic dissipation.”⁶ This means that we need not only new material frameworks to understand earth as a process that would not only prioritise living bodies. It means also, that we need process-oriented practices that would recognize non-living matter and non-living relationalities as a condition of the earth and cosmos.⁷

When we think, we think through the earth and as the earth. Therefore, just as human history, society, and technology are crucial to understanding our contemporary condition, so too is terrestrial history crucial to understanding it as well. If we ignore the material conditions of the earth, we cannot possibly understand our present, which is nothing other than the kinetic structures of the past mixed and continued by other means.⁸

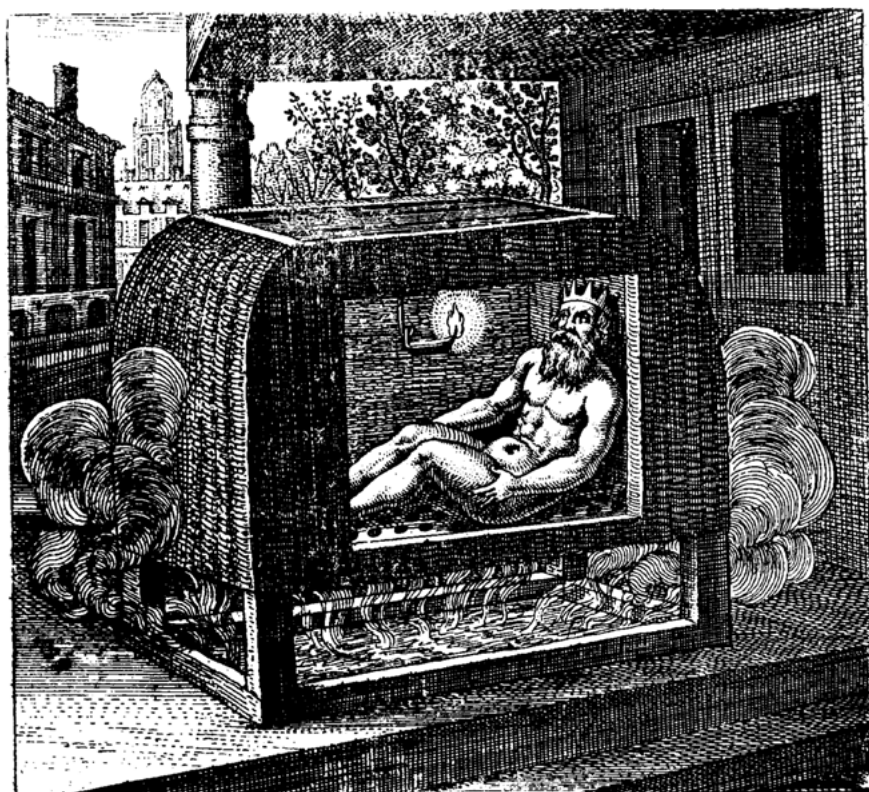
Tiny Mining is a humble, mundane practice which is yet daring in its endurance of daily processes that escape fixation into one routine of a living and non-living relationality. It is a project developed in November 2019 by the artist Martin Howse and which groups experts

5. Nail, 12.

6. Nail, 12.

7. Nail, 44.

8. Nail, 55.



9. —, “Tiny Mining,” V2 Lab for the Unstable Media, v2.nl/archive/works/tiny-mining (accessed on 21.07.2021).

10. —, Tiny Mining Sweatshop Reader, drive.google.com/file/d/1Djv1cafskuv3wxYsx84b-B2HkSKNqgl9H/view, 13.11.2020, 3 (accessed on 21.07.2021).

and practitioners within the fields of chemistry, geology, art and “alternative medicine practices.”⁹ As its main goal, *Tiny Mining* sets out to learn about and to practise the extraction of various minerals and metals from one’s own body. This way, by becoming a resource, humans are to contribute to the accumulation of metals in order to meet their high demand within the production of digital technologies. As “a final ecology for the end days,”¹⁰ this project sets out to not only accumulate valuable resources for human use but also to establish practices of knowing and caring for the cosmic entanglements that we all are conditioned by.

As a major step in testing and documenting these transformations, the first remote sweatshop was organised in November 2020 with Theun Karelse, v2_labs, Dennis de Bel, Kat Austen, Martin Howse, Aniará Rodado and Alfonso Borraran. Each participant was assigned a metal (antimony, arsenic, copper, iron, lead, mercury, silver) which they needed to study for the improvement of both absorption and extraction processes from their own bodies. For this purpose, the participants were thus documenting their bodily routines through observations, measurements, reflections in order to find co-relations with the metal they were to extract. Alongside studying the histories, physical and mythical capacities of these metals, they explored the intimate and risky relationality of what it takes to **become with** the metal they are to extract and how to prepare their body for that process. For a more successful extraction an important element was to feed their bodies with a particular metal-rich diet. For instance, to extract antimony, one is required to eat “foods stored in

enamel vessels and cans, seafood, oysters, brown rice, starfruit, spinach, beetroot, beetroot leaves, fruits high in vitamin C,” and “avoid coriander, onions, garlic.”¹¹

In their reports and reflections, participants reveal the radical co-dependency of one’s body with others. In order to be a sufficient fuel, you need more external fuel, you need constant yet controlled and steady modes of intoxication that allow for the affirmation of transformations of bodies. Caring for the changes of the body means being able to sustain its continuation, even if this is unpredictable. To control transformation is to notice the co-relations and implications it causes, not in order to fix them, but rather to **become more in transformation** through them. In this way, through mapping the levels of the metals influenced by a daily practice of digestions, they explored a particular dualism of their practice: the dualism between their own agency that seeks to control the transformation and the radical objectification of their bodies that are to be later used as a resource of these transformations. Becoming agents of accumulation and objects of extraction, they exposed their bodies to occupy multiple grounds. Fluid and contradictory in their aims, becoming neither a source of metal nor a final beneficiary of its extraction, they occupied the space of inbetween.

The numerous documentations and reflections along the course of five days included performing simple protocols of cooking and testing, reflections on one’s state of feelings, mood and strength, recollections of dreams and their changes, and capture of images made while exploring the properties, capacities and histories of their metal, and the use and func-

To control transformation is to notice the co-relations and implications it causes, not in order to fix them, but rather to become more in transformation through them.

11. Tiny Mining Sweatshop Reader, 7.

By mapping the signals of **becoming as antimony, as arsenic, as copper, as iron, as lead, as mercury, as silver**, they experimented with how to become receptive to the planetary compositions and the patterns of their movement.

tions of this metal for human purposes. Here, the foods they were eating, the routines they were performing, and the dreams and thoughts they were experiencing were all equally as important as the phase of the moon and the phase of the day that accompanied it. Each blog devoted to a particular mineral collects images, reports, videos or protocols that are helpful to learn to follow the practice of mineralisation.¹² Through signifying and a-signifying meanings of metal contamination, they mapped thus how to notice the change of transformation, how to learn to become an indicator of that change, of minerals they **become with**. By mapping the signals of **becoming as antimony, as arsenic, as copper, as iron, as lead, as mercury, as silver**, they experimented with how to become receptive to the planetary compositions and the patterns of their movement. In this way, practising this cosmic observation that blurred the borders between earth and the sky, inside and outside, they explored protocols and forms of knowledge for the wider community of the future tiny miners.

The earth is a cosmic exterior centripetally folded in on itself through the vortical motion of nebular accretion. It is the interior of an exterior. It is a fold. In other words, the earth is already profoundly alien to itself.

It is a hybrid monster composed of all the motley stuff of nebular waste: a piece of shit stuck to a solar anus.¹³

Tiny miners learn to practise **becoming with the cosmos** by tracking the minerals and their extractions across many human and non-human bodies. When we take seriously what Nail

12. Tiny Mining, tinymining.v2.nl (accessed 21.07.2021).

13. Nail, 66.

reminds us, namely, that earth is “a result of contingencies and swerves of solar winds and errant asteroids”¹⁴ that continue to move and transform it, the need to rethink our practises and our own bodies as self-sustainable and impenetrable is urgent. *Tiny Mining* exposes thus our ignorance to these cosmic and mineral movements that conditioned our more than human history. Through these cosmic movements of minerals we can thus not only understand our bodies as already mineral, but we can also practise these mineralised movements as already becoming cosmic. Since there is no origin, no outside of the earth, no binary between earth and sky, in order to understand and practise this geokinetics, we need to learn to follow planetary movements as equally important components and conditions of our lives - as tiny miners are proposing. Importantly, one never learns alone. We need to relate with other bodies to transform and learn new movements. For the tiny miners, the body that serves as a guide of this mineral transformation is the moon and its movement.

A *Tiny Mining* sweatshop begins with the new moon, and each participant is to further map the constellation and co-relation of the moon with their metal harvest and extraction. Through carefully learning how to become sensitive to the moon, they practised, what Nail calls “Lunomorphism” where “the moon is not like us or our ideas” but rather “our ideas are more like the moon.”¹⁵ Tiny miners point thus in their practice to thinking about ourselves as a result of moon projections. Here thus, the notion of a human body as impenetrable and the idea of a human as un-objectifiable and stable in its signification, becomes



Fig. 1625. Anatomical diagram from the *Hui Ming Ching* showing Tu Mo ascending from the reins to the brain and Jen Mo descending from the latter to the former, the first dorsally, the second frontally. The throat-and-trachea (*hou*) and the throat-and-oesophagus (*yen*) are also marked.

14. Nail, 66.

15. Nail, 80.

Here, they surrender themselves into processes of extractions by sharing the waste of their bodies. Through urine, sweat and hair shed, they reject “abundance and over-consumption” [...].

blurred. We as human bodies are not only already a resource for various gains, but also an object of planetary manipulations. In order to understand our bodies, we need to follow the planetary bodies’ movements and the knowledges they generate.

The earth is not a passive object or stage for human activity, nor is it a benevolent subjective agent of life (Gaia). If anything, the earth is a process of expenditure and death—more like Python than Gaia. Human animals do not live on the earth. They are the earth. Technically, even the earth itself is not of the earth.¹⁶

Tiny miners in their experimentations and mapping of ways of extraction, rather than following an understanding of bodies according to identification, explore the patterns of co-relations and transformations that bodies undergo through movement. Here, they surrender themselves into processes of extractions by sharing the waste of their bodies. Through urine, sweat and hair shed, they reject “abundance and over-consumption”¹⁷, embracing **becoming of the earth**. Through the waste of their bodies, they thus practise the movement of expenditure. As Nail argues, “Nature loves to waste and to share its waste as much as possible. This is something our bodies know how to do... however, we tend not to consider it a real form of knowledge.”¹⁸ Tiny miners in their practice of preparing their bodies for extractions resist and question the capitalist values of accumulation and productivity that force all forms of expenditure to be considered as “economically” wasteful and “inefficient.”

16. Nail, 242.

17. Tiny Mining Sweatshop Reader, 3.

18. Nail, 254.



Within the capitalist logic of extraction and the pursuit of more circular economies for the sake of accumulation and efficiency, the human is positioned outside the logic of co-relation and dependency. In the pursuit of the increase of capital, the values and desires of humans are usually unquestioned. We, in the capitalist mindset, tend to invent new materials and look for new solutions not in order to change these desires and practices, but to simply sustain them. In their practice, *Tiny Mining*, on the one hand, seems thus to decentralise the commodity, the resource that was identified to belong to “wasteful” Nature, by including human bodies within the process of extraction. Through equalising the human body with any other living and dead body that acts as a resource of production, tiny miners overthrow the human as the only agent of profit. On the other hand, by doing so, paradoxically, they not only follow the existing desires of unlimited access for resources but also expand the capitalist logic of treating living bodies as a resource for the increase of capital, joining such well-established practices as biopiracy, data mining and human trafficking. As Silvia Federici points out, capitalism has already been relying upon the human body in the commodification and violence of exploitation on the basis of ideologies of social or biological determinism.¹⁹

In their initial statements in the “Tiny Mining Sweatshop Reader”, it is argued that “we [tiny miners] believe that the earth should remain as pristine and untouched nature. We have no desire to carry on extracting resources from an ever-depleted world.”²⁰ Here thus, tiny miners seem to follow the capitalist logic of the radical difference between what

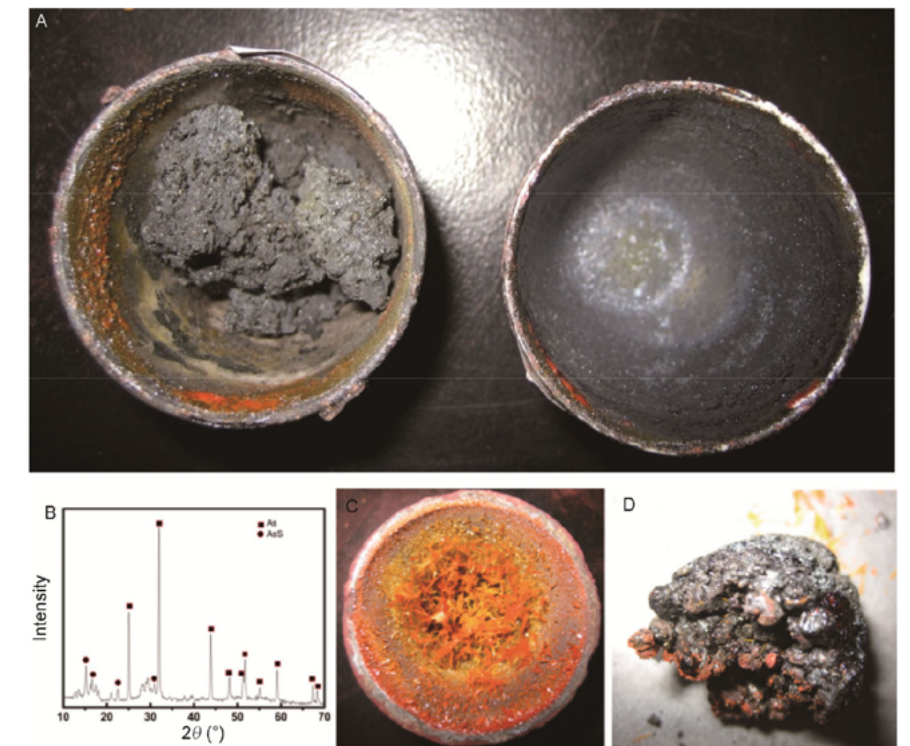
19. S. Federici, *Caliban and the Witch: Women, the Body and Primitive Accumulation*, New York, NY: Autonomedia, 2004.

20. *Tiny Mining Sweatshop Reader*, 3.

is considered as Nature and what is human. In their pursuit of natural purity, they revitalise the romantic notion of Nature as that which is separate from the human, the pure and untouched, disavowing the implications of such a position for the problems and violence it carries. However, what seemingly starts as a continuation of the capitalist logic of exploitation of bodies, taking a position of being outside of whatever is understood by “Nature”, quickly changes its tone. As they write:

What we do to the planet we should first do to ourselves, extract and pollute. We need to get to know the doses - from deficiency to toxicity - how much to extract from ourselves and how much to ingest. We become bio-markers, indicators of earthly or planetary health. How much can we extract from the earth, and return to the earth? I offset what I take from the earth, and the damage I cause the earth, through this giving back. We try to get to know our own cycles, of excess, of regulation and of deficiency.²¹

Rather than prioritising the sense of purity and sustainability as the ecological act of resisting the earth’s extraction and simply using human bodies for a similar purpose, the goal is to become sensitive by dismantling what Patricia MacCormack named as “human privilege.”²² Tiny miners propose to **become earthy** through an equal exposure and accountability for humans’ own practices and desires of exploitation. Becoming earthy means not only becoming contaminated, and intoxicated by the human and non-human relationality, but also



21. Tiny Mining Sweatshop Reader, 3.
22. P. MacCormack, *The Ahuman Manifesto: Activism for the End of the Anthropocene*, Bloomsbury Academic, 2020, 16.

[...] dying well entails
contaminating well, so that all
living and non-living bodies
in relation may continue to
contaminate.

affirming that intoxication. By celebrating the human body as a potential fuel and resource for other bodies' thriving, we not only "pervert" human dominion but also establish a relationship with death²³ that may initiate what Nail characterised as the "ethics of death."²⁴

Tiny miners, in their becoming mineral, **becoming with dirt** through embracing the patterns of signalling these already contaminating bodies, seem to explore how to practise dying well. In their exploration of becoming a mineral resource, they expose that what is at stake in the process of co-dependence and relationality between living and non-living bodies is the affirmation of that relationality which is an affirmation of contamination. In their ethics of death, they thus propose to practice what Heather Sullivan named "dirty nature" which refers to the "material process of extraction and consumption enabling the survival of all living things but also those fuelling technology and the economy."²⁵ In other words, dying well entails contaminating well, so that all living and non-living bodies in relation may continue to contaminate.

The concept of dirt, as Sullivan notices, carries within itself a normative connotation, pointing to an identification that there is too much of something, of something not belonging and polluting. Dirt in this way has the material agency of a pollutant, a contaminant shaping and transforming the space it occupies. Dirt as alien but also as part of us, blurs thus the dualistic logic of inside-outside and the ideology of impenetrable borders that would allow for the exclusion and dominance of one body over another. Embracing dirty nature,

23. MacCormack, 149.

24. Nail, 255.

25. H. I. Sullivan, "Dirty Nature: Ecocriticism and Tales of Extraction - Mining and Solar Power - in Goethe, Hoffmann, Verne, and Eschbach", *Colloquia Germanica* 44(2), 2011, 111.

of what is at stake when practising mining even for such purposes as producing solar cells and other “green” technologies, shakes what Sullivan calls “this standard cultural norm of erasure.”²⁶ Tiny miners, through embracing the process of mining, affirming their bodies within the process of extraction, expose the dirty, risky and unpredictable co-relations and dependencies of their own bodies on others.

For capitalism, extractions are fuelled by the vitalist logic of prioritisation of all that is characteristic to life in terms of its accumulation, growth and production. The process of dirty nature, the many co-relations, implications, dependencies and transformations of mining for not only the geological landscape but human and non-human, organic and non-organic bodies, is hidden. Capitalism’s accumulation thrives on a radical separation of bodies, on an inscribed inequality of access to resources, on not recognising their asymmetric and therefore fragile co-dependences. Therefore, through careful mapping and learning how to practise the asymmetry of dirty mineral movements, exchange and visceral relationalities, tiny miners pave ways for a resistance against capitalism.

Today’s focus on circular energy and accumulation continues to justify mining because of the high demand for various metals to support and enable the growth and production of new technological media. And the target is not the Earth alone any more. Space mining is a new frontier which, as some geo-engineers imagine, will “allow humans to become an interplanetary species.”²⁷ But humans are already interplanetary. We are of the earth and

26. Sullivan.

27. A. Altena and BJ Nilsen, “BJ Nilsen: ORE”, in *Hereafter - Sonic Acts 2019*, Amsterdam: Sonic Acts Press, 2019, 267.

earth is of the cosmos. Not recognising the ontological conditions of that co-relation leads thus to ever more innovative forms of exploitation for the sake of accumulation and expansion. As Jussi Parikka argues, mining in this way, is part of capitalist growth²⁸ but also part of the desires and fantasies of guilt-free consumption and exploration. But what *Tiny Mining* exposes is not only that minerals are part of our technological histories and future desires but they actually are these technologies already, and they condition our lives in the most intimate and crucial way by becoming us, or rather, by us **becoming mineral**.

We are mineralising, composed of dirt bodies that even though moving and transformative, are already dead. In other words, rather than by life, we are conditioned by the movements of dying. Such a shift towards a focus on dying has a transformative effect on how we practise life as a process. Rather than perpetuating the prioritisation of life that values production and accumulation, we learn how to die well, how to waste well, practising and ensuring our bodies' many ways of expenditure. Tiny miners begin thus the process of learning how we are already co-dependent with non-living bodies, approaching the conditions and constellations of expenditure that we need to practise to live well. Because to live well, means to die and ensure others to die in their multiple tiny ways, every day, by **becoming cosmic**.

28. J. Parikka, *A Geology of Media*, Minneapolis; London: University Of Minnesota Press, 2015.

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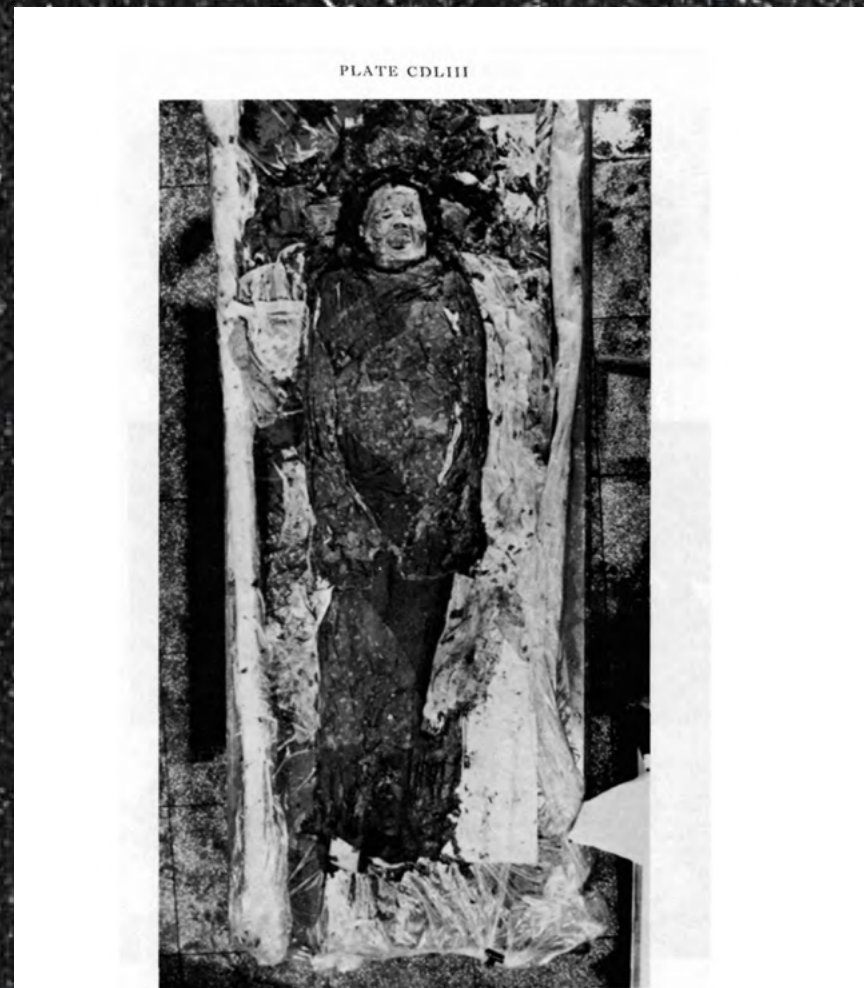
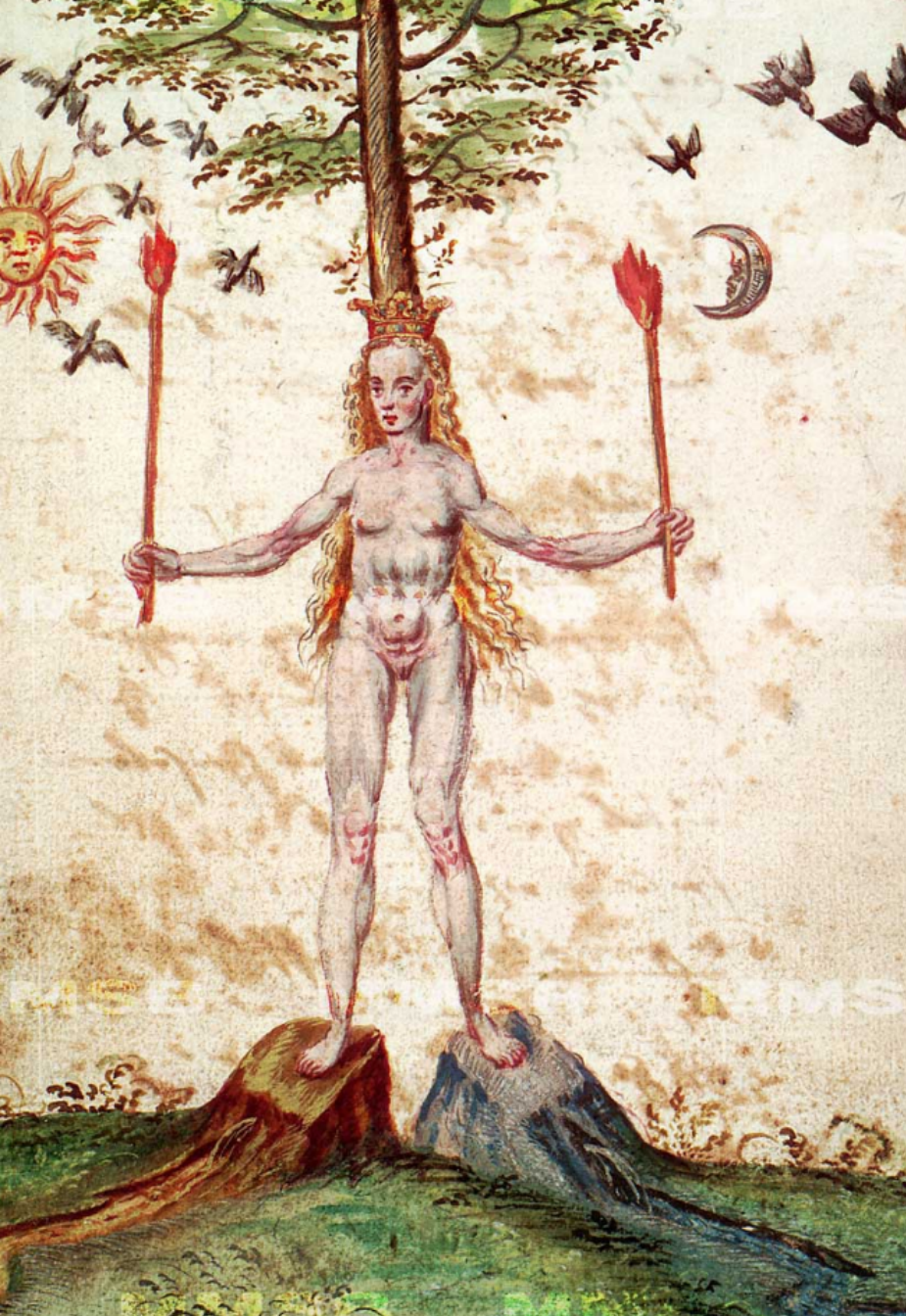


Fig. 1333. The body of the Lady of Tai (d. c. — 166), wrapped in more than twenty silk garments, as at first uncovered (photo. Academia Sinica). The mouth is filled with the protective amulet of jade.

Putrefactio est phorum

Nigredo et lucida

Caput

Corui

Alqua

Ipsum similiter Putrefieri est natarum

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et effiant tra nigra Et tu videbis m2z de

m2zari Gaude quia p2mapiu est dux stroms

Onbuz r2s nrm igne leui sic Arnoldus

Onozz nutrix donet corpe uile qstuat et

tmatura extrahat Ron aut extrahat ea tota si

mul Et paz et paz egrediat omni dia donet in

longo qpleant tempe Hermes pater phorum

Go sum m2z albi et rubeus albi et atrius

Caput

Corui

Nigredo

transparens

Alqua

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culenta de q

Et stat

De q est supra m2z sunt nebul2e tenebrose

hunc sp2s vel fum

Speculum

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Caput

Corui

Alqua

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Ram corruptio vnus est generacio alterius No

docta terra est i fundo vasis et totalr dissoluet in

aquam vt prius Arnoldus de noua villa

Oleum

phorum

Caput

Corui

Oleum

aqua

Ita natus est filius nouus niger hermes

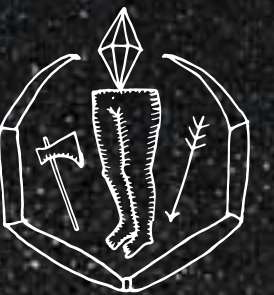
Et efficitur a dissimul2 Et vocabitur

nome eu Phoz Ista tra nigra et fe

culenta quoz est in argenti vniu vt pri2 et solu

ta i colore olei et tuc vocat2 olei phoz Arnoldus

We wish to be of the earth, and free of any reliance on the earth. We celebrate our earthiness, as well as the wish to no longer depend on the earth, no longer to extract and be attached, but simply to be with. I don't want to touch the earth. Nature doesn't need our ecology, our management.



“The dose makes the poison.”

– Paracelsus

Ines Tomašek
interviewed by Tiny Mining

Ines Tomašek is a medical geologist and volcanologist working on the environmental and health impacts of volcanic eruptions using multidisciplinary approaches and methods across geochemistry and particle toxicology. She is based at GReD, a Research Center at Clermont-Ferrand in France.

In November 2019, she took part in the formative Tiny Mining expert meeting in Brussels, in which we discussed her work with several projects in Tanzania, studying the leaching of fluorides from volcanic rocks and their effects on human health in affected areas. We also talked about the belief systems around the Tiny Mining project, embracing geophagy, terra sigillata and biological indicators of deficiency and of surfeit.

This interview was conducted by Zoom on Tuesday the 16th of November 2021.

Tiny Mining: How would you define the discipline of medical geology?

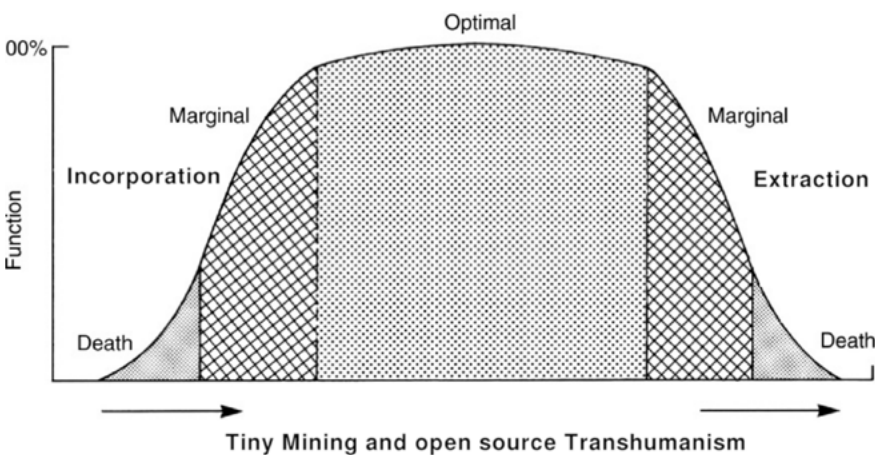
Ines: Medical geology is a scientific discipline that deals with investigations into how the natural environment, and geological processes and materials impact on human and animal health. These include natural hazards, like landslides, volcanic eruptions, dust storms, but also the environment we live in, in general. We investigate the interactions of the hydro-

sphere, atmosphere, and the lithosphere which can have a direct or indirect impact on our health and well being. One of the main research topics is the exposure to potentially toxic elements that can compose natural materials, to which we can be exposed directly through inhalation, ingestion or dermal contact, or indirectly through food contamination. An excess or a deficiency of certain elements in the human body may have an impact on our health.

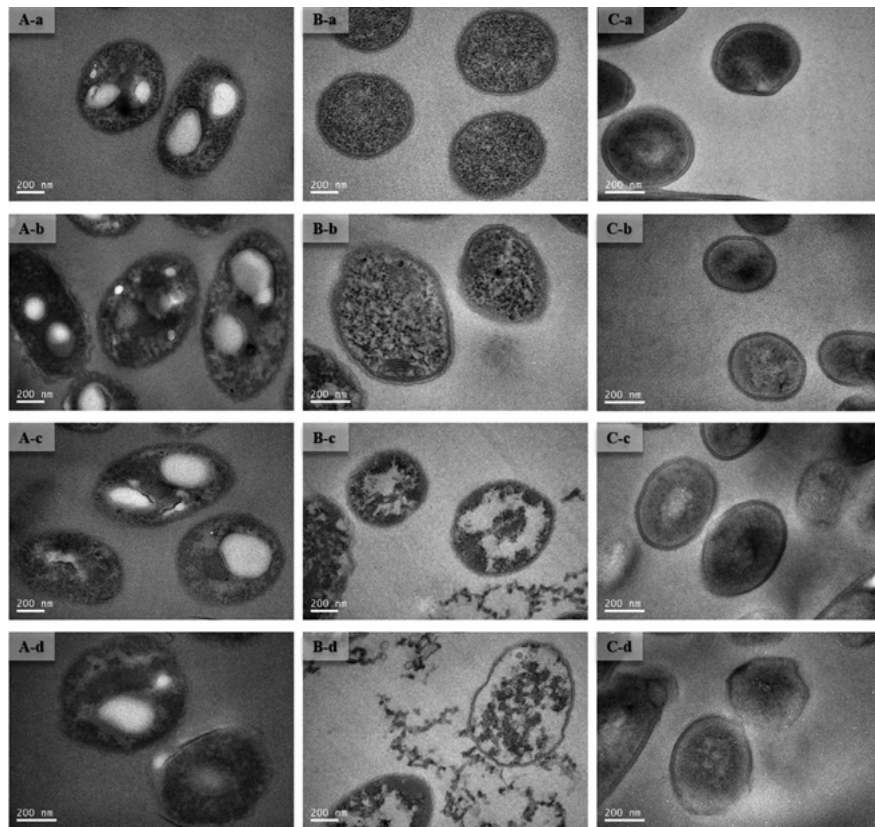
TM: How do you see medical geology as connecting with other disciplines? What other scientific practices does it intersect with?

Ines: It's a very interdisciplinary field bringing together scientists from a number of disciplines, including geologists, environmental scientists, but also medical professionals, chemists, biologists, toxicologists. It is a very broad research field and often you can actually see across different scientific areas that it is referred to as medical geology, but you will also hear of environmental toxicology and environmental medicine.

In practice, geologists focus on characterising the sources and properties of hazardous materials, while medical workers may investigate the effects of exposure and associated pathologies. Some people, like myself, are trained during studies to become multidisciplinary researchers to allow for bridging the gaps among different disciplines. There are only a few places that specifically train students to become medical geologists, but I think anyone with interests in this area can actually contribute to it from different perspectives.



We investigate the interactions of the hydrosphere, atmosphere, and the lithosphere which can have a direct or indirect impact on our health and well being.



TM: Do you have any connection to the history of medical geology?

Ines: There is a history of medical geology in general. Ancient cultures like the Egyptians already had knowledge about medical geology. They just didn't call it that, but this stems from their using natural materials to make, for example, pottery and natural pigments, and the use of minerals for medicinal purpose, and nowadays we still use some of these for colours in pottery and other applications. Personally, I just had a background in medicine and then I ended up doing geology. And then when I first heard about how natural particles can influence health and how there is this whole cycle of elements and exposure, I was interested into linking the two professions that I was trained in.

I always had this interest in analytical chemistry and biology, to know how things work and how sensitive we are. The name medical geology has only been maybe in use for two or three decades, but as a discipline or a thing, it exists ever since we exist, because we live in the environment and we mutually affect each other.

TM: What sparked your initial interest in this field?

Ines: I was a medical lab technician before I started studying geology and then through all the different subjects throughout my studies, I first I had a lecture that was called medical geology, and that really bombarded me with cool examples of geographic areas with endemic diseases that were triggered by the environment, perhaps through exposure to

It's not always purely natural. It's also because people via industry and their activities contaminate the environment, and then this again comes back to us. You inhale contaminated particles from mining sites.

some elements through water consumption. There were of course also anthropogenic effects. It's not always purely natural. It's also because people via industry and their activities contaminate the environment, and then this again comes back to us. You inhale contaminated particles from mining sites. I had a great love for analytical chemistry, having a clear objective and purpose to my research with the idea that what I would research would have direct implications or applications for human health and well-being.

TM: Over the years working as a medical geologist or researching, has this changed the way that you view the world, how you see your own physical health, your diet or wider views on ecology?

Ines: Taking care of everyone's health should be important and in our interest. But there are things that we like to do that we know are harmful, but it's a choice. Whereas living in a polluted environment is not always a choice. Sometimes it's a necessity. This is the distinction that I started to make. I can say from experience that while I lived in Brussels I think I developed an allergy or a reaction which I didn't have in other places where I lived before.

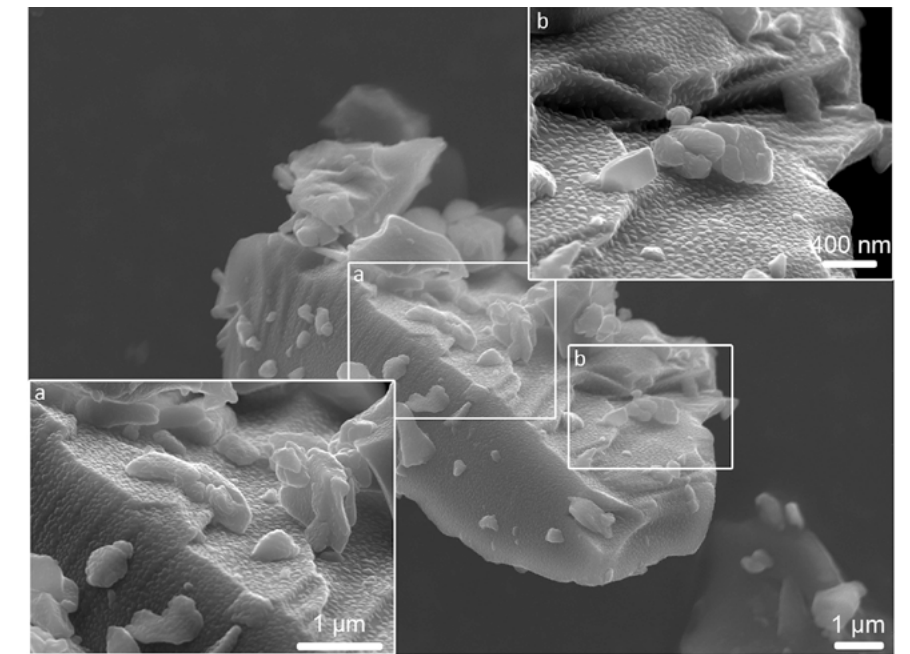
I think there was a clear effect for me to live in a different place where I was in a more urban area and where there was more pollution detected scientifically. I also recognise in my daily life that all these places that I'm moving to have an impact on me. Diet-wise I don't know. I did start to think about avoiding man-made additions to food, like nitrates, and also meat. I think definitely my science has an impact because I have this deeper understanding.

TM: *Can you tell us what your current research is occupied with?*

Ines: I work on the impacts of volcanic eruptions on human health and specifically on the respiratory hazards of volcanic ash, which are particles emitted by an eruption smaller than two millimetres in diameter. In my research, I also combine the geological aspects, the physical and chemical characterisations of material, but also toxicology because I work in a biological environment with human lung cells. I do experiments with lung models in vitro. In my current research I'm interested specifically in complex atmospheres, in volcanic gases and ash in combination because in general we are never exposed to one individual component. While it is important to study and understand them separately, we need to investigate them in combination, as we are always exposed to a mixture of compounds. Air is composed of different materials, of different elements. My focus now is on co-exposures to volcanic gases and ash, and also on exposures with urban pollution and natural materials.

TM: *What elements are important here?*

Ines: For respiratory health and for potential mechanisms of toxicity in the lungs, the elements that are absorbed on particles, not just volcanic ash but particles in general. We are interested in elements such as iron, manganese, copper, zinc, cadmium. These are the metals that are involved in the generation of reactive oxygen species, which may have adverse effects. They're involved in the redox reaction in our body. These are the processes



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that on the cellular level can lead to oxidative stress. Very often you will hear about pharmaceutical products saying this is against oxidative stress. It's an antioxidant. In this context I'm looking at metals that are involved in these reactions in lung cells specifically.

TM: Can you tell us something about the ways in which you work on a very practical level?

Ines: I'm specialized in toxicology, so with in-vitro experiments with lung cells, with lung models. I'm exposing the cells to volcanic particulate and gases, to study the mechanisms of toxicity of such exposures. I also have sometimes the opportunity to go into the field. What I do in the field is sample my materials. I sample volcanic ash at different locations. For my research, I'm interested in areas where there is ash fall and which are populated, in urban cities. There are different ways to sample. Sometimes we sample from the ground what has been deposited, but also we do in-situ samplings, we put buckets that directly sample what is falling from the air.

My field work usually involves the collection of samples which then I will use in my in-vitro studies. Sometimes we collect some to characterize them, so to look at health relevant characteristics. For the materials, we are interested in what is the proportion of respirable particles; particles in the size that we can inhale and that can reach the deep lung.

We look at leachable elements which are soluble upon contact with water and that could contaminate water. We look at leachable elements in body fluids, simulated body fluids to

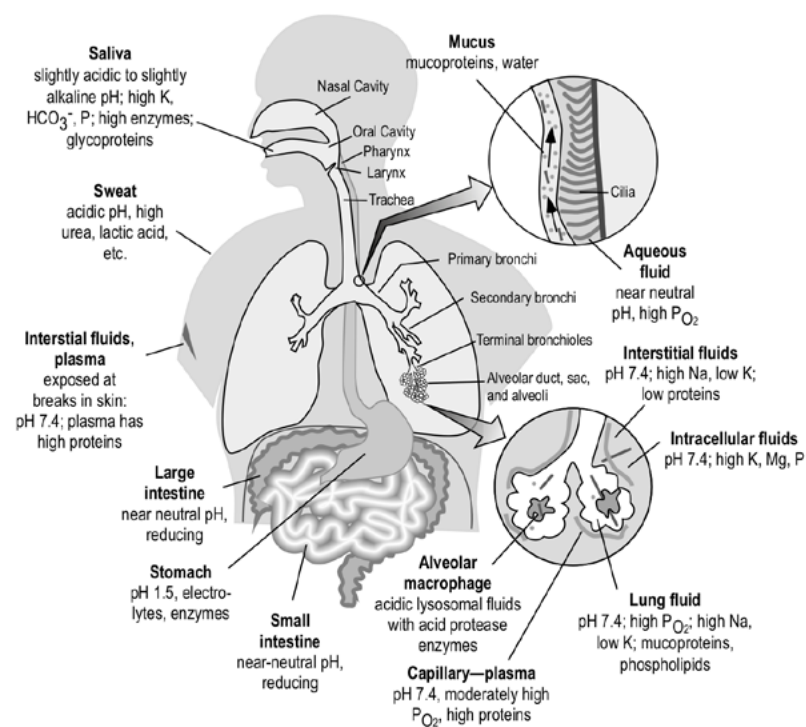


Figure 2. This schematic diagram, modified from Plumlee and Ziegler (2006), illustrates the various exposure routes and the substantial variability in body fluid types and compositions that can be encountered by earth materials during exposure.

also get an idea of what could be leached in our body. We'll look at the mineralogy of samples because there are some minerals (like crystalline silica) that are known toxicants.

TM: How does your work or medical geology in general relate to the idea of dosage, an optimal area of intake or exposure, and the idea of pharmakon?

Ines: There are established values like tolerable daily intakes for specific elements. This is a body of literature from the different disciplines with compiled and proposed ranges or values that should not be exceeded. There is an optimum range for each element which we can work on. I made a study where we were looking at groundwater quality in Tanzania. I was measuring trace elements in water that is being used by local people, for drinking, for cooking and for irrigation. This is when I compare measured values to existing guideline values. If I find an excess of some elements, this is an indication to tell them locally that this water may not be appropriate for long-term consumption. We try to understand local geology to find areas with safe water because elements in water depend on geological background and on water rock interactions.

The base in toxicology is to do a dose response curve at the beginning of any experiment, because I need to establish which concentrations are inducing a response in my cells. This is the tricky part, as not always what we do in the lab relates to real life as sometimes the doses I need to use in my experiments are not really realistic. This is the tricky part in science to establish the concentrations that we are actually exposed to.

For air quality, there are also guidelines. The concentrations of particulates, so PM 10, which are less than 10 microns, and PM 2.5 is monitored in every city daily. There are guidelines to say that a specific value should not be exceeded more than several times per year. This is also just like dose response because if these concentrations exceed this threshold on several locations, it means the quality is poor and that it could have an impact on people's health.

TM: What are your initial thoughts on the Tiny Mining community and its connection with medical geology?

Ines: I find the idea interesting. Personally I never thought about it in this way. Mining the body for the elements, it sounds tricky. Elements in the environment exist in different forms, in different chemical states, which may be the same or not in our bodies. Scientifically, the form in which you would get elements from our bodies is not the same as it is in nature. I like the train of thought, especially from the perspective of ecology. I worked on mining sites and pollution related to mining activities and how mine waste can be dangerous for people who are exposed to it by air or by ingestion. To have this idea that we can move away from these processes and actually use ourselves for such a benefit, I think it's interesting.

But from a scientific point of view I find it difficult to imagine. How would it work? Can it actually work? Our balance is sometimes so fragile. If you wanted to extract amounts that an

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The only extraction that I know, of geological material from our body is our kidney stones, because this is a process that is mineralogical.

industry would need, you would need to input excessive amounts. The balance of health and benefits in everyday life with this project is very tricky and difficult to imagine.

TM: Can you relate the project to anything or to any other practices that you've come across in medical geology?

Ines: I've never come across the idea of extracting things from the body. We are producing elements as well. From what we input and regardless of the dose, we produce chemical compounds and elements. In urine you will find elements and these can tell you about your health state, but also if your environment is influencing you, if there are certain elements in excess. The only extraction that I know, of geological material from our body, is our kidney stones, because this is a process that is mineralogical. It's a sedimentation within the body that is an interaction of our body fluids and different elements and external factors. What people call a stone. This is obviously harmful for our body to have any type of deposits. So extracting kidney stones is the only thing I can think of that has this idea related to the concept of your project.

TM: Do you have any advice from a scientific or a personal perspective for the tiny mining community?

Ines: I'm not a nutritionist. But we try to be aware of what we eat. There is the saying, 'we are what we eat, breathe and drink'. We should be more aware to try to avoid vegeta-

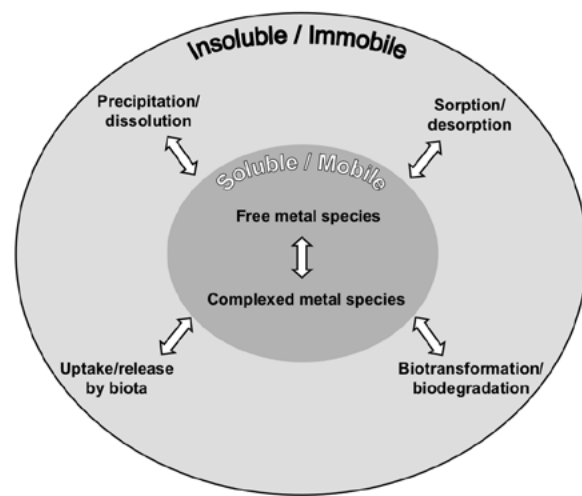


Figure 3. Dominant processes that control the mobility of metals in the environment. Oxidation/reduction may be associated with any of these processes, depending on the metal.

I think we were made and we are in nature and we live with nature. So why not use what nature gives us and avoid areas where we destroy this, where we overuse the land.

bles and fruits that were exposed to pesticides. This is again man-made, also through the soil, and the use of such products is scientifically proven not to be good. In this way we, through our food, we input things that we don't expect to input.

This is something that we can control. Whereas air pollution is something that is often out of our control. It's about governmental policies to reduce the number of cars in areas or to reduce emissions. As an individual, maybe you don't have such an influence. Air is how it is. You can think for yourself to not use your car as often. If you follow warnings for poor air quality, the scientific recommendation usually is to stay indoors or just to try to limit your exposure. There is always this precautionary approach. During volcanic eruptions, of course, the recommendation is to wear face masks. Not the surgical ones, like for COVID, but masks that are able to filter out particulates. It's more about educating yourself and trying to avoid the input of the unnecessary, to avoid over-industrialized, over-processed food products. Obviously this is altered from its natural state. And again, I think we were made and we are in nature and we live with nature. So why not use what nature gives us and avoid areas where we destroy this, where we overuse the land. Regarding levels of elements, this also largely depends on individuals and on individual health, on the background, on genetics and on the environment. This is why it's so complicated because it's influenced by so many different factors. We should be aware of the factors that we can influence and try to control them.



Figure 1. There is a continuum of interactions between the earth's geosphere, hydrosphere, biosphere, atmosphere, and anthropogenic activities that all can produce earth materials or environmental materials to which humans can be exposed and that may be of potential health concern.

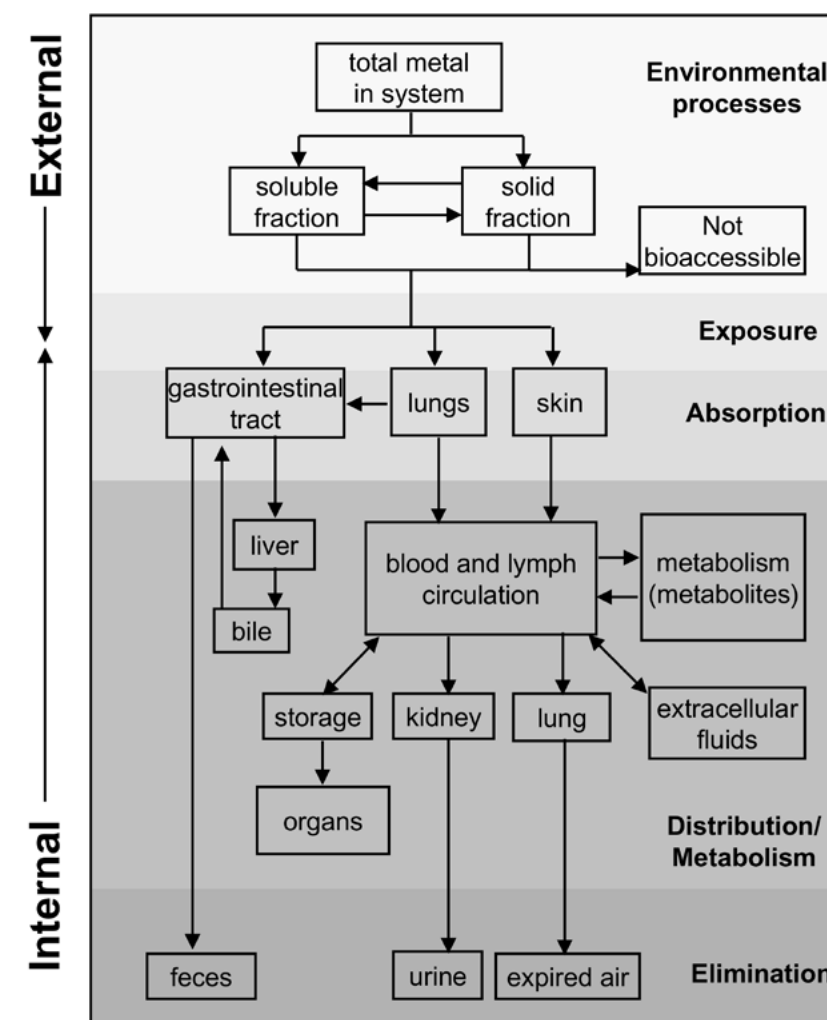
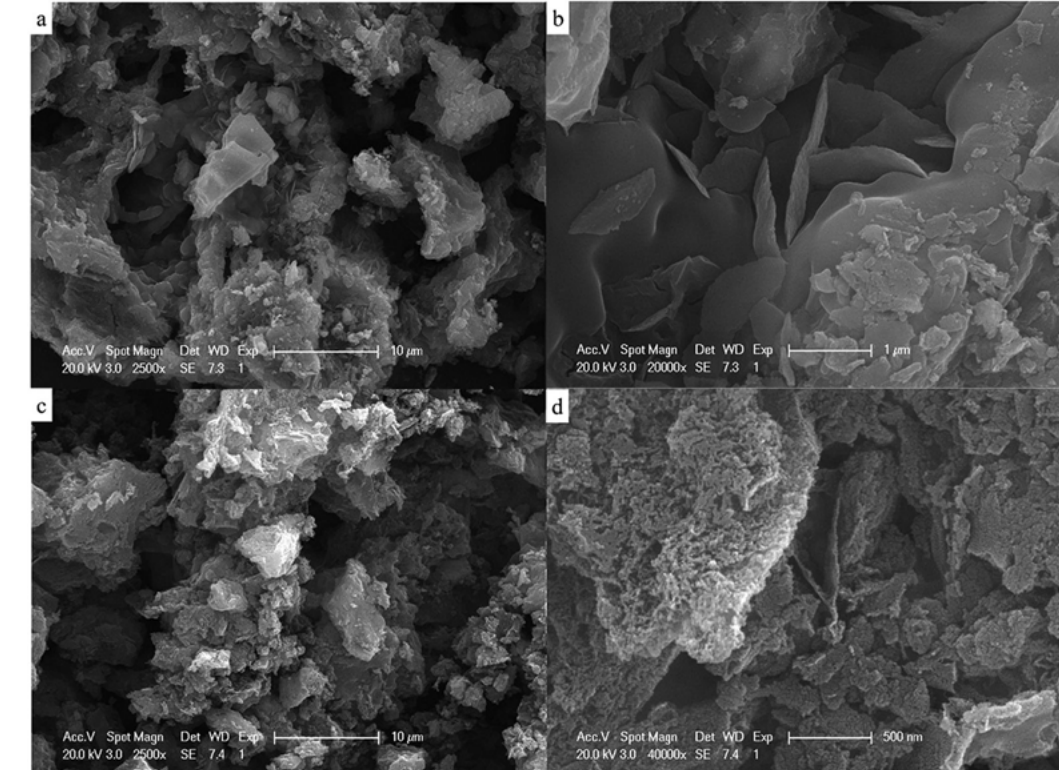
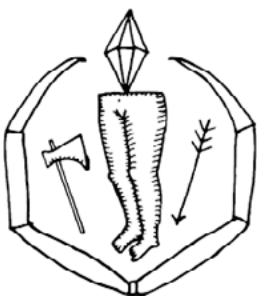


Figure 6. Idealized diagram illustrating the range of pathways and processes affecting the environmental and physiological behavior of metals. [Adapted from the National Library of Medicine (<http://www.sis.nlm.nih.gov/enviro/toxtutor/Tox2/a11.htm>).]

We need to get to know the doses - from deficiency to toxicity - how much to extract from ourselves and how much to ingest. We become bio-markers, indicators of earthly or planetary health. How much can we extract from the earth, and return to the earth? I offset what I take from the earth, and the damage I cause the earth, through this giving back. We try to get to know our own cycles, of excess, of regulation and of deficiency.





Schwermetalle im Urin

Schwermetalle weisen ein breites Wirkspektrum auf.

- Sie binden aufgrund ihrer hohen Affinität zu Schwefel an Disulfid- und Sulfhydrylgruppen von Proteinen. Dies führt zu **Proteinstrukturveränderungen**, sowie zur **Enzymfunktionsbeeinträchtigungen** und begünstigt die Entstehung von Autoimmunerkrankungen.
- Schwermetalle schädigen Zellstrukturen v.a. des **Immun- und Nervensystems**. Sie inhibieren zentrale Regulationsmechanismen.
- Schwermetalle inaktivieren das **Entgiftungssystem** durch Enzymhemmung. Sie induzieren auf diese Weise die Bildung freier Radikale.
- Ein zentraler Wirkmechanismus der Metalle besteht in Ihrer Wechselwirkung mit essenziellen Mikronährstoffen wie Calcium, Eisen, Zink und Selen, deren Aufnahme reduziert wird. Hieraus resultieren erhebliche **Stoffwechselstörungen**, da Mikronährstoffe insbesondere als Enzymaktivatoren fungieren.
- Schwermetalle reichern sich bevorzugt in ZNS, Knochen, Bauchspeicheldrüse, Nieren und Leber an. Einige Organe fungieren als **Schwermetalldepots**, so z.B. Knochengewebe (Blei, Cadmium), Hypophyse (Quecksilber) und Leber (Kupfer).

Arsen im Urin

Arsenverbindungen werden überwiegend im Gastrointestinaltrakt resorbiert und reichern sich in Leber, Nieren, Lunge sowie Milz an.

Folgende **Symptome und chronische Erkrankungen** sind mit einer erhöhten Arsenbelastung assoziiert:

- Ekzeme, Dermatitis, Depigmentierung, Hyperkeratosen
- weißliche Querstreifen an den Fingernägeln (Mees-Bänder)
- starker Haarausfall
- neurologische Symptome: Neuropathien, Polyneuritis, Sehnervenatrophie
- Atembeschwerden
- Herzrhythmusstörungen
- toxische Leberschäden
- bei chronischer Arsen-Belastung: initialer Abfall des Hämoglobins mit reaktiver Polyglobulie durch starke Bindung an Sulfhydryl-Gruppen von Enzymen der Blutbildung wie z.B. der Delta-Aminolaevulin-säure-Synthetase

Einigen Arsenverbindungen wird eine teratogene und mutagene Wirkung zugeschrieben. Arsenhaltige Säure wird als karzinogen eingestuft. Reines Arsen selbst ist zwar nicht giftig, dafür jedoch umso mehr seine Verbindungen. Dreiwertige lösliche Verbindungen des Arsens sind hoch toxisch, weil sie biochemische Prozesse wie z.B. die DNA-Reparatur und den zellulären Energiestoffwechsel inhibieren können.

Zur individuellen Besprechung der übermittelten Laborergebnisse setzen Sie sich bitte mit einem Arzt oder Therapeuten in Verbindung.

Anonym, -

Probenabnahme am 15.04.2021
Probeneingang am 15.04.2021 11:32
Ausgang am 21.04.2021



Eine erhöhte Arsenkonzentration sollte hinsichtlich folgender möglicher **Expositionsquellen** abgeklärt werden:

- Farbstoffe
- Holzschutzmittel
- Emission bei der Kohleverbrennung
- Halbleiter in der Computerindustrie, Leucht- und Laserdioden
- Entfärbungsmittel in der Glasproduktion
- Keramikartikel
- Trinkwasser
- Nahrungsmittel: Meeresfrüchte (Muscheln), Fisch (Garnelen), Hühnereier (Fischmehl), Reis und Reisprodukte

Medizinisch validiert durch Dr. med Patrik Zickgraf und Kollegen.
Dieser Befund wurde maschinell erstellt und ist daher auch ohne Unterschrift gültig.

Wichtige Laborinformation



Schwermetall-Analytik im Urin

Urin-Kreatinin-Bestimmung zur Prüfung der Probenverwertbarkeit optimiert

Sehr geehrte Kolleginnen und Kollegen,
liebes Praxisteam,

im Rahmen der Optimierung der analytischen Qualität in der Schwermetall-Analytik können wir die Analytik von Schwermetallen im Urin nur dann durchführen, wenn die

► **Kreatininwerte im Urin innerhalb der Grenzwerte von 0,2 bis 3,0 g/l** liegen.

Hintergrund: Mit Hilfe der Kreatinin-Bestimmung im Urin können diuresebedingte Schwankungen der Schwermetallkonzentrationen berücksichtigt werden. **Im Falle stark verdünnter bzw. konzentrierter Urine kommt es zu falsch hohen bzw. falsch niedrigen Messwerten der jeweiligen Analyten**, sodass eine valide Aussage im Hinblick auf eine etwaige Schwermetallbelastung nicht mehr möglich ist.

Da das Trinkverhalten maßgeblich Einfluss auf die Diurese und damit auf die Kreatininausscheidung nimmt, ist die Aufnahme von größeren Trinkmengen – aber auch eine Flüssigkeitsabstinenz – vor Durchführung des Tests zu vermeiden. Daher bitten wir Sie, den Test morgens durchzuführen und Ihre Patienten anzuweisen, am Abend bzw. in der Nacht vor der Probennahme **ca. 300 ml in der kalten Jahreszeit** und **ca. 500 ml Flüssigkeit in der warmen Jahreszeit** aufzunehmen. Diese Information findet sich auch in unserer aktualisierten Anleitung, die jedem Urin-Testset beiliegt.

Weitere Gründe für Abweichungen der Kreatinin-Konzentrationen im Urin finden Sie auf der Rückseite dieses Schreibens.

Danke für Ihr Verständnis, wenn eine Schwermetall-Analytik nicht mehr erfolgt, sobald die Kreatinin-Messwerte außerhalb der definierten Grenzwertbereiche liegen. In diesem Fall bitten wir um Neueinsendung und detaillierte Anweisung des Patienten.

Haben Sie Fragen oder möchten Probennahme-Materialien bestellen? Unser Kundenservice-Team steht Ihnen per E-Mail unter info@ganzimmun.de wie auch unter der Rufnummer **+49 (0) 6131 7205-0** montags bis freitags zwischen 8 und 19 Uhr zur Verfügung. Oder nutzen Sie das Kontaktformular unter www.ganzimmun.de.

Mit freundlichen Grüßen

Dr. med. Zickgraf
und das Team der GANZIMMUN Diagnostics AG



Wichtige Laborinformation: Schwermetall-Analytik im Urin

Weitere Ursachen für **erniedrigte** Urin-Kreatinin-Konzentrationen:

- geringe Skelettmuskelmasse
- Nierenerkrankungen, die zu einer eingeschränkten glomerulären Filtrationsrate (GFR) führen
- Altersbedingte Einschränkung der GFR:
Ab dem 20. Lebensjahr kommt es zu einer 5%igen Abnahme der GFR* pro Lebensdekade, sodass bei einem 70-jährigen mit einer um ca. 25% reduzierten GFR zu rechnen ist.
- in-vitro- sowie in-vivo-Verdünnungen des Urins

* Zur Beurteilung der GFR empfehlen wir die Bestimmung von Cystatin C im Serum.

Weitere Ursachen für **erhöhte** Urin-Kreatininkonzentrationen:

- unzureichende Flüssigkeitsaufnahme
- hohe Skelettmuskelmasse
- hoher Fleischkonsum
- regelmäßige Supplementierung von Kreatin, z. B. in Form von Muskelaufbaupräparaten
- Nierenerkrankungen, die zu einer eingeschränkten glomerulären Filtrationsrate (GFR) führen





medivere GmbH - Hans-Böckler-Straße 109 - D-55128 Mainz



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Probenabnahme am 10.12.2020
Probeneingang am 10.12.2020 13:46
Ausgang am 18.12.2020

Befundbericht

Endbefund, Seite 1 von 4

Benötigtes Untersuchungsmaterial: Urin

Untersuchung	Ergebnis	Einheit	Vorwert	Referenzbereich/ Nachweisgrenze
Klinische Chemie				
Kreatinin i. Urin (Jaffé)	0,86	g/l	<div><div></div></div>	0,25 - 2,00
Mikronährstoffe				
Schwermetall Urintest plus				
Kreatinin-bez. Messwerte:				
Aluminium i. Urin	14,1	µg/g Krea	<div><div></div></div>	< 45,0
Antimon i. Urin	<1,50	µg/g Krea	<div><div></div></div>	< 1,50
Arsen i. Urin	15,3	µg/g Krea	<div><div></div></div>	< 35,0
Wegen des hohen Arsengehalts in Meeresfrüchten und Hochseefischen (nicht schädliche organische Verbindungen), sollten die Ernährungsgewohnheiten des Patienten berücksichtigt werden.				
Blei i. Urin	0,55	µg/g Krea	<div><div></div></div>	< 15,0
Cadmium i. Urin	0,88	µg/g Krea	<div><div></div></div>	< 1,25
Chrom i. Urin	<2,3	µg/g Krea	<div><div></div></div>	< 2,25
Eisen i. Urin	<4,0	µg/g Krea	<div><div></div></div>	4,0 - 30,0
Kobalt i. Urin	1,30	µg/g Krea	<div><div></div></div>	< 1,3
Kupfer i. Urin	31,9	µg/g Krea	<div><div></div></div>	4,5 - 160,0
Nickel i. Urin	2,97	µg/g Krea	<div><div></div></div>	< 4,5
Palladium i. Urin	0,1	µg/g Krea	<div><div></div></div>	< 2,0
Platin i. Urin	<0,06	µg/g Krea	<div><div></div></div>	< 0,06



medivere GmbH - Hans-Böckler-Straße 109 - D-55128 Mainz



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Probenabnahme am 17.12.2020
Probeneingang am 17.12.2020 11:18
Ausgang am 23.12.2020

Befundbericht

Endbefund, Seite 1 von 5

Benötigtes Untersuchungsmaterial: Urin

Untersuchung	Ergebnis	Einheit	Vorwert	Referenzbereich/ Nachweisgrenze
Klinische Chemie				
Kreatinin i. Urin (Jaffé)	1,07	g/l	<div><div></div></div>	0,36 - 2,37
Mikronährstoffe				
Schwermetall Urintest plus				
Kreatinin-bez. Messwerte:				
Aluminium i. Urin	31,3	µg/g Krea	<div><div></div></div>	< 45,0
Antimon i. Urin	<1,50	µg/g Krea	<div><div></div></div>	< 1,50
Arsen i. Urin	226,0	µg/g Krea	<div><div></div></div>	< 35,0
Wegen des hohen Arsengehalts in Meeresfrüchten und Hochseefischen (nicht schädliche organische Verbindungen), sollten die Ernährungsgewohnheiten des Patienten berücksichtigt werden.				
Blei i. Urin	<15,00	µg/g Krea	<div><div></div></div>	< 15,0
Cadmium i. Urin	0,06	µg/g Krea	<div><div></div></div>	< 1,25
Chrom i. Urin	<2,3	µg/g Krea	<div><div></div></div>	< 2,25
Eisen i. Urin	5,1	µg/g Krea	<div><div></div></div>	4,0 - 30,0
Kobalt i. Urin	0,15	µg/g Krea	<div><div></div></div>	< 1,3
Kupfer i. Urin	8,0	µg/g Krea	<div><div></div></div>	4,5 - 160,0
Nickel i. Urin	4,49	µg/g Krea	<div><div></div></div>	< 4,5
Palladium i. Urin	0,1	µg/g Krea	<div><div></div></div>	< 2,0
Platin i. Urin	<0,06	µg/g Krea	<div><div></div></div>	< 0,06

Schwermetall Urintest plus

Kreatinin-bez. Messwerte:

Aluminium i. Urin	8,5	µg/g Krea	<div><div></div></div>	< 45,0
Antimon i. Urin	<1.50	µg/g Krea	<div><div></div></div>	< 1,50
Arsen i. Urin	65,6	µg/g Krea	<div><div></div></div>	< 35,0
Wegen des hohen Arsengehalts in Meeresfrüchten und Hochseefischen (nicht schädliche organische Verbindungen), sollten die Ernährungsgewohnheiten des Patienten berücksichtigt werden.				
Blei i. Urin	1,81	µg/g Krea	<div><div></div></div>	< 15,0
Cadmium i. Urin	0,15	µg/g Krea	<div><div></div></div>	< 1,25
Chrom i. Urin	<2.3	µg/g Krea	<div><div></div></div>	< 2,25
Eisen i. Urin	19,9	µg/g Krea	<div><div></div></div>	4,0 - 30,0
Kobalt i. Urin	<1.30	µg/g Krea	<div><div></div></div>	< 1,3
Kupfer i. Urin	7,3	µg/g Krea	<div><div></div></div>	4,5 - 160,0
Nickel i. Urin	3,15	µg/g Krea	<div><div></div></div>	< 4,5
Palladium i. Urin	0,2	µg/g Krea	<div><div></div></div>	< 2,0
Platin i. Urin	<0.06	µg/g Krea	<div><div></div></div>	< 0,06

Arsen im Urin

Arsenverbindungen werden überwiegend im Gastrointestinaltrakt resorbiert und reichern sich in Leber, Nieren, Lunge sowie Milz an.

Folgende **Symptome und chronische Erkrankungen** sind mit einer erhöhten Arsenbelastung assoziiert:

- Ekzeme, Dermatitis, Depigmentierung, Hyperkeratosen
- weißliche Querstreifen an den Fingernägeln (Mees-Bänder)
- starker Haarausfall
- neurologische Symptome: Neuropathien, Polyneuritis, Sehnervenatrophie
- Atembeschwerden
- Herzrhythmusstörungen
- toxische Leberschäden
- bei chronischer Arsen-Belastung: initialer Abfall des Hämoglobins mit reaktiver Polyglobulie durch starke Bindung an Sulfhydryl-Gruppen von Enzymen der Blutbildung wie z.B. der Delta-Aminolaevulin-säure-Synthetase

Einigen Arsenverbindungen wird eine teratogene und mutagene Wirkung zugeschrieben. Arsenhaltige Säure wird als karzinogen eingestuft. Reines Arsen selbst ist zwar nicht giftig, dafür jedoch umso mehr seine Verbindungen. Dreiwertige lösliche Verbindungen des Arsens sind hoch toxisch, weil sie biochemische Prozesse wie z.B. die DNA-Reparatur und den zellulären Energiestoffwechsel inhibieren können.

↕
Eine erhöhte Arsenkonzentration sollte hinsichtlich folgender möglicher **Expositionsquellen** abgeklärt werden:

- ▶ Farbstoffe
- ▶ Holzschutzmittel
- ▶ Emission bei der Kohleverbrennung
- ▶ Halbleiter in der Computerindustrie, Leucht- und Laserdioden
- ▶ Entfärbungsmittel in der Glasproduktion
- ▶ Keramikartikel
- ▶ Trinkwasser
- ▶ Nahrungsmittel: Meeresfrüchte (Muscheln), Fisch (Garnelen), Hühnereier (Fischmehl), Reis und Reisprodukte

Messwerte in µg/l:

Aluminium i. Urin	4,1	µg/l	<div><div></div></div>	< 20,0
BAT-Wert: < 300 µg/l am Schichtende (Labor & Diagnose, 8. Auflage, 2012). Bei langfristiger Exposition können toxische Auswirkungen ab einem Wert von 100 µg/L auftreten.				
Antimon i. Urin	<0.25	µg/l	<div><div></div></div>	< 0,25
Arsen i. Urin	31,5	µg/l	<div><div></div></div>	< 25,0
Biologischer Leitwert (BLW): < 50 µg/l Human Biomonitoring HBM-Wert: < 15 µg/l				
Blei i. Urin	0,87	µg/l	<div><div></div></div>	< 4,5
Biologischer Arbeitstoleranz Wert (BAT) für Gesamtblei: < 50 µg/l (Arbeitsmedizinische Leitlinie „Biomonitoring“, Stand 3/2013).				
Cadmium i. Urin	0,07	µg/l	<div><div></div></div>	< 0,50
Human Biomonitoring HBM-I Wert: < 1,0 µg/l (Erwachsene), < 0,5 µg/l (Kinder). Human Biomonitoring HBM-II Wert: < 4,0 µg/l (Erwachsene), < 2,0 µg/l (Kinder).				
Chrom i. Urin	<0.4	µg/l	<div><div></div></div>	< 1,00
Referenzwert: < 1,5 µg/l (Lexikon der medizinischen Laboratoriumsdiagnostik, 2007).				
Eisen i. Urin	9,6	µg/l	<div><div></div></div>	4,0 - 18,0
Kobalt i. Urin	<0.05	µg/l	<div><div></div></div>	< 1,1
MAK-Wert: < 60 µg/l am Schichtende (Lexikon der medizinischen Laboratoriumsdiagnostik, 2007).				
Kupfer i. Urin	3,5	µg/l	<div><div></div></div>	2,0 - 80,0
Maximale Aufnahme mit der Nahrung kann bis zu 1000 µg/Tag betragen (Labor & Diagnose, 8. Auflage, 2012).				
Nickel i. Urin	1,51	µg/l	<div><div></div></div>	< 3,30
Human Biomonitoring HBM-Wert: < 3,0 µg/l (Arbeitsmedizinische Leitlinie „Biomonitoring“, Stand 3/2013).				
Palladium i. Urin	<0.1	µg/l	<div><div></div></div>	< 0,4
Platin i. Urin	<0.010	µg/l	<div><div></div></div>	< 0,01
Human Biomonitoring HBM-Wert: < 0,01 µg/l (Arbeitsmedizinische Leitlinie „Biomonitoring“, Stand 3/2013).				
Quecksilber i. Urin	1,4	µg/l	<div><div></div></div>	< 2,3

Interview with a user.

Transcript of a leaked video. 2021.

How was the income?

I was making a good monthly income without any diets or supplements, without the fingers in the throat, and the burning. Just the monthly transfer from the company.

What did the company tell you about the health benefits for you and for the planet, what are their key words and what do they mean?

Chelation is one of their buzz-words. Bio-remediation, all those things which sound healthy for the body, healing for the planet. It's supposed to be good for the earth. Why dig deep in the earth to pull out precious metals when you can let the

body extract minerals and then simply harvest them with some pills. They say that it can heal people if they have too much of one mineral, or too much of the wrong kind - heavy metals, or radioactive.

Why did you start mining?

I started mining because I needed the money, and somehow it felt good, like I was more in contact with something out there, not in here. Death will stay away from me.

Is it natural? How does it feel or taste, what sensations are there?

It doesn't sound natural, but I think it is.

It shows us, beneath all this technology shit [looks down at phone], that we're one with nature. We are stone. Sometimes I even feel a bit more earthy after taking the pills. There's always a thick mineral taste in my mouth and some foods taste a bit different. It could be the taste of blood though. Slightly metallic, always a bit sandy when I think about it. Red, like red itchy eyes, you feel it in the mouth... It can be sore and rubbed.

Was the company open? How did they show you it working?

The company was quite open at the beginning and there was lots of information

available. It was technical ... maps of the human body, like those acupuncture posters, showing where it would mine and for what, how the pill would break open and the miners move through the body ... like crab claws which grab hold of the minerals inside, then scuttle away with their spoils. Into the deep red rock pools.

Is Argotine monitored? Do some users go DIY?

Argotine use is monitored. I've heard of users trying to break these limits, to mine with an unlocked app, but then you've got to go totally DIY and ditch mining for street pills and home extraction, and then sell your ores to the highest bidder. I didn't think that was for me.

How do the pills work?

The pills arrive, they're transparent but each one has an ID and has to be taken at a certain time. I think then they're all different. You take the pills when the app tells you, track, trace and wait. It depends a lot on what you're eating, how much you're exercising and where you are.

How do you know when it will happen? How does it feel, what is the process?

I sense it first. I know it's going to happen. I call it the "collector," the final pill, it pulls all the miners inside me together, clumps all the ores and then it comes out. That was the first shock. After a few hours you feel nauseous, sick inside and you know from the app and deep inside that something has to come out. It doesn't want to

stay in your body. I'm used to it now and it feels quite clean. I can do it fast as I know that it has to happen, but I don't force it. It feels a bit like a detox, those things aren't healthy for the body and Argotine is helping you, cleaning you out.

Tell me more about the process? Is it clean?

Then you vomit. If you eat too soon, just before the app tells you, it's messy. I feel it coming so I don't eat or drink for a few hours. Then it's clean. Just a bit of mucus, and dry retch. At first I wanted to keep that stone and polish it. It's dark and mysterious. But you have to let it go. Take a picture for the app, share if it's a nice one, then ship it. I like the terminal as it's more anonymous and no-one knows you're mining. There's a bit of stigma as you have to

be low-income. Well the ones who know they're mining at least, didn't just "catch" a dose of Argotine in someone's saliva.

What were some side effects, did it affect your vision?

I lost my sight, everything was red, seeing through the Argotine, just black, my toes and fingers looked burnt. Then it would pass. I would call the centre to ask about these side effects, symptoms, but there was only piped music, bagpipes and windpipes. People were breathing.

Why did you start mining for yourself, what feelings prompted this?

There's this feeling that something dark and fibrous was growing inside me, storage for the next level. This growing inside

thing is not "for" me, not for an outside but that it keeps itself, saves itself up, keeps me from earning. They called it "symbiotic" but it was keeping something from me, hiding something from me so I had to look inside, break it open and maybe make credit at the same time. Inside is a storage daemon, all the false promises of the company. They have transformed my natural life into an unnatural one. I can no longer live on my own resources.

I stopped eating.

Do you think there is some kind of conspiracy behind the company?

The company hides the natural way of doing things, of farming and eating, so that they can be financed by the mining within us. This is our sacrifice, of a way of living,

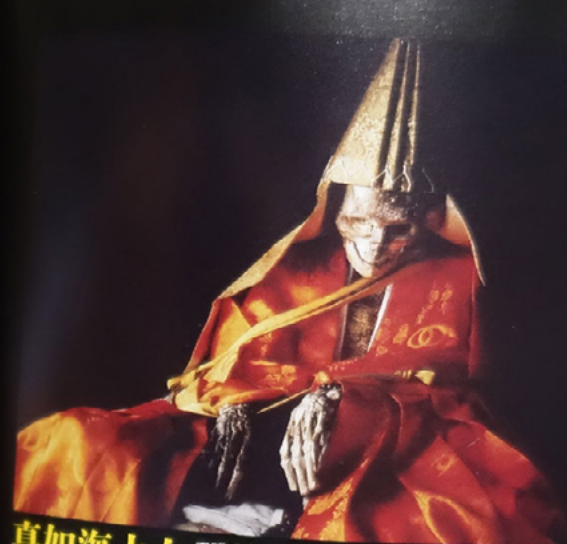
of our lives. It came to me like a conspiracy. They make fake adverts so we can find no other way, to keep them living on at our expense, by keeping ourselves alive, whoever or whatever it is that they are; demons maybe.

What should we do to end this conspiracy? How should we behave?

We must stay calm, detach from the body and from the processes of extraction, and call the true process. Continue with the uploads but to another server, served up by those who chase off the company and make it disappear. You will regain the natural extractions. You will attain perfection. You will spit on the ore that you vomited up and live always. You will go to your origin.



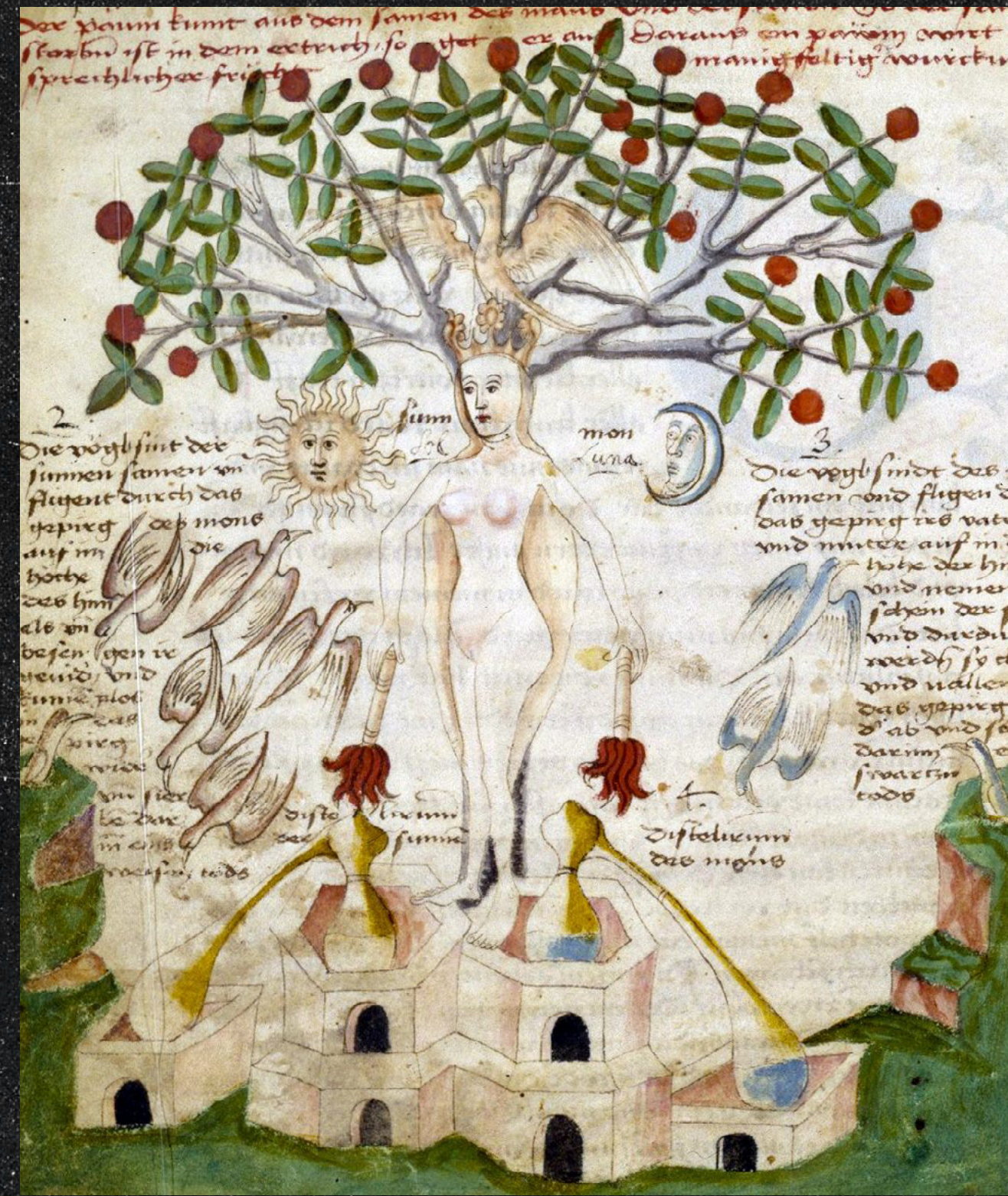
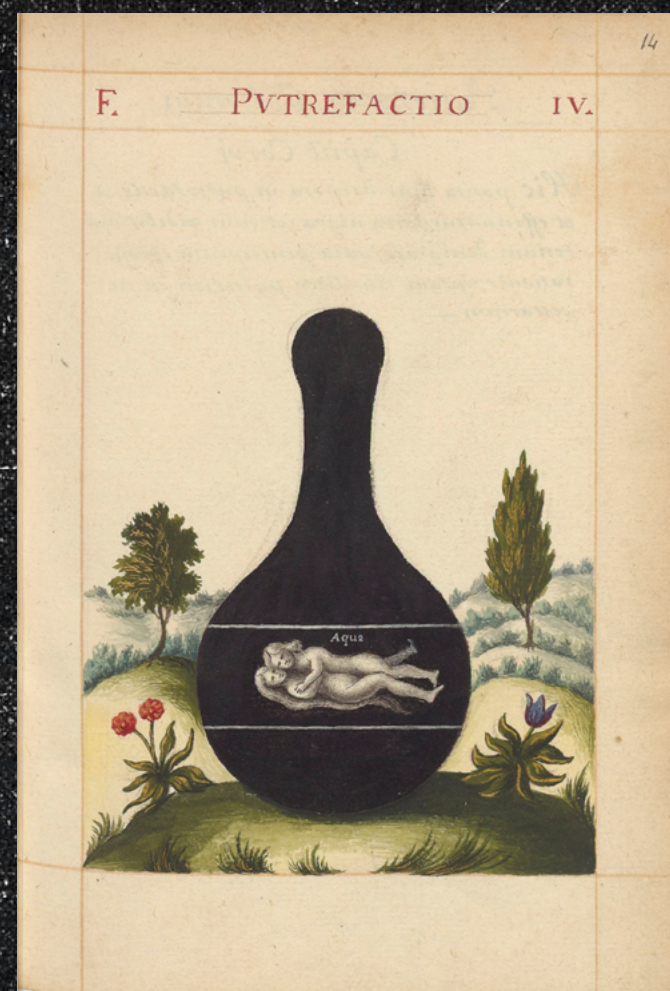
鉄門海上人 文政12(1823)年入定。下は12年に度の衣替
まの儀式(6章)。山形県鶴岡市/法蓮寺



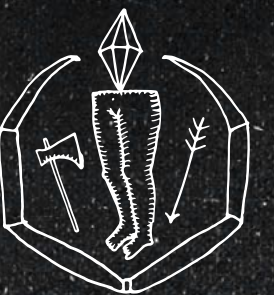
真如海上人 天明3(1783)年、大飢饉に苦しむ民衆の救済を祈願して土中
に葬られた(6章)。山形県鶴岡市/法蓮寺大日坊、写真は同寺



本明海上人 天和元(1681)年入定。下は12年に度の衣替
まの儀式(6章)。山形県鶴岡市



I incorporate the other; the earth, the forest at night, the haunted hedges, the poor wastelands. I incorporate the other only to vomit, piss and shit it out as my value in the world, as my consumption and my due. What I mine and refine belongs only to me, it comes from me, it is mine, mined. I don't touch the earth.



Coffee and blood: A brief anthropological reading of *Tiny Mining* on and off-world

Dr Aaron Parkhurst

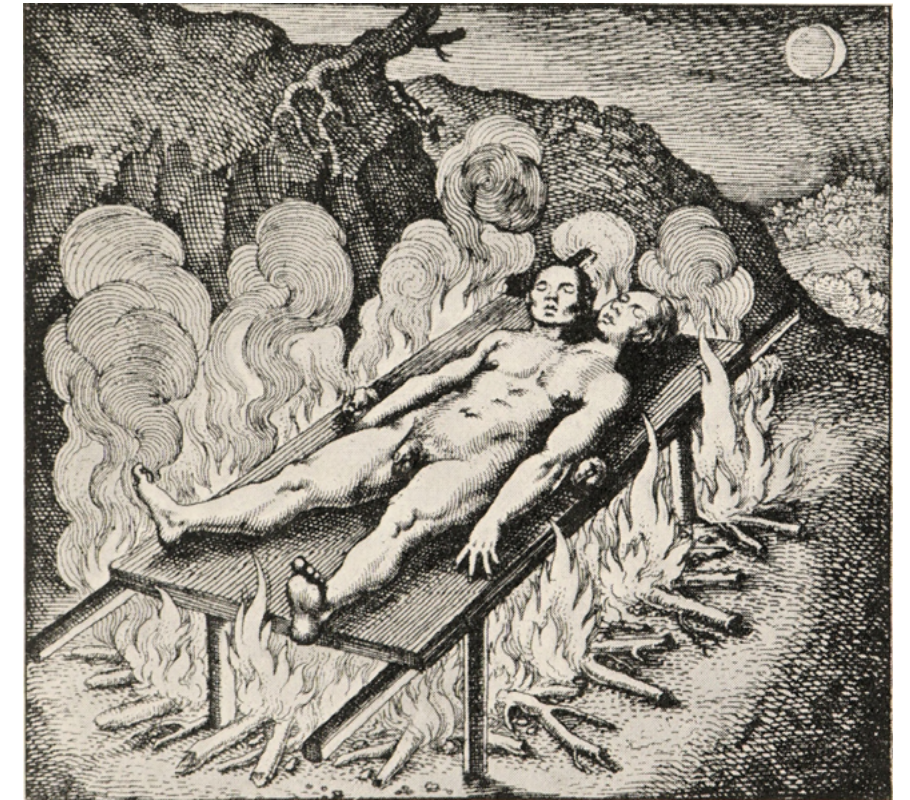
Senior lecturer in Medical and Biosocial Anthropology at University College London (UCL). His research has focused on the anthropology of the body, management of chronic illness, and bioethics.

Introduction: Mineral kinship

One of the greatest achievements of “Cosmos”, when it aired in 1980, was Carl Sagan’s ability to inspire a new sense of perspective from his viewers and readers. In one episode, he challenged his audience with a now famous provocation: “We are a way for the universe to know itself. Some part of our being knows this is where we came from. We long to return. And we can, because the cosmos is also within us. We’re made of star stuff.” The statement is powerful on multiple registers. In one regard, Sagan was speaking literally. Almost every metal in the universe is forged in the great celestial furnaces of the galaxy through nuclear fusion. Every atom of these metals in our bodies was made by these stars - lighter elements at first, and then heavier elements as their parent stars eventually ran out of fuel and exploded. In another regard, however, Sagan was speaking socially, perhaps even ethically. The idea that we are all ‘made of star stuff’ frames a collective identity. For some generations of anthropologists, kinship was understood as the very fabric of society, a universal concept that bound together people and the worlds which they inhabit. A grand intellectual project at that time was to understand what kinship actually was, or how it was defined and transmitted.

The late Marshall Sahlins, through what he called a “Frazerian piece... an exercise in uncontrolled comparison”, presented a paper that was meant to transcend idiosyncratic cultural practices and moments. He laid out the basic principle that kinship, whether applied genealogically or sociologically, is defined as nothing short of social actors being “made of the same stuff”¹. Such a definition is important. It allows for acceptance of relationships between people who are born of the same parents, or who are sustained of the same nutrient rich soil, or who are composed of the same dreams and stories. Biological transmission is then understood as one of many cultural transmissions within the remit of kinship. How romantic, then, is the grandiose vision of Carl Sagan’s provocation! One’s iron-rich blood, and the zinc and copper in one’s joints, binds one to another, and to the planet and its parent star as well, in a sort of cosmic procreation. It is an interesting conjecture, and no doubt attractive to the artists within us, even if such kinship is rarely grounded, so to speak, in practice. To what degree, and under what remits, do we share our composition? What is the separation and connection between our ‘selves’, and the various physical and social elements of which we are composed?

By challenging its audience to reconsider the composition of the human body, *Tiny Mining* invokes these first of many anthropological questions. *Tiny Mining* is a community of artists, chemists, geologists and other scientists and practitioners, exploring what they call ‘extreme’ ecologies of the body – positioning the human body as an extractive mineral resource.



1. M. Sahlins, “What kinship is (part one)”.
Journal of the Royal Anthropological Institute,
17(1), 2011, 4.

The iron within the blood has [...] cosmic origins. It is formed in stars, the heaviest atoms that a star can make in its fusion cores before it supernovas and scatters its elements across the galaxy. Within the human body, iron is no less remarkable.

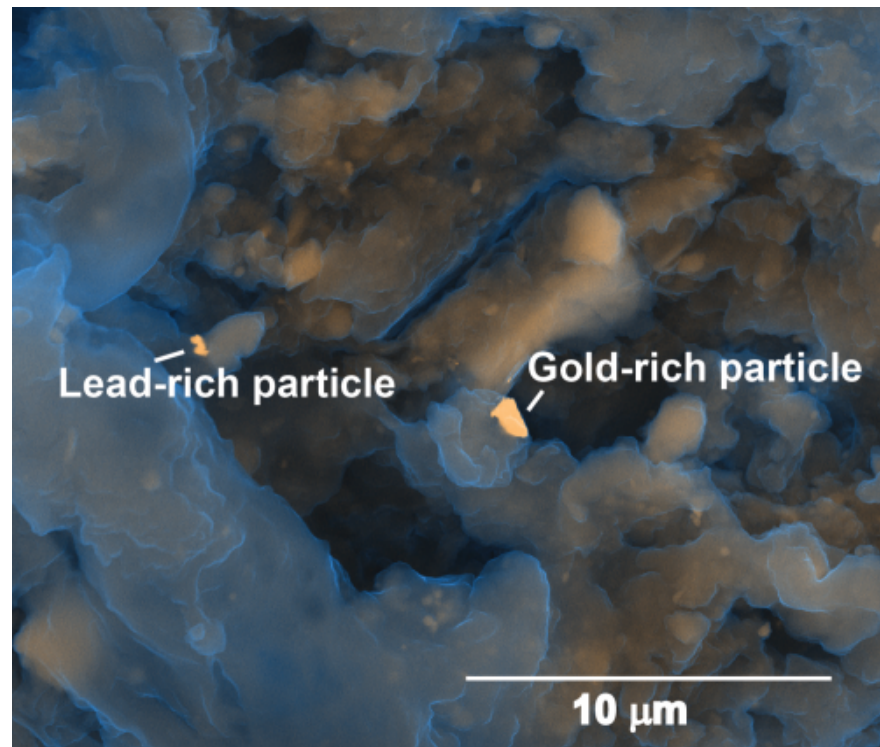
2. M. Douglas, *Natural Symbols* (1996 ed.). London: Routledge, 1970.

3. J. Copeman, and D. Banerjee, *Hematologies: The Political Life of Blood in India*, Cornell University Press, 2019.

Within anthropogenic contexts, *Tiny Mining* is a comment upon the exploitation of the natural environment. However, it is also a reflexive and embodied practice, a meditation perhaps on one's relationship with land, waste, and resources. As a discipline, anthropology might ask very broadly how social relations are formed. Few things escape the inclusion of social systems, and a project on extreme ecologies of the body is no less susceptible to such scrutiny. In this short essay, I offer a very brief discussion of what *Tiny Mining* might offer to debates within anthropology, and medical anthropology more specifically, and how it might challenge narratives of the objectification of the body and its parts, perhaps even on an atomic level.

Blood, organs and markets

The iron within the blood has, as alluded to above, cosmic origins. It is formed in stars, the heaviest atoms that a star can make in its fusion cores before it supernovas and scatters its elements across the galaxy. Within the human body, iron is no less remarkable. It is crucial in the construction of myoglobin and hemoglobin, helping to carry oxygen throughout the body. Without this function of blood, human life cannot survive. In her formulations of a framework of symbolic anthropology, Mary Douglas has outlined blood as a seemingly natural symbol of society, partly because of its widespread association of kinship². Such thinking charts the potency of blood as far beyond biological, and indeed beyond the remit of kinship, shaping commercial and political life, and creating new social collectivities³.



Relatively recent medical technologies that allow for the safe sharing of blood between individuals complicate such social potency. Transfusion practice saves lives. Any patient with hemorrhagic shock requires transfusion, and there are complex economies of care that shape how such practice is conducted. From a medical perspective, in any particular context, blood must be taken from the ‘correct’ individual, and given to the ‘correct’ patient, in the correct dose, within the correct time, and in the ideal amount for the nature of the hemorrhagic shock. Blood is always in demand, and often must be triaged. It is this scarcity, and the fact that it is sourced from the human body, that makes blood a nexus for anthropological thought. Transfusion technologies, and related practices, have informed a wide social consciousness. Community and national level blood drives, organ donation campaigns, regulated and unregulated organ trades, and new forms of medical tourism arise from what is now common medical practice.

Medical anthropologists have explored multiple dimensions of these trends, but I have space in this short piece to outline two related themes that take central importance in thinking through the construction of ethics and the sociality of what can be taken from the human body: commodification and inalienability. Both of these themes speak towards a wider problem in the anthropology of the body. That is, in what ways is the body objectified, and what are the consequences of this objectification? In the case of organs, the ethics of trade are brought to the fore: who has rights to the materials of the body? In an unregulated

organ trade, the fact that a kidney can be removed and given to another creates a situation in which massive economic disparity informs the flow of organs from the global South to the global North. Ethnographers have collected the narratives and experience of individuals who have lived through the choice of selling their organs in the face of extreme debt and poverty, and the nature of the full agency of the seller is always complicated⁴. As many theorists of labour have pointed out, it can be argued that workers of all sorts sell their physical body as an economic liaison for skilled trade - to chop, assemble, dig, fight, construct; the energy stored within the human cells converted into French baguettes, Honda Civics, architectural renderings, or sex work. The stuff of the human body, however, seems to bridge the cultural limits of what can be considered an economic good. As American political Philosopher Michael Sandel has asked⁵, we might accept that there are things that money can buy, but are there things that money shouldn't be able to buy? When debt-ridden individuals turned to kidney selling in Calcutta, they received a tiny fraction (one-fortieth) of the cost paid by the wealthy who, faced with the final years of dialysis, would purchase a kidney at any cost. The vast majority of the money is kept by middle agents of the ambiguous international market. Within a year, sellers are back in debt⁶.

Marxist scholars might refer here to the fetishization of commodities - the ability for the market to remove social relations and affective and emotive engagements that exist between individuals, and place them into objects, in the money exchanged between vendors,

[...] workers of all sorts sell their physical body as an economic liaison for skilled trade - to chop, assemble, dig, fight, construct; the energy stored within the human cells converted into French baguettes, Honda Civics, architectural renderings, or sex work.

4. N. Scheper-Hughes, "The global traffic in human organs". *Current anthropology*, 41(2), 2000, 191-224; L. Cohen, "Where it hurts: Indian material for an ethics of organ transplantation". *Daedalus*, 128(4), 1999, 135-165.

5. M.J. Sandel, "What money can't buy: the moral limits of markets". *Tanner Lectures on Human Values*, 21, 2000, 87-122.

6. Cohen.



7. L.A. Sharp, "The commodification of the body and its parts". *Annual review of anthropology*, 29(1), 2000, 287-328.

8. L.A. Sharp, "Commodified kin: Death, mourning, and competing claims on the bodies of organ donors in the United States". *American Anthropologist*, 103(1), 2001, 112-133.

and within brands, rather than people. The ethical danger here is a shift in cognitive association, in which kidneys, say, do not 'come from' a woman in Calcutta, but simply from a branded clinic in Turkey. Instinct has readers often recoil at the idea of people selling their body parts; it transgresses the sacral boundaries of the skin. Yet, when there are not enough of these body parts to satisfy need, it is easy to turn to the comfort of the market. History has shown that markets and their actors will enact great violences for things less intimate and critical to life as organs: oil, salt, gold, as I will address soon, and opiates, even as one is unlikely to die without gold (though, as the tiny miners can tell the reader, gold atoms are indeed present throughout the human body). Yet many societies are used to markets. They are comforting, and they afford an erasure of the obligations between people.

Yet the commodification of the body and its parts in anthropology is far more complex than reduction to political economy. Its existence opens up multiple lines of social inquiry, from debate on novel ethical commitments, to the subtle use of metaphor that shapes social acceptance⁷, to questions on the inalienability of those 'stuffs' that can be extracted from the body⁸. Technological advancements might serve in some regards to objectify the body, isolating it from the identity and selfhood of those from whom it is sourced. However, there is great consideration in the social canon on how the relationships and obligations between people are carried forth in economic and cultural transactions, and through technological processes. Some of the very foundations of British Anthropology are premised partly on a re-

[...] what aspects of a good are alienable - separated from the giver in the exchange - and what are inalienable.

9. B. Malinowski, *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*, Routledge, 2013 [1922/1994].

10. M. Mauss, *The gift: The form and reason for exchange in archaic societies*. London: Routledge, 2002.

lated ethnographic question. Bronisław Malinowski, from his years spent studying the Kula cycle, an exchange of bracelets and necklaces in the Trobriand Islands in the Melanesian New Guinea archipelago, famously asked “why would men risk life and limb to travel across huge expanses of dangerous ocean to give away what appear to be worthless trinkets?”⁹. Decades of inquiry following this question has outlined theories of what relations are embedded in the ‘gift’ exchange, the obligations of reciprocity involved, and the ‘spirit of the thing’ - what the Maori for example, famously outlined by Marcel Mauss, called the Hau - a force binding the giver and the receiver.

The person within the object

There is something very challenging here in teasing out the different complexities between what is embedded in a ‘gift’ as opposed to what is ‘purchased in a market’. That is a large debate, but one perhaps central to the future of the practice of *Tiny Mining*. One brief concept to think through is what aspects of a good are alienable - separated from the giver in the exchange - and what are inalienable. The Austrian painter Gustav Klimt’s signature, for example, is very recognisable by curators. He places his given name on top of his surname, the ‘U’ and the ‘V’ in his name sharing the same pointed edges. His paintings can be sold and exchanged multiple times, but there is an aspect of the painter that cannot be removed from the painting - an identity sealed by the signature. There is an element of inalienabili-



Figure 4 Emblem 8, 3rd series, Johannes Mylius, *Philosophia reformatata*, 1622

ty to the work that gives the painting much of its value. The artist is in the painting. To a small degree, each consecutive owner of a painting is also embedded in its purchase, telling a story, and bringing the art its identity. When it comes to the body and its parts, such inalienability might take strange forms. In the case of organ donations and donor kin, returning a small sense of inalienability to a donated organ bears “the potential to transform the anonymous dead once again into social creatures”¹¹, creating unexpected forms of kinship. Even when the organ donor remains fully anonymous, ideas of reciprocity might remain for the living in the forms of social obligation, a change in personal health-seeking behaviour, and/or forms of responsible citizenship, all in the spirit of the ‘gift’ from the organ donor. In terms of the economy of blood, as mentioned earlier, the obligations of responsible citizenship and reciprocity are merged with altruism and enacted by the giver to inform donation practices. Here, biology and demographics additionally inform the spirit of the bodily gift - “O” negative blood, for example, is medical ‘gold’ - it is always in demand, and people die when this blood is scarce. A pint of blood from a healthy adult can be given safely every three to four months. If someone produces such blood, what is their obligation to society? In Euro-American contexts, blood donors are very rarely compensated in terms of money, though depending on the national context, other organ or tissue donations may be. The dance between commodification, marketisation, reciprocity, alienability, and altruism, is thus always a careful and complex ethical navigation.

11. Sharp 2001, 129.

When minerals and metals
are extracted from the body,
how does it change the social
constitution of those minerals?
What new ethics does it open
upon the people who take part?

When bodily substances are turned into commodified goods in non-medical markets, they are often met with controversy, curiosity, public distaste, or taboo. Such is the case with breastmilk, for example, which has been purposed into making resin for jewelry to commemorate the act of breastfeeding, or into ice cream ingredients in trendy cafes, or marketed and sold as performance nutrients for elite ironman athletes. The taboos upon such goods may partly be informed from social constructions of pollutants and dirt, what Dame Mary Douglas frames as “Matter out of Place”¹², objects and processes that disrupt social constructions of purity by transgressing normative orders, or the binaries that people make to shape their world: nature vs. culture, inside vs. outside.

For the project of *Tiny Mining*, and to the artist-scientists engaged in its practice, the anthropologist asks, what is the spirit of the ‘thing’? When minerals and metals are extracted from the body, how does it change the social constitution of those minerals? What new ethics does it open upon the people who take part? The tiny-mined mineral is an odd thing for the anthropologist because the mineral is ‘from’, but not normally associated with the human body - not like, say, grand anatomical structures, a heart, a kidney, or the cornea, the most common ‘opt-out’ organ donation in the UK. The eye or the kidney, outside the human body, is still tied to its organic roots in the very nature of its composition and structure. Gold, silver, aluminium and nickel form solid matter by organising their atoms in face-centered cubic structures. These structures are the same whether the metal is mined from the body or

12. M. Douglas, *Purity and Danger* (Vol. 68),
London: Routledge, 1966.

from the earth. Instead, one might suggest, as many anthropologists have, that the minerals have social lives¹³, and biographies¹⁴ that shape relationships between people and things.

Gold is particularly curious in this regard. Its importance to peoples throughout human history cannot be understated, though its value is fully invented. As Ferry, Vallard and Walsh have shown, “its preciousness must always be understood in relation to complex cultural, political-economic, and semiotic systems of value.”¹⁵. It is relatively rare, but it never breaks down. All the gold atoms that exist on the planet were forged in a dying star, and they will outlive humans, and indeed outlive the planet. It exists as ore in the rock and the earth, causing great social movement and unrest whenever and wherever it is discovered. It exists in great amounts in the earth’s core, but is unobtainable from that source. It exists as well in the human body, sitting in the human brain and the heart, and it is particularly useful, albeit in small amounts comparatively, in the knees and elbows, supporting human joints. Should all the naturally occurring gold be extracted from the bodies of all the humans residing within the metropolitan London area, it would amount to some 4.6kg of gold worth, at the time of writing, almost £200,000 (\$267,000). It is likely to be (or should be) for readers an absurd calculation, though it becomes sinister when juxtaposed with the dehumanising and objectification of the body.

At the beginning of the holocaust, the Schutzstaffel (SS) Reichsführer Heinrich Himmler gave the SS orders to collect gold teeth from individuals who died in Hitler’s death camps.

Should all the naturally occurring gold be extracted from the bodies of all the humans residing within the metropolitan London area, it would amount to some 4.6kg of gold worth, at the time of writing, almost £200,000 (\$267,000).

13. A. Appadurai (Ed.), *Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press, 1966.

14. I. Kopytoff, “The Cultural Biography of Things: Commoditization as Process”. In Appadurai, 1966, 64–93”.

15. E. Ferry, and A. Vallard, A. Walsh (Eds.), *The Anthropology of precious minerals*. University of Toronto Press, 2019.



Figure 1 Alchemical emblem from 'De Alchimia', c. 1526

Hundreds of dentists were employed for just this task. By the date of the liberation of Auschwitz, around 6,000kg of gold had been mined from the gas chambers of that camp alone¹⁶. Each concentration camp had many dentists employed for just this purpose. The operation was profoundly profitable. The gold was melted down and added to national gold stocks, and then traded to the Swiss national bank. Switzerland remained politically neutral during the war but was also the central distribution point for the axis powers' gold, worth many billions of US dollars at current exchange rates, the vast majority of which was looted by the Nazi party through their portfolio of war crimes. The majority of this gold then flowed into European banking systems in the years following the Second World War. There is much to comment on here, and there is no shortage of controversy over this gold¹⁷. The question on inalienability remains, and in some regard, especially in terms of large-scale compensation for victims of the holocaust, calls for justice were never resolved. The social life of bullion in Europe after the war, moved through Swiss vaults, the Vatican, the Bank of England, and spread across the globe, is thus still tainted by the spirit and biographies of the un-named dead. Such social lives of minerals still shape political, cultural, and economic relations.

Taboos, then, may not arise from the inherent materiality of precious minerals, but rather from their biographies. 'Blood diamonds' cannot be labelled thus as emanating from the colour, tint, cut, carat, or molecular structure of the carbon complexes that form the rock. Rather, the blood diamond is known as sanguine because of social and moral obli-

16. X. Riaud, "History of Nazi Dental Gold: From Dead Bodies till Swiss Bank", *SAJ Forensic Science*, 1(1), 2015.

17. I. Sayer, and D. Botting, *Nazi Gold: The Story of the World's Greatest Robbery - and Its Aftermath*. London: Granada, 1984.

To release the mineral from the blood with whom it is tied is to be complicit in the potent market stoicism that fetishises commodities over human life.

gation, a recognition of deeply exploitative labour and social injustice. Body and mineral are therefore concretely joined through synecdoche. The ‘social life’ of carbon matters. To release the mineral from the blood with whom it is tied is to be complicit in the potent market stoicism that fetishises commodities over human life.

Mining the body off-world

I argue nothing at all so sinister for *Tiny Mining*. The *Tiny Mining* community is interested in the connections between one person and another, between people and their environment. They are interested in how bodily engagement with the ‘non-human’ is part and parcel of the human condition. Such a premise presents the human body as a form of gestalt, a unified whole more than the sum of its parts. This geological rendition of the body may serve indeed as a mode of highlighting the primacy of the human, rather than an objectification of the body and its parts.

As a medical anthropologist, I work in the context of space medicine and life-science research aboard the International Space Station (ISS). Part of this work is to understand the role of the ISS as a dual analogue - a model of living to inform future habitats off-world, and a model of living that affords an opportunity to question the structures of living developed on earth. An anthropology of the body that positions the human as a nexus of biology, society, ecology and politics is critical to helping to understand, appreciate, and communicate what is required for humans to thrive off-world as well as on earth at a



Figure 5 Emblem 101, Daniel Stolcius, *Viridarium Chemicum*, 1624

time of profound environmental change. New research platforms envision the curation of self-sustainable biologically-based life-support systems for off-world living. These can take many forms, from biologically-based exoskeletal systems, space suits, and other integrated extraterrestrial clothing, to designing biologically sustained greenhouses for the moon. Such projects already exist in their infancy on the ISS, and are planned for many off-world living missions. They speak towards a common need for human sustainability under harsh conditions, in extreme isolation, in environments that are unsuitable for life, and in which resources are extremely scarce - developing ecosystems that operate at as close to perfect efficiency as possible, and which rarely, if ever, need resupply.

The human body, if it is to thrive off-world, is a critical part of this closed-loop system. The body's need to consume nutrients and resources must be contextualised by its need to also produce these resources. It is no small endeavor to create and improve these systems in the ISS. The Urine Processor Assembly on the ISS, and its many improvements and developments since its initial launch, collects and recycles astronaut urine to convert it back to potable drinking water. As JAXA astronaut Koichi Wakata states from his many months of living in space "Here on board the ISS, we turn yesterday's coffee into tomorrow's coffee!". Initial operations from the Urine Processor Assembly failed due to the large excess of calcium excreted by astronauts due to extreme osteopenia created from microgravity living. Astronauts must also take supplements such as calcium and vitamin D as well as medications

The ability of the individual to produce resources for the community in which they are a part is an element of the engine that keeps everyone in the community alive. Tomorrow's coffee is only possible because of yesterday's coffee.

18. —, *National Aeronautics and Space Administration*, “Preventing Bone Loss in Space Flight with Prophylactic Use of Bisphosphonate: Health Promotion of the Elderly by Space Medicine Technologies”, *NASA Archives*. 29.02.2012, nasa.gov/mission_pages/station/research/benefits/bone_loss.html

such as biophosphinates to help mitigate against bone loss¹⁸. While much of the fluid excretions from people can be recycled, the closed loop system is broken when it considers the dynamic compositions of the body. For the space farers aboard research stations in lower earth orbit, every gram of resources sent to them is extremely expensive to ship, but regular payloads are manageable. As human habitation moves further from its home-world, better closed-loop systems become more critical for survival.

There is much to say on these endeavors. However, for the tiny miners, and for the anthropologist as well, I suggest that the future of closed-loop biological systems offers a vantage point to reconsider frameworks of kinship, reciprocity and the objectification of the body. In such contexts of close to 100% life-support efficiency, gone is the seductive voice of marketisation and commodification. The ability of the individual to produce resources for the community in which they are a part is an element of the engine that keeps everyone in the community alive. Tomorrow's coffee is only possible because of yesterday's coffee. The epistemological and cognitive moieties that are often woven into the fabric of society - nature/culture, self/other, inside/outside - are challenged and perhaps even rendered obsolete through cyborgian living. Gold and iron and copper and carbon are both simultaneously inside and outside the flesh. That is not to say that there would be an erasure of the boundaries of the skin, or of the concept of the 'self'. Rather, to be part of a totalising system is perhaps to celebrate the individual's sense of collectivity, shared matter, and novel kinship. All resources,

even water, are unalienable. Embedded in the mineral within these hypothetical extraterrestrial habitats is not a price or cost, but rather nothing short of humanity's obligations to itself.

In conclusion, the tiny miners have called their practice 'extreme ecology', and to a degree it is. Through their practice, the scientist-artists personify the planet by highlighting, through the human body, exploitation and extraction. But it is more than that. They imagine what a future ecology might look like, to be tied more intimately to the cycles of consumption and production that sustain the body and the community. It is a fascinating thought experiment. No doubt others will have differing ethical takes on such a practice. I am content for now to leave the reader with the optimism of collective and ecological unity. All the medical anthropologist asks of the miners is to consider - when the mineral leaves the body, what goes with it? Such projects may indeed show that people and places are bound together in ways one might not anticipate or expect. We are all made of star stuffs.

Gold and iron and copper and carbon are both simultaneously inside and outside the flesh.

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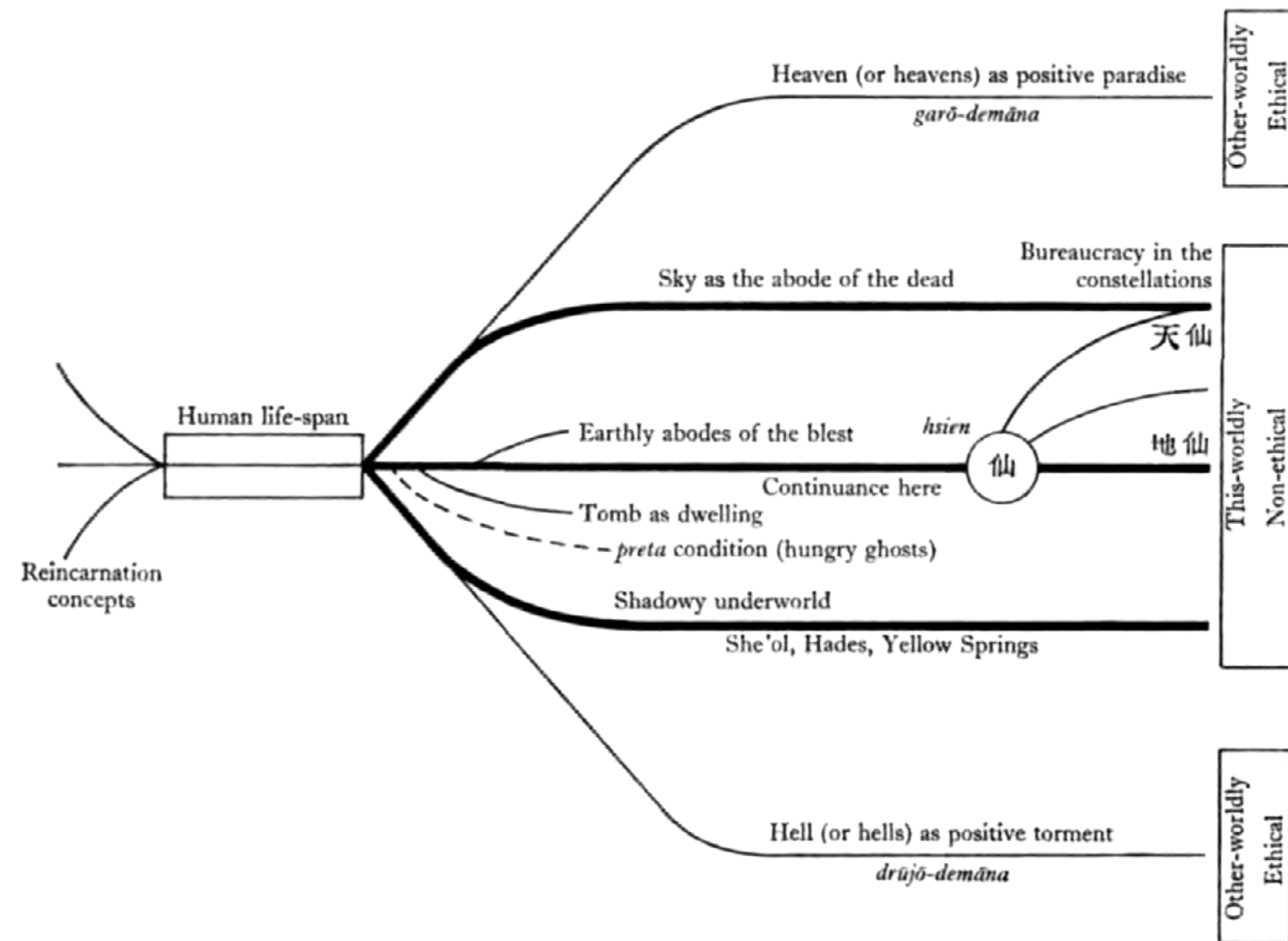


Table 93. *Schematisation of immortality conceptions; development of ethical polarisation*



Sweatshop introduction and protocols

Tiny Mining

Kat Austen

Dennis de Bel

Alfonso Borragan

Martin Howse

Theun Karelse

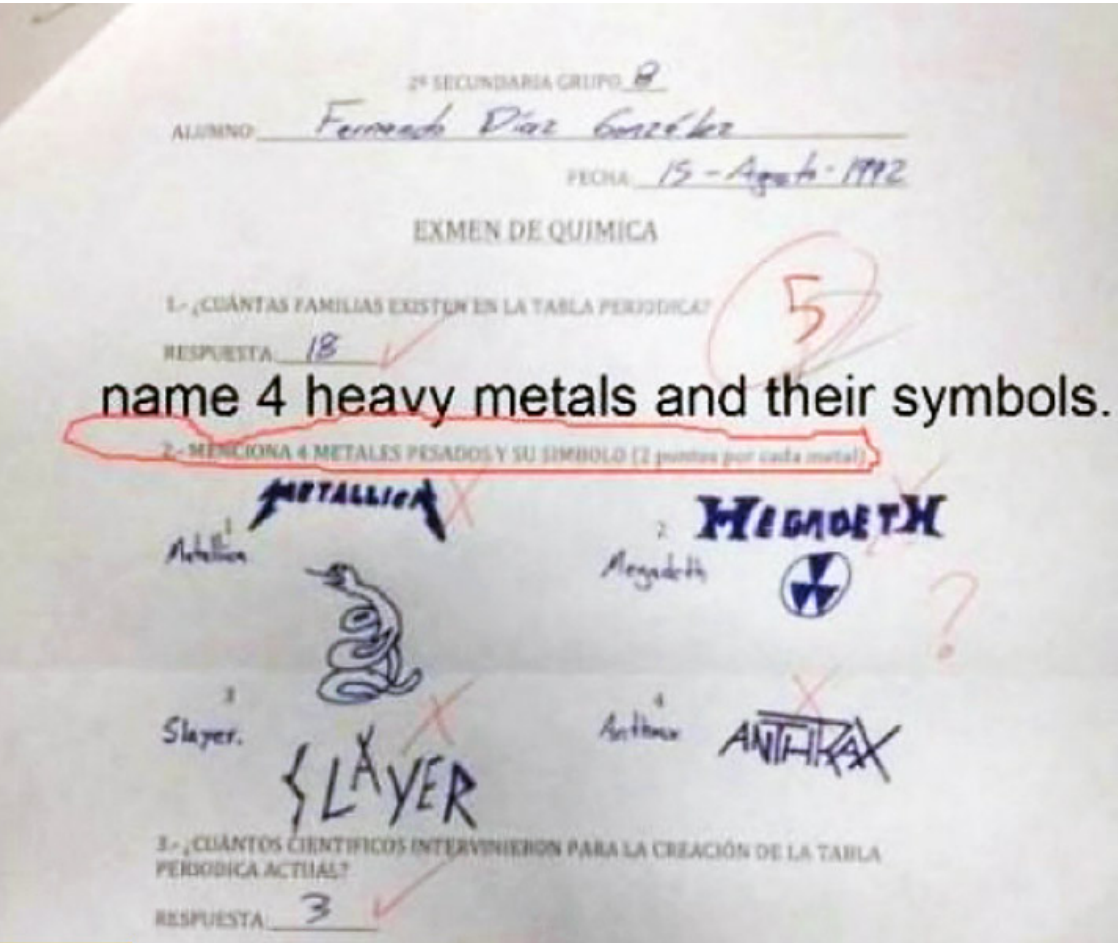
Aniara Rodado

In November 2020, a small group within the *Tiny Mining* community took part in the first remote sweatshop, lasting six days and commencing with the new moon.

We dedicated this collective sweatshop to the exploration of experimental protocols for improving extractive yields and facilitating testing procedures for the benefit of the wider community. We also explored the construction of alternative belief systems, facilitating the adoption of *Tiny Mining* as a widespread cultural practice. One metal or element was assigned to each sweatshop participant for reflection and extraction.

These elements, alongside the communities' research findings and actions, are documented here. They are presented largely unedited, to reflect the experience of the participants.

In alphabetic order of elements the participants were: Theun Karelse, v2_labs(control only), Dennis de Bel, Kat Austen, Martin Howse, Aniara Rodado and Alfonso Borragan. The metals were antimony, arsenic, copper, iron, lead, mercury and silver.



name 4 heavy metals and their symbols.

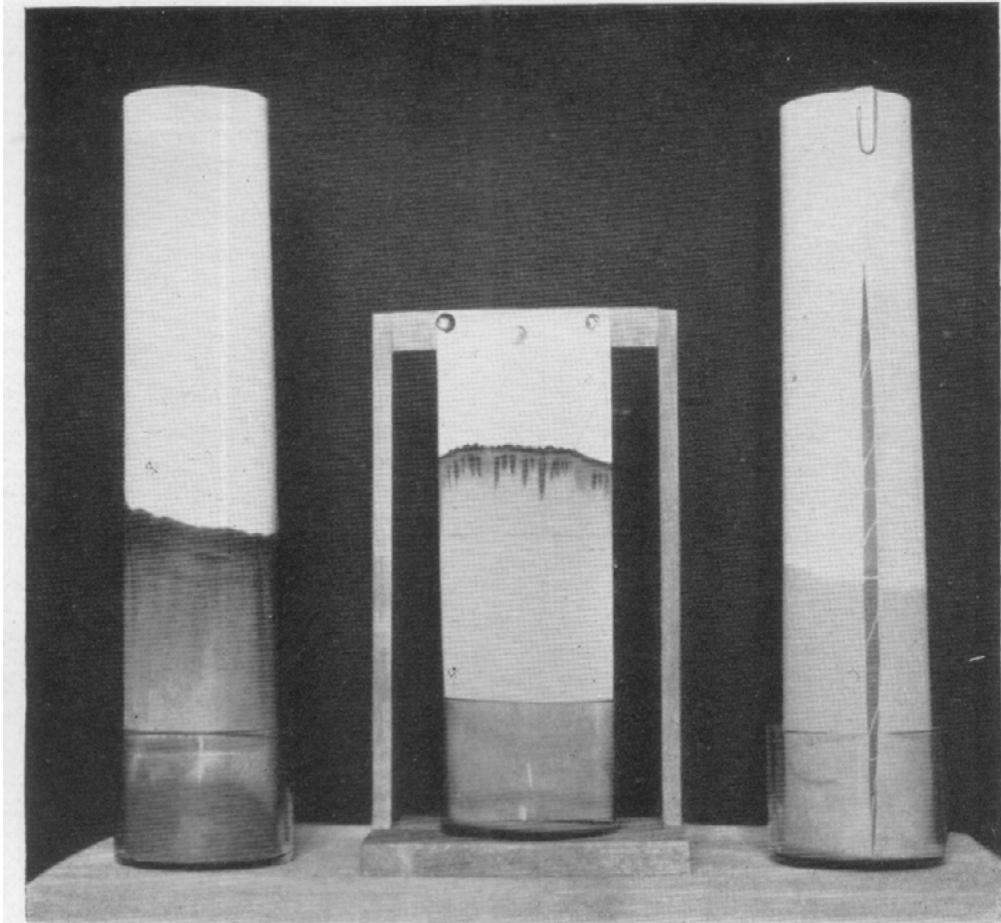


Abb. 4.

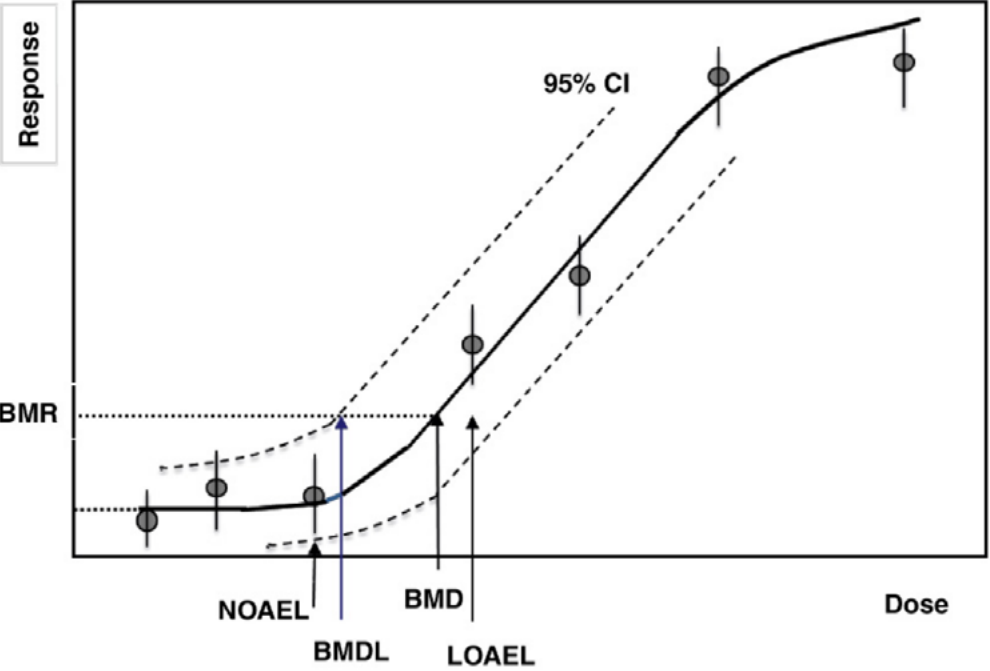
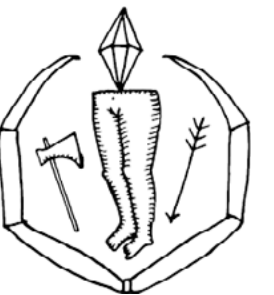


FIGURE 1.4 Schematic dose-response curve, illustrating the no adverse effect level (NOAEL) and the lowest adverse effect level (LOAEL) of a toxic substance. Confidence interval (CI), benchmark response (BMR), benchmark dose (BMD), and benchmark dose lower confidence interval (BMDL) are also indicated. A risk assessor would choose the study displaying the most sensitive endpoint when identifying the LOAEL or the critical dose.

I'm starting to feel that the natural way of doing things, of living, eating and farming, of the cycles and balances of the body, is being hidden from us so that something else can be nourished by the mining that takes place within ourselves. I automatically distrust anyone trying to make money from *Tiny Mining*.



An excerpt from the protocols for the sweatshop

SAFETY:

There are very few risks associated with the Tiny Mining remote sweatshop protocols but the following precautions should be observed:

- Please handle the mineral or metal samples only while wearing protective gloves. Some mineral samples are poisonous and other harmless specimens could contaminate the test results.
- Do not ingest any of the extraction kit materials unless absolutely certain that these are intended for internal use only.
- Please observe basic safety precautions whilst conducting any of the outlined experiments, for example when using high heat processes.

INTRODUCTION:

Participants will follow a precise diet (one specified meal, the other is left open but should not include certain specified foodstuffs) during the first five days of the six day study. For the first 3 days this diet is intended to allow for the ingestion of specific metals at trace levels. This is followed by a chelation diet (2 days), accompanied by testing and experiment.

Participants are asked to take biological samples at certain times, to conduct short experiments and to record dreams and impressions.

PRE-PREPARATIONS:

Eat a normal, balanced diet for several days before the test:

- A diet high in citrus fruits, vegetables, or dairy products can increase your urine pH. A diet high in meat products or cranberries can decrease your urine pH (which would be good). No seafood for 3 days.
- Please wash your hair before the first day but follow certain protocols:

~~Dandruff Shampoo~~ ~~CONDITIONER~~ ~~HAIR SPRAY~~ ~~HAIR GEL~~

- Please precisely document your diet and any potential exposure to heavy metals during the 3 days before the remote sweatshop begins.
- Please inform us beforehand of any pharmaceutical/medicinal intake, allergies or specific dietary information.
- You will be assigned a particular metal for study,

ingestion, contemplation and extraction. A sample (alongside text and short list of protocols) is included in the supplied extraction kit.

- Collect working clothes, overalls or lab coat, recording devices (camera, notebooks).
- Shopping and sourcing for diet and household materials:
 - Please read your protocol and source any specific fresh ingredients for diet and chelation.
 - Generic diet: brown rice, fresh fish for sashimi/sushi, mussels, fresh oysters, tofu, green vegetables.
 - Chelation diet (if unable to shop this for the fourth day please buy in advance and store well): 300g coriander, garlic, onions, green chillis, limes, beetroot with leaves (preferably), fresh turmeric, cranberries or blueberries.
 - Distilled water, drinking straws, plastic bags, gaffer tape, small deep dish.

ROUGH SCHEDULE:

EACH DAY:

- Record in words, visually or on audio any notable dreams or any feelings/experiences connected to the metals under study.
- Perform one experiment with Silver Nitrate (following the Lilli Kolisko protocol).
- Perform and record (in words, images) the results of a single metal strip test on drinking water, sweat or urine.
- Consume the suggested diet and perform tests/experiments/sampling as specified.
- Upload to the server! To be specified.

ONLINE DISCUSSION EACH DAY:

- Mining for meaning: Discussion of: extraction, bio-indicators, we become bio-indicators, chelation, what cycles we become part of, what we should

pay attention to during the workshop (psychological and physiological), links to alchemy as psychic/bodily/material transformation (also techniques such as digestion, the person of copper).

- We are all farmers, chelators, and indicators.
- How can we enter into cycles/circulations (eg. eating plants which chelate or uptake metals, eating chelating agents, refining our outcomes using these plants)? What are these parallels?
- How and why could *Tiny Mining* become a way of life?

DAY 1:

- Morning: Introductions and discussion around schedule and protocols, safety and waivers.
- Unboxing the extraction kit.
- Control hair test donation and first sampling (urine, breath and sweat collection exercises - devise sweat collection, please preserve these for later testing).
- Afternoon: First pre/control tests on urine - kits,

colorimetric, potentiostat, flame tests.

- Diet: Please follow the diet indicated for your assigned metal alongside the following: brown rice, fresh oysters, tofu.

DAY 2:

- Reflect and meditate on the assigned metal. Research and dig deeper into this mineral.
- Diet: Please follow the diet indicated for your assigned metal alongside the following: brown rice, fresh oysters, sushi/sashimi, green vegetables.
- Perform or repeat one of the assigned experiments.

DAY 3:

- Reflect and meditate on the assigned metal. Research and dig deeper into this mineral.
- Diet: Please follow the diet indicated for your assigned metal alongside the following: brown rice, oysters, sushi/sashimi, green vegetables.

- Perform or repeat one of the assigned experiments.

DAY 4:

- Beginning of chelation.
- Diet: Please follow the diet indicated for your chelation protocol alongside: much coriander, raw beetroot, leafy greens, broccoli sprouts, garlic and onions - with naan bread. Chelation Smoothie (4 times per day).
- Perform or repeat one of the assigned experiments.

DAY 5:

- Chelation.
- Diet: Please follow the diet indicated for your chelation protocol alongside: much coriander, raw beetroot, leafy greens, broccoli sprouts, garlic and onions - with naan bread. Chelation Smoothie recipe (4 times per day).
- Perform or repeat one of the assigned experiments.

DAY 6:

- Hair test donation and final sampling in the morning (urine, breath and sweat collection exercises - devise sweat collection, please preserve these for later testing).
- Perform the heavy metal screen test (NissenMedica) on the latest urine sample.
- No specific diet. Tea and warm water is recommended.
- Final online discussion and drinks.

TABLE 3.1 Causes and Symptoms of Metal Intoxications				
Metal	Acute presentation	Chronic presentation	Typical sources of intoxication	Results of paraclinical examinations
Lead	Abdominal pain Encephalopathy Motor neuropathy	Motor neuropathy, encephalopathy (parkinsonism) Abdominal pain and cramps, constipation(lead colic) Tubulointerstitial nephropathy Gingival Burton’sline Arterial hypertension Anemia, gout, arthralgia	Old lead-containing paint Battery industry Lead smelting Food or beverage stored in leaded containers Retained bullets Traditional Asian medicine	Anemia, basophilic stippling in erythrocytes Increased urine δ- aminolaevulinic acid and zinc protoporphyrin in the blood Hyperintense lesion in T2w MR images in putamen and white matter predominantly in insula Dense metaphyseal band in long growing bones on X-ray
Arsenic	Sialorrhea, gastroenteritis polyneuropathy, encephalopathy MODS	Sensori-motor polyneuropathy, Encephalopathy Mees’ lines on finger nails Skin lesions (pigmentation, leukodermic spots, palmar and solar keratoses) Hepatopathy Lung, liver, skin and other cancers	Contaminated well water Traditional Asian medicine Suicidal, homicidal, accidental	Pancytopenia, basophilic stippling in erythrocytes Increased LE
Thallium	Gastroenteritis Perioral erythematous skin lesions MODS	Polyneuropathy, hyperalgesia, encephalopathy, visual disturbances Alopecia, Mees’ lines on finger nails	Suicidal, homicidal, accidental	

(Continued)

TABLE 3
Supplies Required to Perform One Sweat Electrolyte Analysis Using the Whole-Body Rinse Technique
ITEMS
1 pair of exercise shorts, ^a socks, ^a and sneakers
1 t-shirt ^a
1 exercise machine ^b (ie, treadmill, elliptical trainer, stair climber, stationary bike)
2 pairs of nitrile or latex examination gloves
1 electrolyte-free plastic sheet ^{a,c}
2 plastic jugs ^a (1-gallon capacity) filled with distilled water ^a
2 clean towels ^a
3 disposable pipettes (2-mL to 5-mL capacity)
6 clean plastic test tubes with lid or storage cap (minimum 0.5-mL capacity)
1 digital floor scale, 0.2 lb (ie, 0.1 kg) precision
1 laboratory electrolyte analyzer
1 stop watch
1 laboratory bench top pan balance, 0.01-g to 1.0-g resolution
1 metal wash tub (1-m diameter; 15-cm to 30-cm height)
1 plastic trash bag
1 permanent marker
1 pair scissors
1 data sheet (Table 5)

^a Item is initially electrolyte free.

^b Exercise equipment is not necessary if the athlete runs outdoors.

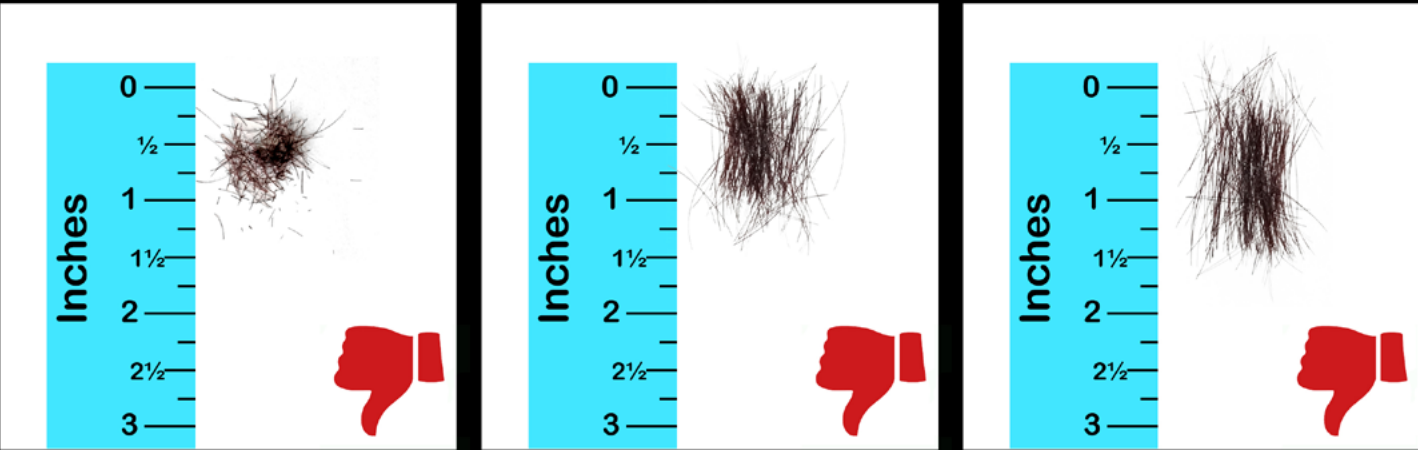
^c A disposable plastic paint tarp (0.2-mm to 0.4-mm thickness; 12×12 ft) serves this purpose well.

COMMON HAIR SAMPLING MISTAKES

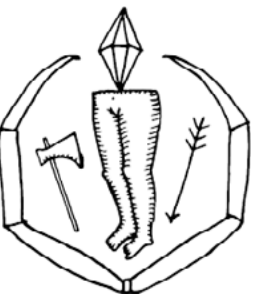
These are all too long:

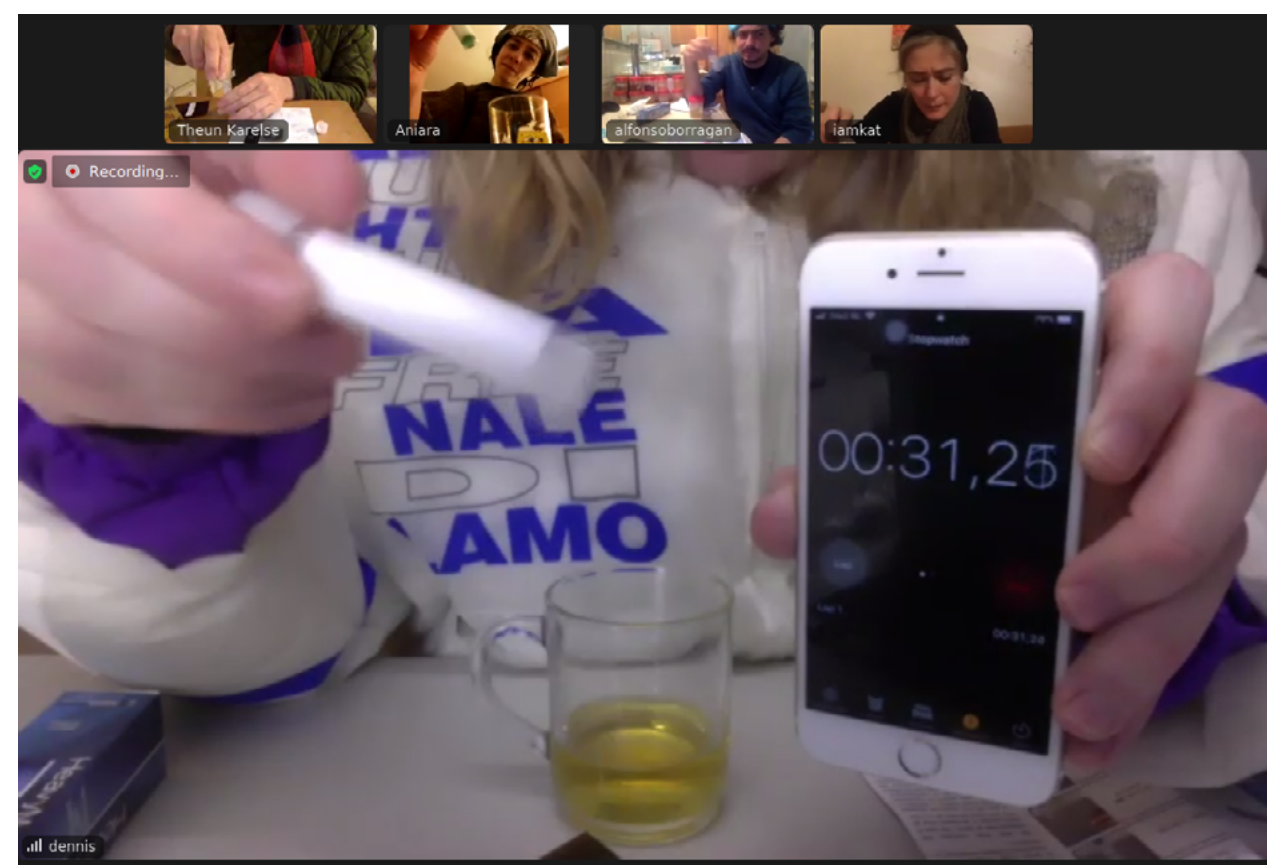


These are all good lengths but there is not enough hair:



If what we use every day, smartphones, cables, electricity, comes from the earth, then by making it part of ourselves and then taking it out of ourselves we become part of these things, they come from us and we use them. That's why we call ourselves users.





Antimony

The Ancient Egyptians used antimony sulfide as a mascara. Revered by alchemists because of its uncanny power to purify gold. Antimony is used in the electronics industry to make some semiconductor devices, such as infrared detectors and diodes.



Toxicology and location

Historically, antimony has been known for its emetic properties. Amounts as low as 0.529 mg/kg can result in vomiting. Oral exposure to antimony predominantly affects the gastrointestinal system. Airborne antimony has effects in skin described as “antimony spots” which are pustules and eruptions in the trunk and limbs near sweat and sebaceous glands.

Insufficiency / Mining side effects

None.

Private mining applications

As a symbol of protection, royal power and good health. Purification of extracted gold.

Industrial scale mining

Infrared detectors and diodes. Bullets.
Cable sheathings.

Protocol diet

Foods stored in enamel vessels and cans, seafood, oysters, brown rice, starfruit, spinach, beetroot, beetroot leaves, fruits high in vitamin C.

Protocol chelation agents

Homeopathic antimony tincture, vitamin C, cilantro/coriander essence, coriander, onions, garlic.

Experimental approaches

Strategies for endo and exo-crystallisation.

Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argotone packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottle for sweat and breath collection, magnesium oxide supplement, homeopathic antimony tincture, Vitamin C powder, coriander/cilantro essence, stibnite/antimony ore sample.

Dreaming

DATE:
November 19, 2020

WRITTEN BY:
Theun



The sleep of miners brings forth giants. In this case a giant bumblebee appearing on the horizon ominously.

Dream: from the back of a car I witness a minor car accident, as a car with trailer slides down the side of a road next to us. We head over to inspect. This is a transition to a landscape beyond. Where giants exist. No humanoid giants are observed, just the certainty that they do exist after all. With that satisfying realisation we become aware of a vast (flat Dutch) landscape and looking to the horizon a giant bumblebee becomes apparent. It must be hundreds of meters tall. It's feet on the earth, it's bristled back disturbing the clouds. Against the light we

see the titanic insect mainly as a silhouette.

According to DreamGlossary:

Bumblebee – Dream Meaning and Interpretation

To see a bumblebee

If you see a bumblebee in your dream, it means that you are trying to achieve big success without putting a lot of effort. You are sure that something like that is possible and that hard work is a waste of time. No matter how your intentions are clear, you can't rely on that at this point. It is time to roll up your sleeves and do something good for your future, instead of living in illusions.

Sweat collection

DATE:
November 19, 2020

WRITTEN BY:
Theun

A set up to finally harvest some sweat in this shop!

- 1 – Heated distilled water
- 2 – Large towel
- 3 – Collection vessel

Result: about 15 drops collected. They simply roll down the face and with some practice can be guided to drop down from the nose straight into the vessel.



Lupus metallorum

DATE:
November 19, 2020

WRITTEN BY:
Theun

Lupus metallorum = The grey wolf or stibnite, used to purify gold, as the sulphur in the antimony sulphide bonds to the metals alloyed with the gold, and these form a slag which can be removed. The gold remains dissolved in the metallic antimony which can be boiled off to leave the purified gold.

Also a death metal band, for those on bandcamp:

<https://goodtodierecords.bandcamp.com/album/lupus-metallorum>



Diet

DATE:
November 21, 2020

WRITTEN BY:
Theun



Saturday 14/11:

White bread with Dutch cheese and ajvar
Danish pastry
Oatmeal porridge with half an apple
Miso soup, broccoli quiche with almond crust
Warm water and tea

Sunday 15/11:

White bread with honey
Warm water
Chicken with chickpeas and parsley
Cooked pear with yoghurt

Monday 16/11:

White bread with honey
White bread with Dutch cheese

Tea and warm water

Chicken and potato dinner
Muesli with milk
A shot of blackcurrant juice

Tuesday 17/11:

Spelt bread with smoked herring
Oatmeal porridge with half an apple
Chocolate biscuits
Mussels and courgette
Warm water and tea

Wednesday 18/11:

Warm water
Spelt bread with Dutch cheese
Cabbage with tofu and catfish

Magnesium Oxide drink
Oranges

Thursday 19/11:

Spelt bread with smoked herring
Chocolate with hazelnuts
Octopus with spinach, basil and olives
Magnesium Oxide drink
Organes
Warm water
Muesli with milk

Friday 20/11:

Chocolate
Warm water
Spelt bread with Dutch cheese
Chicken Marsala with brown rice garlic and coriander
Antimonium Crudum (1drop 3x)

Koriander
Koriander essence
Vitamin C

Saturday 21/11:

Starfruit
Seaweed snacks
Prosecco
Warm water
Spelt bread with smoked herring
Moksi (surinam meat dish with leafy-vegetables from mustard family)
Steamed leek dumplings
Magnesium Oxide drink
Muesli with milk
Antimonium Crudum (4drops 3x)
Koriander
Koriander essence
Vitamin C

Rest

DATE:
November 21, 2020

WRITTEN BY:
Theun

Inner peace within limbs and somehow bones.

This has been a surprising week so far. A deep calmness has come over my body, like a silence. When I lie down I feel a quite profound sense of peace and relaxation in my body. In my awareness of the environment too. As if I've been standing and now finally can lie down. This may be due to the magnesium oxide. I think it has an impact on my parasympathetic nervous system. It's quite amazing and I feel very much like continuing the diet.



Arsenic

Arsenic is very important in Chinese alchemy as a key ingredient in various elixirs of immortality. It stimulates the population of red blood cells and is used as a treatment for some forms of Leukemia.



Toxicology and location

Arsenic poisoning manifests itself with thickened and darkened skin.

Insufficiency / Mining side effects

Excessive arsenic mining can cause Carpal Tunnel syndrome and other repetitive motions.

Private mining applications

As a wood preservative and for private agricultural occupations. As an elixir of immortality and purgative medicine. As a green

pigment for paintings and decor, copper acetoarsenite, Paris Green, Emerald Green.

Industrial scale mining

Used in pesticides, wood preservatives, and metal alloys.

Protocol diet

Rice, grape juice, fish, shrimp, shellfish and other seafood may contain significant amounts of organic arsenic, the less toxic form. However, mussels and certain types of seaweed may contain inorganic arsenic.

Protocol chelation agents

DMPS pills, coriander, onions, garlic.

Experimental approaches

Endo-crystallisation of trace metals.

Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argotone packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottles for sweat and breath collection, DMPS pills, oxalic acid, sweat scraper, realgar (arsenic ore).

Boxing arsenic

DATE:
November 16, 2020

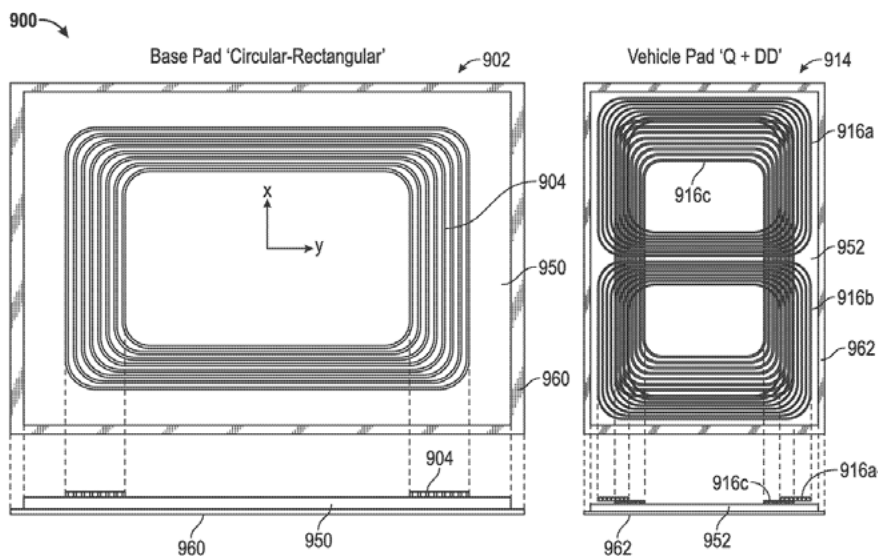
WRITTEN BY:
Martin

Boxing of the kit to send to v2_unstable for *Tiny Mining* remote sweatshop.



Copper

Copper has historical early uses in smelting. In molluscs and crustaceans, copper is a constituent of the blood pigment hemocyanin, replaced by the iron-complexed hemoglobin in fish and other vertebrates. Copper exhibits high thermal electrical conductivity, neuronal conductivity in tandem with iron and zinc.



Toxicology and location

Copper is present in every tissue of the body, but is stored primarily in the liver, with fewer amounts found in the brain, heart, kidney, and muscles. With iron, it enables the body to form red blood cells. It helps maintain healthy bones, blood vessels, nerves, and immune function, and also contributes to iron absorption.

Insufficiency / Mining side effects

Menkes, Wilson's, and Alzheimer's disease.

Many of the substances that protect us from excess copper perform important functions in our neurological and endocrine systems, leading to diagnostic difficulties. When they are used to bind copper in the plasma, to prevent it from being absorbed in the tissues, their own function may go unfulfilled. Symptoms often include mood swings, irritability, depression, fatigue, excitation, difficulty focusing, and feeling out of control.

Private mining applications

Neuronal re-wiring.

Industrial scale mining

Integrated circuits, PCBs, wiring, cables, nutritional supplements, fungicides.

Protocol diet

Oysters, seafood, shiitake, tofu, sweet potatoes, organ meats, nuts and seeds, whole bran cereals and whole grain products, brandy.

Protocol chelation agents

Chlorella, coriander, onions, garlic, beet-root, bougainvillea flowers.

Experimental approaches

Copper piss portraits.

Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argotine packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottles for sweat and breath collection, copper sheets, copper paint, copper wire, copper test kit.

17 Nov

DATE:
November 17, 2020

WRITTEN BY:
Dennis



Last time I had oysters I ... expelled more than only copper, but all of my contents for two days. It took a week to recover. So I am easing into my diet and cheating a little here and there.

Morning:

2 'Wholegrain' buns with peanut butter, ABC vitamin juice (mostly sugar), two cups of coffee

Afternoon:

Mexican bean soup: 400gr tomato, 200gr kidney beans, chili, cumin, chipotle tabasco (half an onion + some garlic)

Froze my pee + stored sample of my hair in ziplock bag

Evening:

Fried cod, liver sausage, cola light, rest of the ABC juice (1.5l), 4 'wholegrain' buns, green tea (sencha).

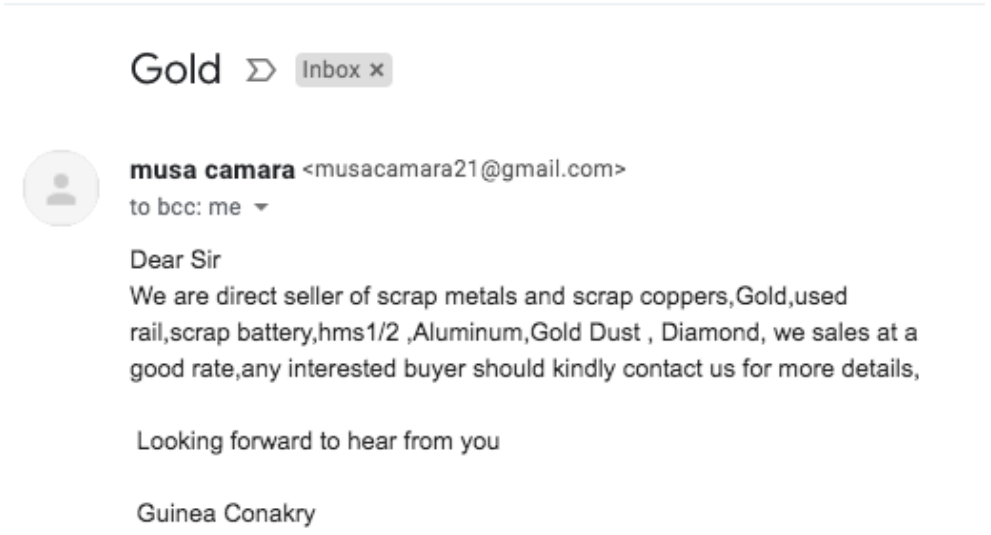
18 Nov

DATE:
November 18, 2020

WRITTEN BY:
Dennis



Not much food today, no time, too much work. All this talk about metals was instantly reflected in my email inbox. The following (spam) evaded my filters and was eager to mine my body:



The following reply was sent, along with samples (see below):

Dear madam, sir,

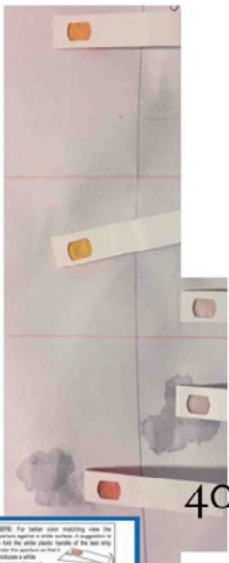
Thank you for reaching out at this time and for letting me know about your business. Your communication could not have come at a more fortuitous moment, as I have been mining my body for metals for a few weeks. Please refer to the attached proofs of concentrations extracted. As I am confident the ppm levels will satisfy you I will be awaiting your detailed quotation. I have been specially looking for copper into my body, which I managed to obtain in large quantities from my urine, sweat and other bodily fluids. I hope you also consider the special value of these metals, as they are directly coming from my body, no refinement needed.

I am prepared to offer these at a very reasonable price, in an exclusive offer for you. 15% reduction

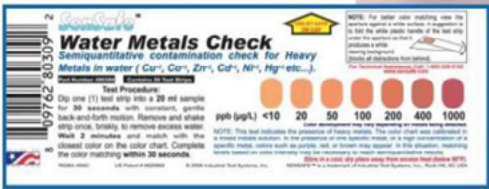
if you pay in cryptocurrency. I only need details of how to exchange and up-front payment and the copper is yours.

Looking forward to hear from you

Tim Maia



400PPM



Unfortunately they were not interested in buying at all! See reply below:

Subject: Copper Wire Scrap

Dear Alex Smith

Thanks for your mail and we sell Hms 1.2 and used rails rate,of \$ 200 usd per mtn and we sell Copper Cathode and copper scrap, Copper Scrap, Copper ingot, at the rate of 3.300usd per mtn and we sell Aluminum scrap at the rate of 600usd per mtn and the buyer or buyers representative will come to Guinea conakry for physical inspection of the materials is our stock yard and the buyer will pay 10% for the Logisitices booking of containers and shipment and the Buyer make the balance payment 90% by wire transfer upon delivery of goods at buyers discharged port.and send the name of your seaport so that we will start the shippment

We sell Gold 30.000 usd 1kg seaport name auto-

nome de Guinee conakry

AINOHA MOM SARL

Office. Port 2, 2ème étage, face grand hotel du Conakry

Tel. +224669128836

19 Nov

DATE:
November 19, 2020

WRITTEN BY:
Dennis

Finally some proper food! This was dinner, steamed a bunch of oysters + chipotle tabasco, great and tender!



20 Nov: Dinner

DATE:
November 20, 2020

WRITTEN BY:
Dennis

My urine smelled like bbq'ed oysters, happy to lay off the seafood for a while, while starting chelation. Beetjuice (100%, 1.5 Liters), Beans, Onions, Garlic, Cilantro, Chlorella Pills.



20 Nov: Capillary dynamolysis

DATE:
November 20, 2020

WRITTEN BY:
Dennis



Heavy crystal sediments near the top.

Last night I had a dream of playing a computer game. A glitch enabled me to physically travel through dimensions. I ended up in the atelier of a friend housed atop of a well known hamburger restaurant, which doubled as a ‘hidden in plain sight’ security check, preventing random people from going upstairs. In the atelier floated a sphere, resembling the cryogenic containment unit from Akira, cables coming out everywhere. It had a brown copper hue to it, but that could also have been isolation material or even wood. How did it float? This ‘device’ allowed you to trigger ‘lucid déjà vu’ allowing you to relive memories as you wanted. Realising I was already in another dimension, I did not want to go further. We all left to go to a club. Exiting the restaurant someone had parked a trailer under the trees. My attention was drawn to the shiny assortment of shapes faintly visible through reflection of the faint moonlight penetrating the canopy. Upon inspection the trailer was full of aluminium extrusions in every shape and size you can imagine. Every piece was unique, except for their perfect shiny, brushed finish.

21 Nov: Dinner

DATE:
November 26, 2020

WRITTEN BY:
Dennis

I cooked about several kilos of food yesterday, this was enough for dinner, lunch and dinner.
This time added grape juice to the mix.

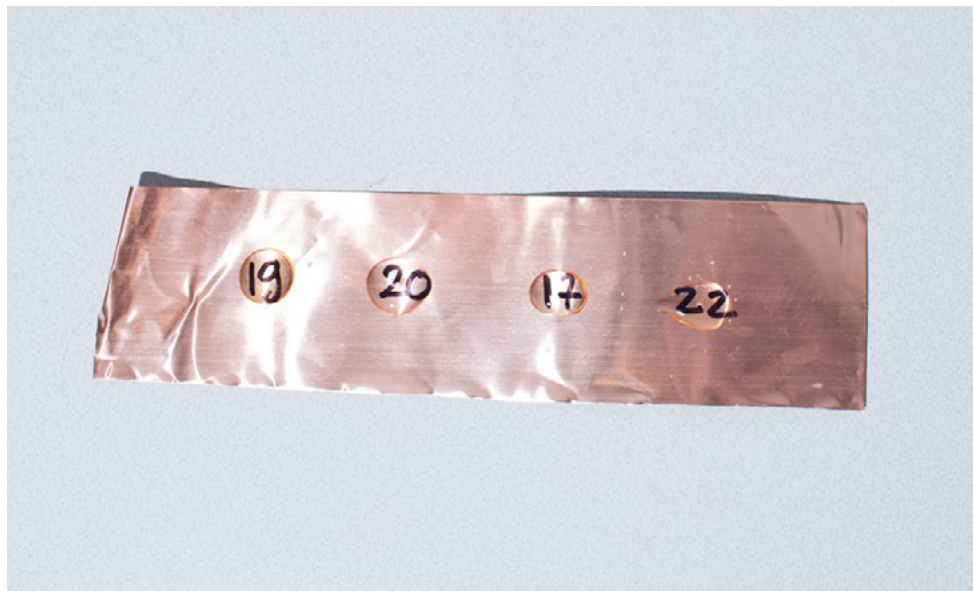


22 Nov: Urine etching test strip

DATE:
November 22, 2020

WRITTEN BY:
Dennis

Making a test strip to see what samples are most useful for copper etching using urine (copper not degreased).

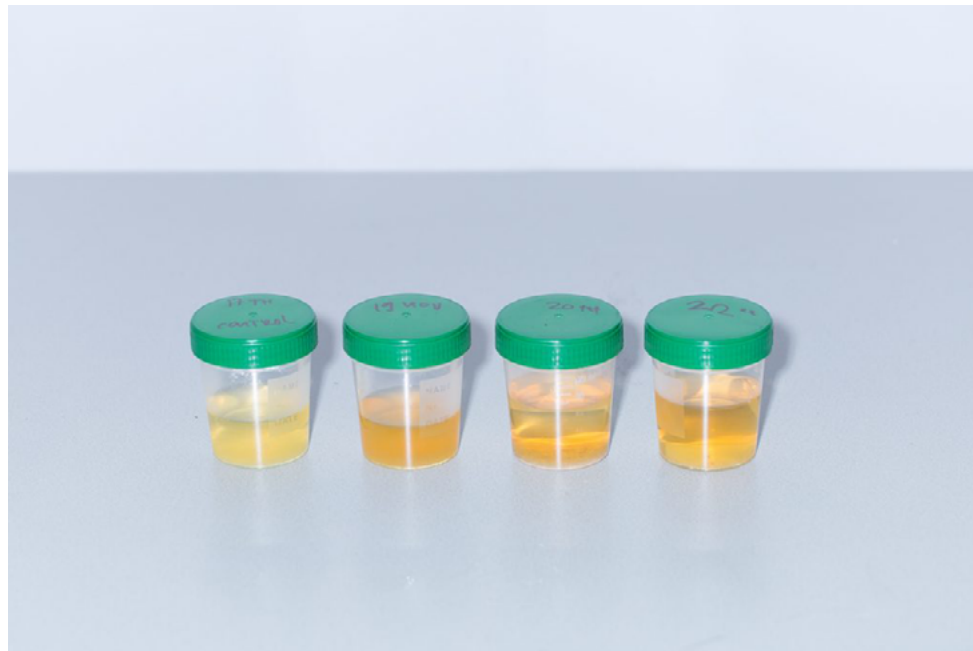


Urine samples

DATE:
November 22, 2020

WRITTEN BY:
Dennis

Not much beetroot juice translated in the urine, this seems to exit the body through other... means. Some urine (19th) went cloudy after freezing, like a contamination in fermentation process. The sample jar for the 21st was sacrificed for the 22nd.



Heavy metal screen test

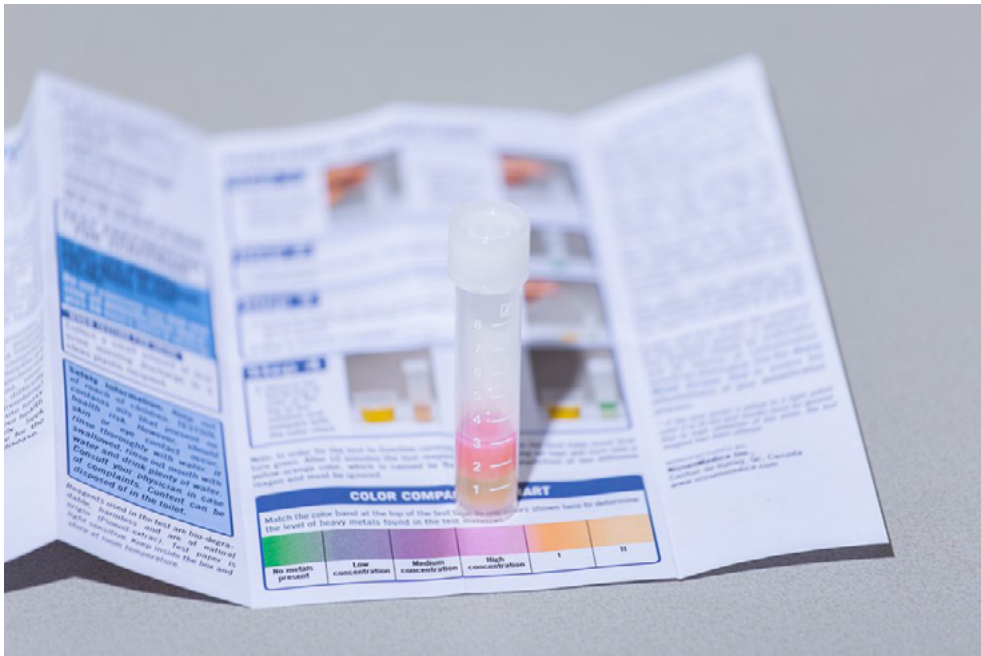
DATE:
November 22, 2020

WRITTEN BY:
Dennis

The heavy metal screen test on the last day showed high concentrations of heavy metals or per instructions manual:

The screen test measures the elimination (extraction ed.) of free zinc, copper and lead ions in the urine.
Mercury, cadmium, nickel, cobalt and manganese ions are also detected.

The generic metal (‘Sensafe water metals check’) and copper tests did not yield any significant results. The only change visible is the concentrations of ‘generic metals’ on the 21st (orange strip).

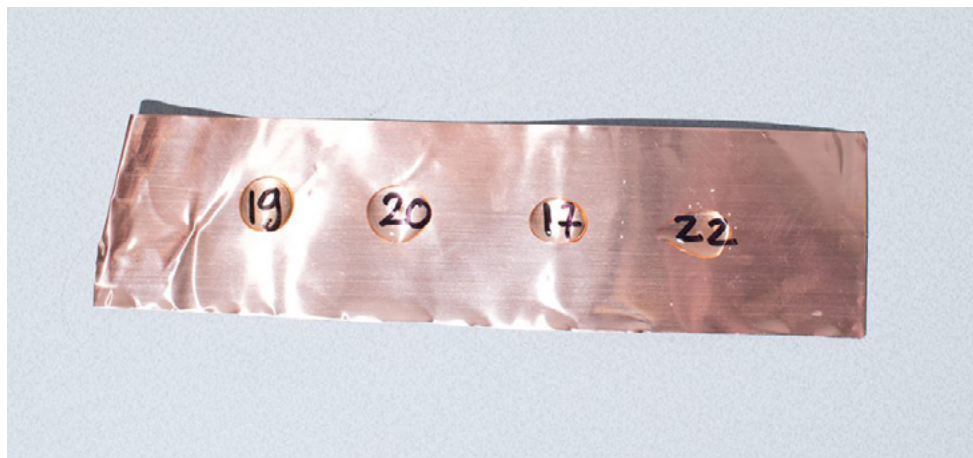


26 Nov: Urine etching test strip results

DATE:
November 26, 2020

WRITTEN BY:
Dennis

After one day the copper was visibly oxidised by the earliest samples. The latest urine sample did not oxidise at all. I forgot about the test strip until the 26th of November. Four days later this is the result (and underneath the initial strip):

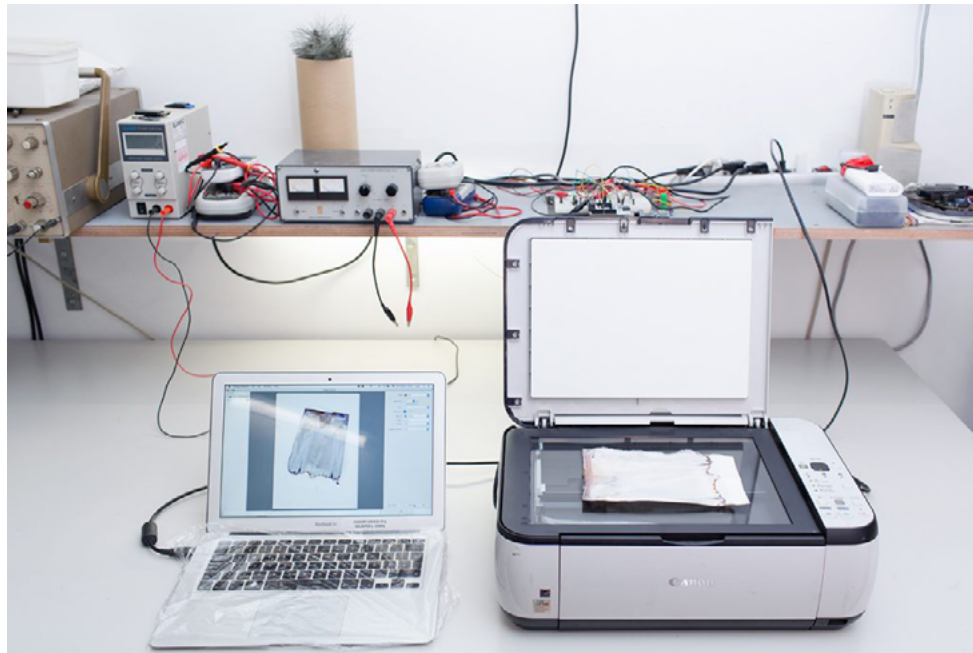


Capillary dynamolysis scanning

DATE:
November 26, 2020

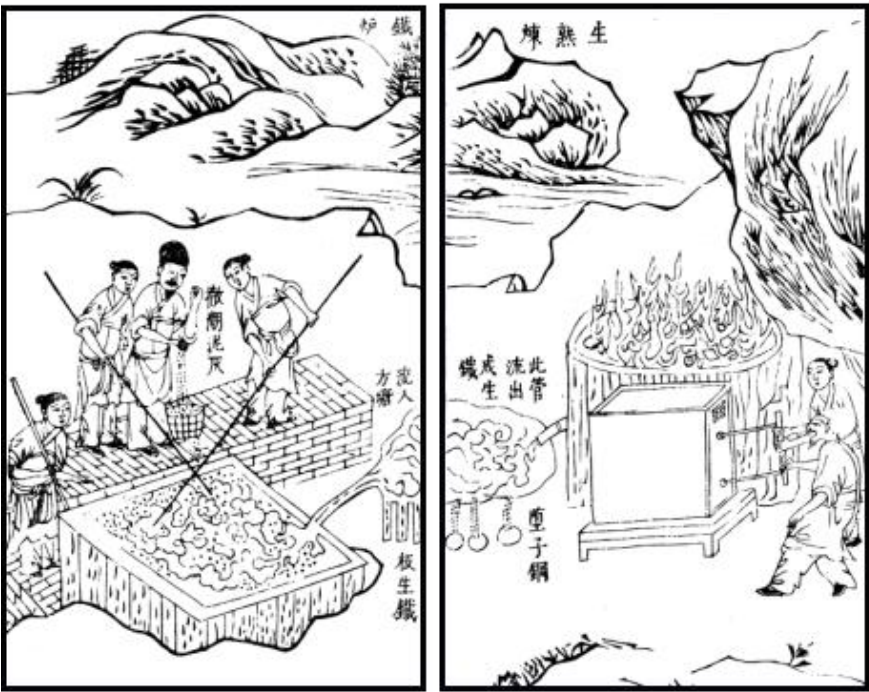
WRITTEN BY:
Dennis

Capillary Dynamolysis as per Lilli Kolisko is a technique involving the moon, a solution (urine in this case) and 1% silver nitrate. It is a mix between chromatography, photography and mystery. My scanner was full of urine + silver nitrate crystals, so the laptop was covered with foil to not contaminate the keys, electronics too much.



Iron

Alloy steels are made from iron and carbon with other additives such as nickel, chromium, vanadium, tungsten and manganese. These have a huge variety of applications including bridges, electricity pylons, bicycle chains, cutting tools and rifle barrels. Iron catalysts are used in the Haber process for producing ammonia, and in the Fischer-Tropsch process for converting syngas (hydrogen and carbon monoxide) into liquid fuels. Europeans developed iron smelting from bog iron during the Pre-Roman Iron Age of the 5th/4th-1st centuries BCE.



Toxicology and location

Iron is an essential element for all forms of life and is non-toxic.

The average human contains about 4 grams of iron, much of which is in haemoglobin, in the blood. Haemoglobin carries oxygen from our lungs to the cells, where it is needed for tissue respiration.

Insufficiency / Mining side effects

A lack of iron will cause anemia to develop. Symptoms can include: tiredness and lack of energy, shortness of breath, noticeable heartbeats (heart palpitations), pale skin.

Private mining applications

Ceremonial iron rings.

Replenishment of bog iron.

Industrial scale mining

Steel production.

Protocol diet

Tofu, beetroot, dark chocolate, ice cream.

Oysters, dark chocolate, lentils, beet greens, liver and offal, game and beef; cereals, cereal products and pulses also contain moderate to high levels. Vitamin C aids in iron uptake, calcium inhibits. An excess of iron inhibits zinc absorption and excess zinc inhibits iron uptake.

Protocol chelation agents

Turmeric/curcumin, beetroot, coriander, onions, garlic.

Experimental approaches

Flame spectroscopy, cyanotype photographic imaging, potassium thiocyanate tests.

Contents of the supplied mining kit

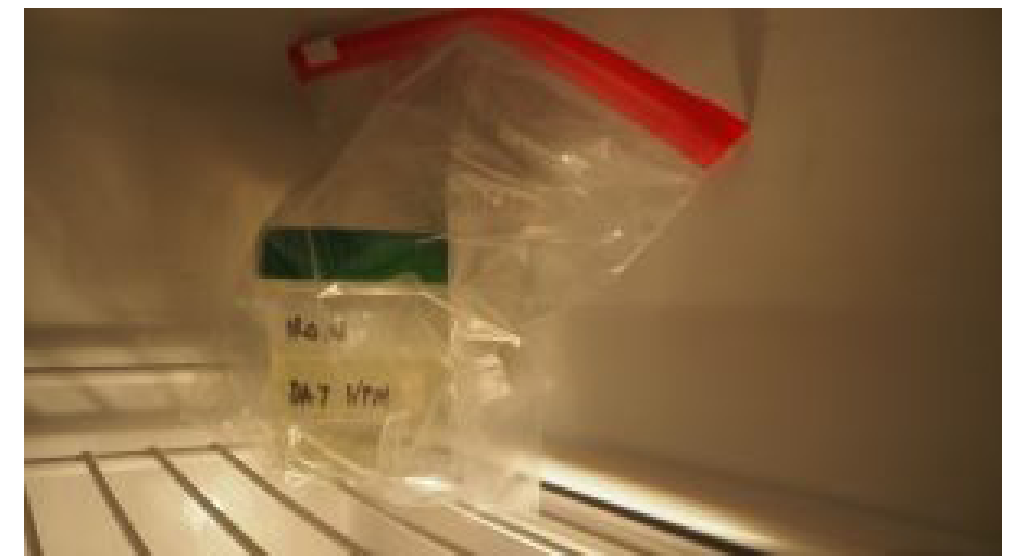
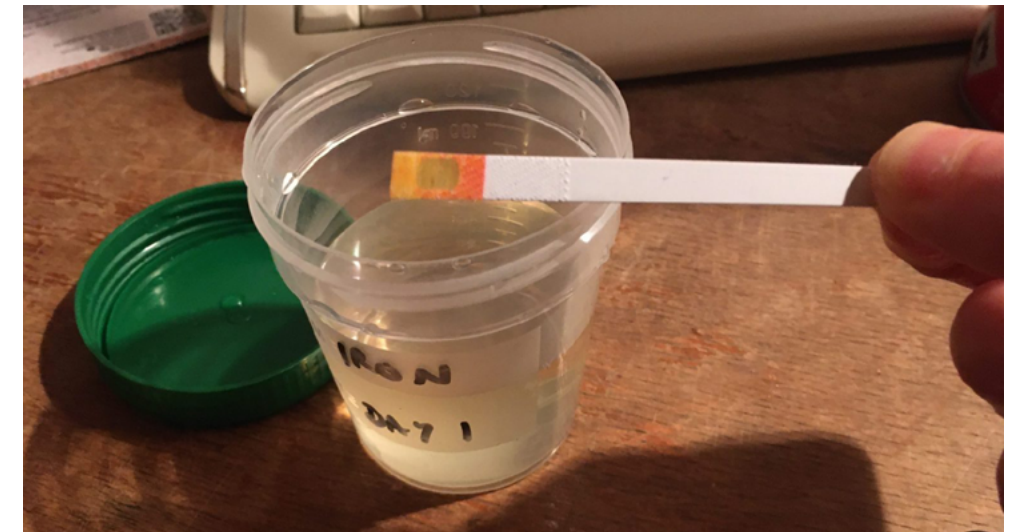
Gloves, sample bags, sample containers, Argotone packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottles for sweat and breath collection, curcumin powder, cyanotype chemistry (Ferric ammonium citrate and Potassium ferricyanide), blowtorch, DIY spectroscope, potassium thiocyanate, magnetite, vitamin C.

Day 1: I am rusty

DATE:
November 17, 2020

WRITTEN BY:
Kat

My whole life led up to this point.
The chemistry of my biology.
Today I began to mine what is mine.
Conclusively negligible
But I find what is mine is negligible.
I begin from a starting place that belongs in
the past.
I'm sampling myself like the oceans and rivers I study.
Preservation of Naught
I am a mine tailing, I try to precipitate my
iron.
Is the pull the moon or magnetism?
I am strong.
I am rusty,
at the flame test.



Day 2: Magnetic

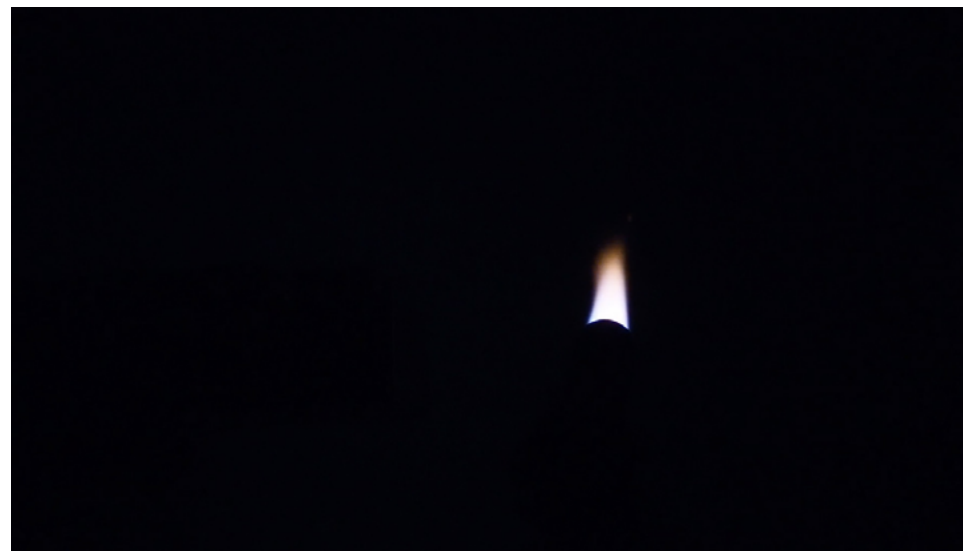
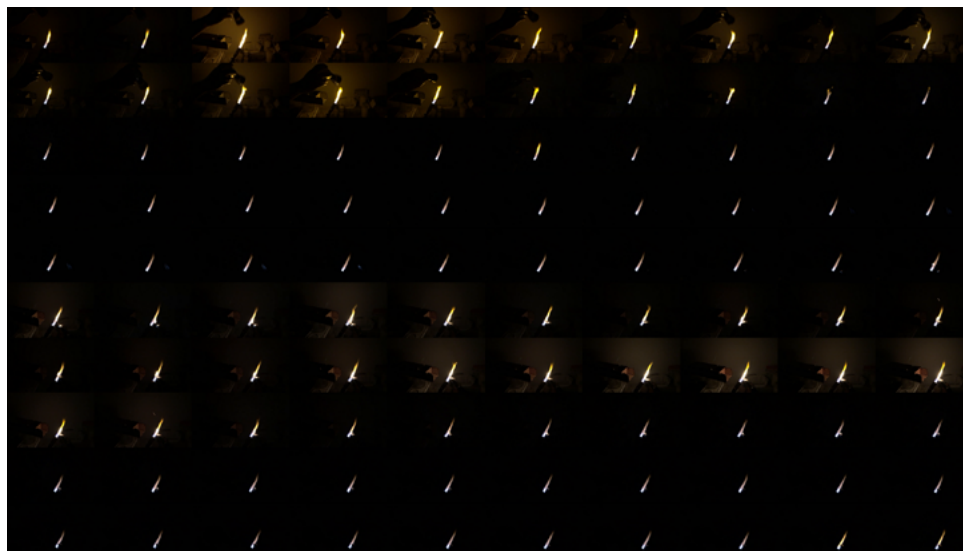
DATE:
November 18, 2020

WRITTEN BY:
Kat

Most likely Na, C, O, N. Fe 2+ and Fe3+ have outer orbitals that look like this. 3d orbitals. This orbital structure means that iron flips between two oxidation states that allow it co-function as an oxygen carrier in the blood. Earth is almost 1/3 iron. Iron containing minerals listed in *Alexander von Humboldt: Minerale und Gesteine im Museum für Naturkunde Berlin*. Magnetite has the highest weight ratio of iron. Humboldt discovered that magnetite-containing cliffs could confuse a compass' needle.

Iron – power and force!!! Iron – the centre of gravity! Iron – giver of life! The essence of Earth!

And yet my coffers were once again empty.



Day 3: Heavy

DATE:
November 19, 2020

WRITTEN BY:
Kat

(1) The Golden Dawn, J.G. Frazer. Papermac (1995)

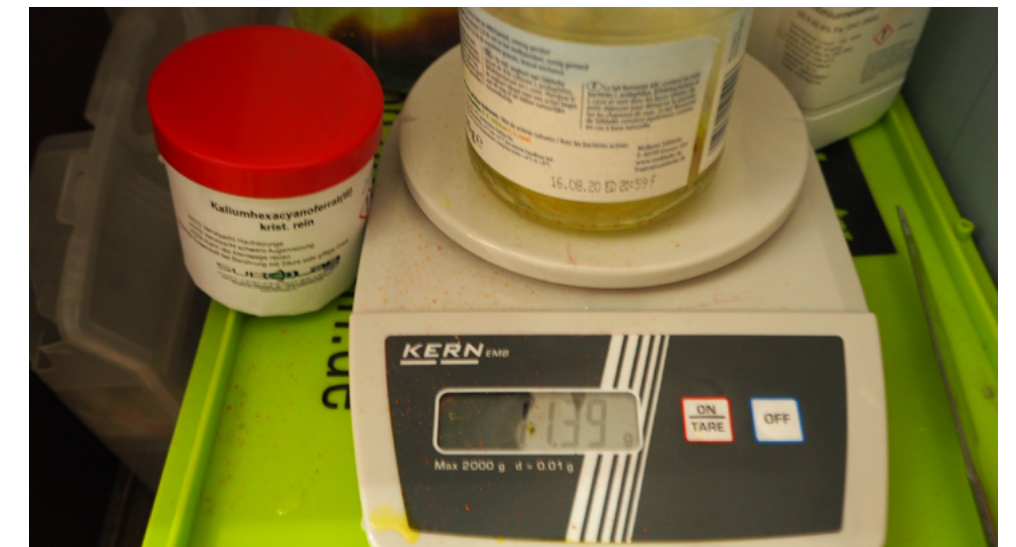
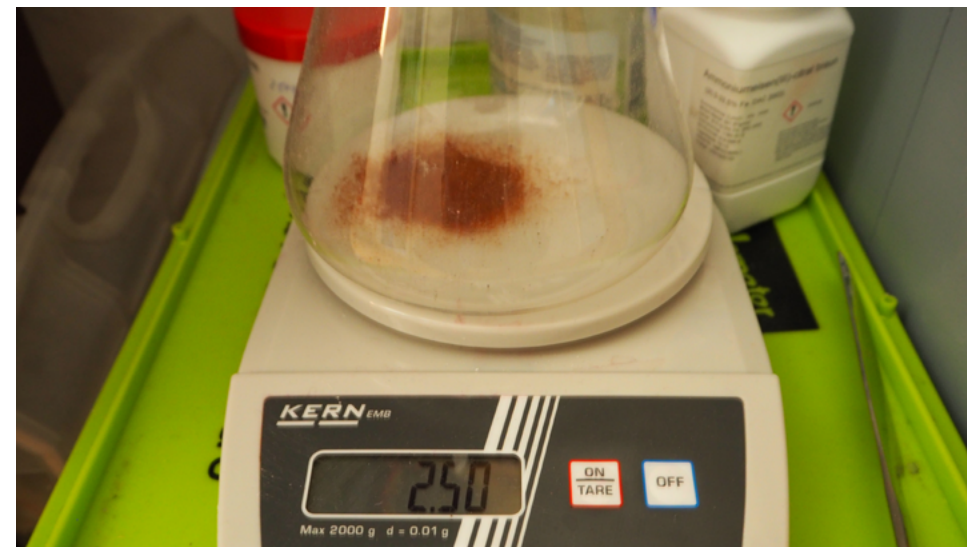
I feel heavy, saturated.

Like a cannonball in my stomach, like something is gestating in my blood.

Getting stronger

I have felt all day like I could vomit up a girder.

I read that iron was used to keep away the magical folk: elves and faeries. In many cultures, iron cannot be used for ceremonial practices, or to cut significant materials, because it is seen as a magic-killer or will offend the spirits (1). My body rejects the iron – there is too much, it is draining me to have it inside me. Though it is the element of Mars, and has the lucky number 5 associated with it, it weakens me. My period begins. I am nauseous all day. The iron has to come out. I am like a river sick from too many mine tailings, sluggish and rust-filled.



Reflections

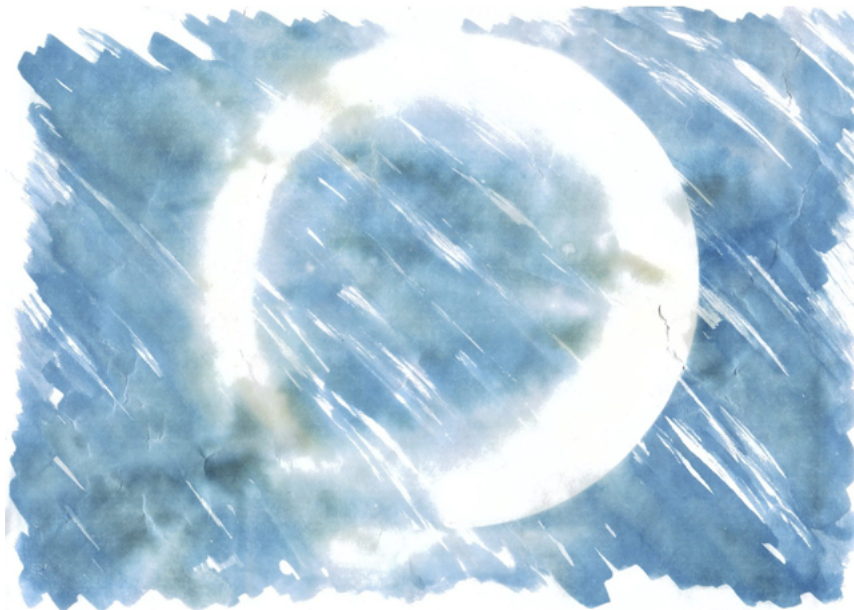
DATE:
November 27, 2020

WRITTEN BY:
Kat

The water runs out of the Earth's flesh, streaming red like blood from the great gashes hewn into the rock. Ripped from history by pumping, gushing industry, sour rushing rust red left-overs are traces of extraction, exploitation, exhaustion.

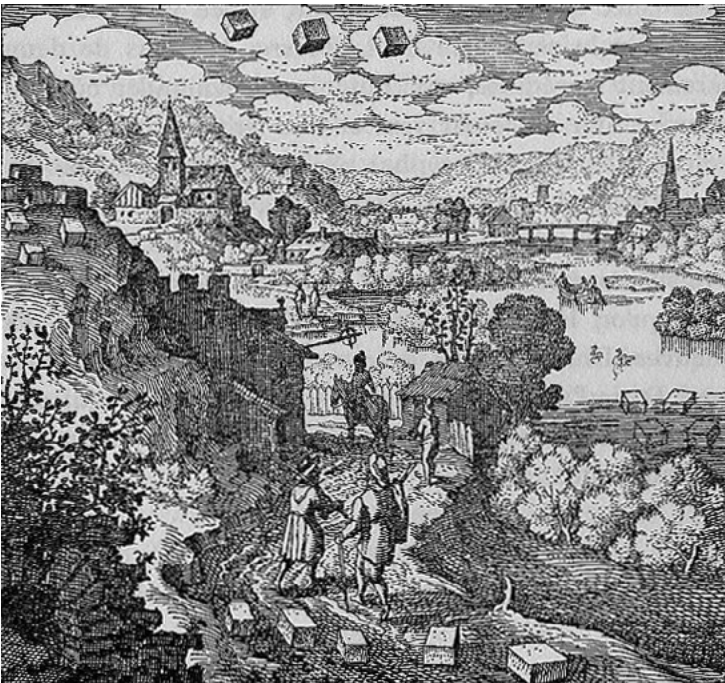
From heavy space crystals treasured by pharaohs, when humans learned to manipulate you, you caused the first technological revolution. Drawn out, distributed, dispersed; you are a victim of humengendered entropy, your many-faced clusters consumed by a fool's quest for gold.

Common, unexotic, magnetic: iron's true value is unexplored by our steely gaze.



Lead

This easily worked and corrosion-resistant metal has been used for pipes, pewter and paint since Roman times. It has also been used in lead glazes for pottery and, in this century, insecticides, hair dyes and as an anti-knocking additive for petrol. All these uses have now been banned, replaced or discouraged as lead is known to be detrimental to health, particularly that of children. Lead is widely used for car batteries, pigments, ammunition, cable sheathing, weights for lifting, weight belts for diving, lead crystal glass, radiation protection and in some solders.



Toxicology and location

It can accumulate in the body and cause serious health problems. It is toxic, teratogenic (disturbs the development of an embryo or foetus) and carcinogenic.

Daily intake of lead from all sources is about 0.1 milligrams. The average human body stores about 120 milligrams of lead in the bones.

Insufficiency / Mining side effects

None.

Private mining applications

Lead crystal glass receptacles.

Prima materia for all transformations.

Industrial scale mining

Batteries.

Weights.

Cable sheathings.

silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottles for sweat and breath collection, stirrer, potentiostat and printed electrodes, copper foil, hydrochloric acid, nitric acid.

Protocol diet

Grape juice, oysters.

Protocol chelation agents

EDTA, coriander, onions, garlic.

Experimental approaches

Potentiostat/voltammetry tests, Reinsch tests.

Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argentine packaging, heavy metal screen test kit, other metal tests, short printed protocol,

Day one: Dreams

DATE:
November 17, 2020

WRITTEN BY:
Martin

Two fragments of dreams from last night seem relevant to the study (lead) and *Tiny Mining*.

In the first I'm pissing into a toilet and each stream is accompanied by an intense blue light – like a gas light, and maybe even the smell of gas as if there could be an explosion. This could relate to the use of flame spectroscopy to analyze heavy metals in organic matters (such as hair). The blue would correspond to the colour of a certain metal – such as lead itself or arsenic.

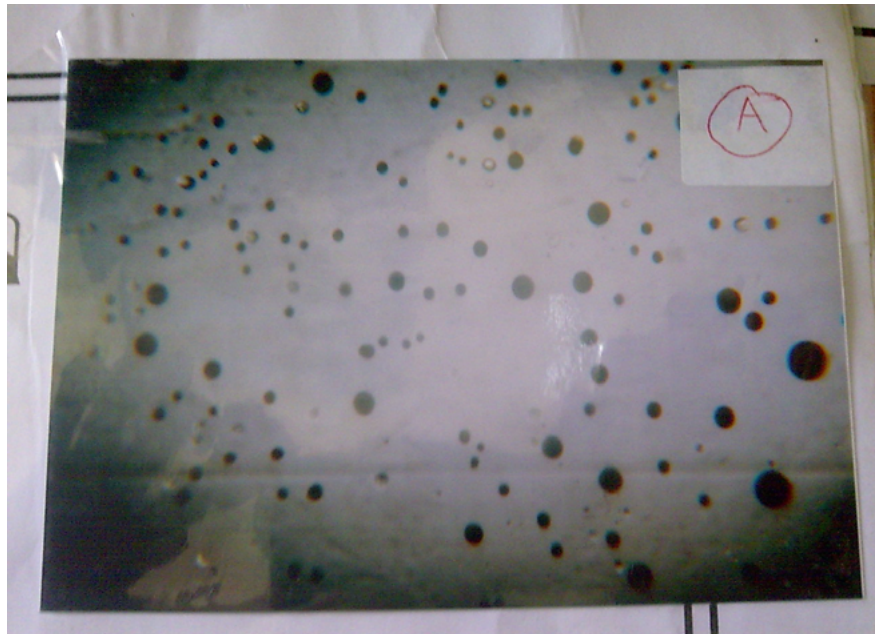
In the second fragment we go past a kiosk (in Cologne) with 2 fresh fish stalls nearby, run by Vietnamese people. Outside one of these stalls there are two older men, scruffily dressed and with red, bruised faces, looking a bit like old English standup comedians. They are there to entice people to come and see/buy the fish. At first they hold up the fish but later they bite pieces of fish and then spit them out, catching them and spreading them on their faces, to make a new face. They lay blue pieces over their eyebrows and other features, making their faces more bruised and blue looking. This relates to the seafood diet for the first three days of the sweatshop. Again a metallic, bruisy blue colour.



Day three: Dreams

DATE:
November 19, 2020

WRITTEN BY:
Martin



Two dream fragments which relate to metals and testing – the “becoming indicator” of *Tiny Mining*.

In the first fragment, in a rustic hallway with bouncing rabbit-bats and real bats feasting on chocolate cake – I am approached by a woman holding a glass with a dark blue ultramarine liquid, stirring this and telling me about a urine test for menstruation.

In the second, on a very straight USA highway, crowded beaches on either side a huge truck pulls up, big lettering on the side. The driver jumps down from the cab saying that she has to pee but that we can get ice cream for as cheap as 60 cents. People run over – I am hot and thirsty so I go to the truck. But when I try to pay all my coins are coated in a silver metallic spray. They don’t accept these and even offer for me to take more of the silver sprayed coins which they have. I pay with old, dirtier coins.

In the morning very dark, black almost faeces. Lead, putrefaction. Again more from Maier (XII):

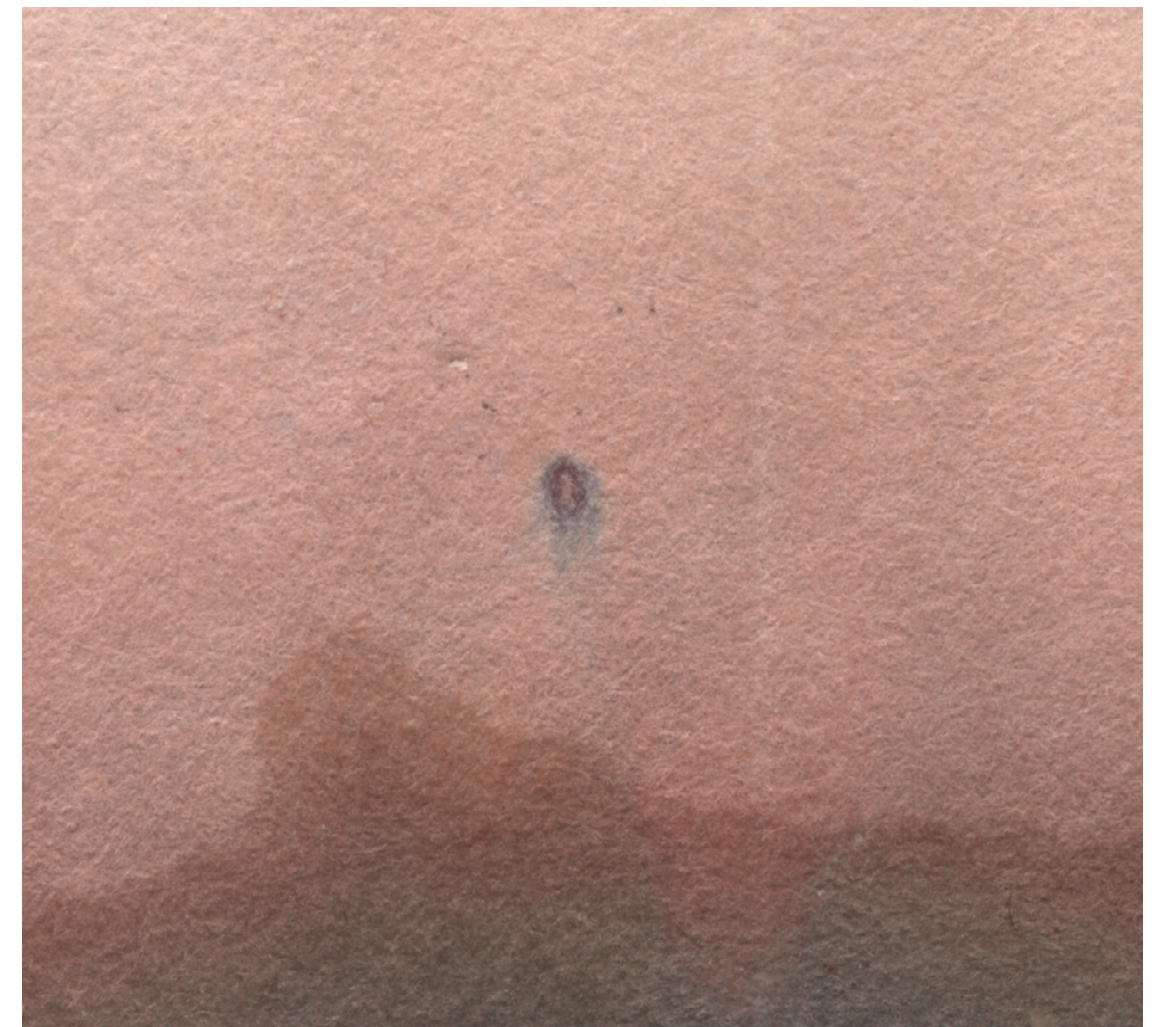
So the blackness is Saturn, he is the touchstone of truth ... The blackness is a dark haze which covers the stone at the beginning, so it cannot be seen.

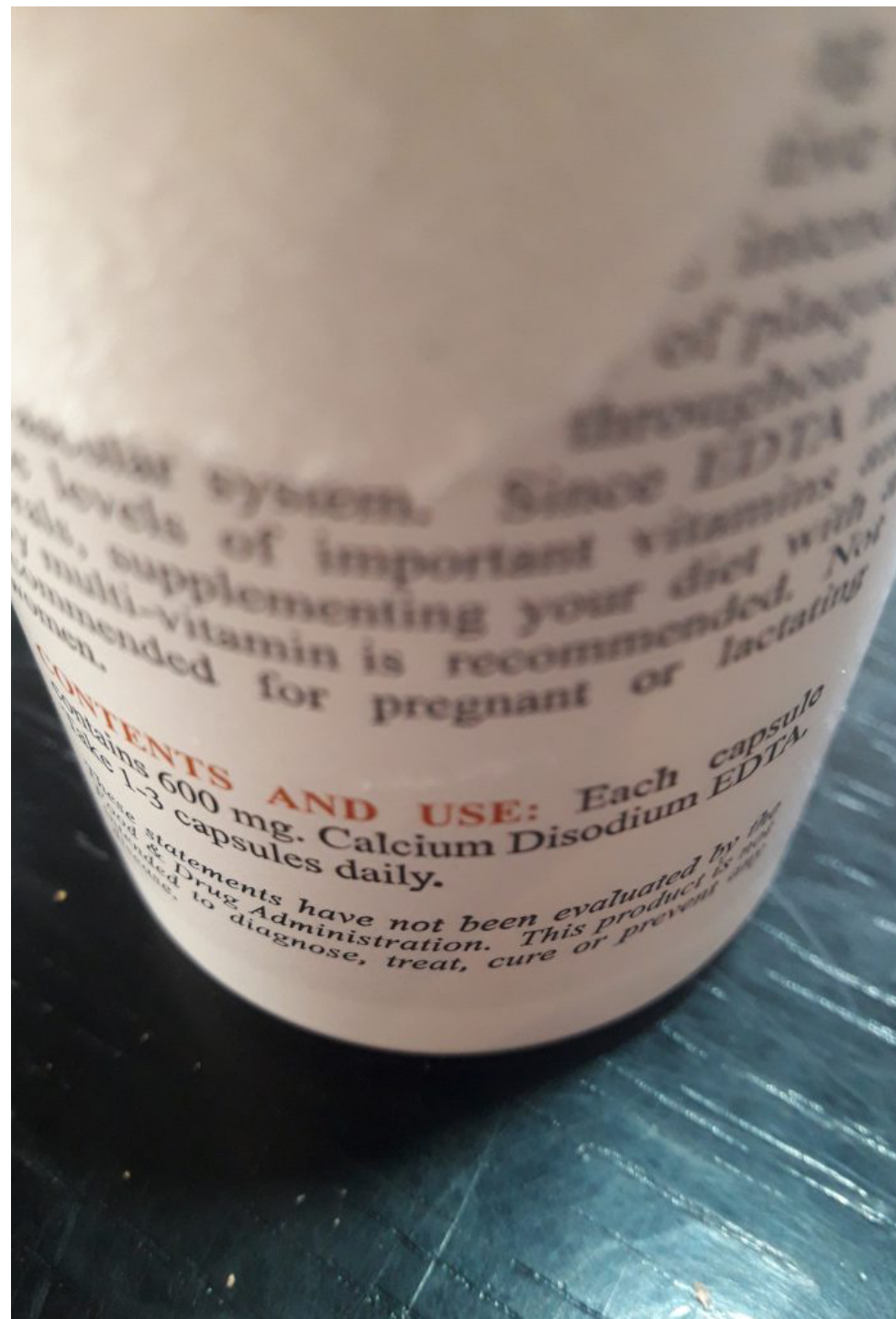
Day four: Diary

DATE:
November 20, 2020

WRITTEN BY:
Martin

First day of chelation. Morning expulsion of black, swampy matter. As in the emblem's title or epigram (modified): I am bathed, sitting in a steam-bath, and freed from the black bile. This morning around 12 I took the first EDTA – Ethylenediaminetetraacetic acid – capsule (600 mg Calcium Disodium EDTA from Arizona Natural Products): arizonanatural.com/explore-products/edta





At 1pm or so I went shopping (mineral water to stay hydrated as recommended) and felt nauseous and dizzy. This could be as I hadn't eaten anything since 10am following this advice.

“Oral EDTA Recommendations: Take EDTA at least 2 hours apart from any meals or supplements.”

Or it could be connected to the putrid black mussel episode from the previous day. The listed side effects of EDTA do include: EDTA can cause abdominal cramps, nausea, vomiting, diarrhea, headache, low blood pressure, skin problems, and fever. But there is some question as to how much is absorbed when taken by mouth (non-intravenous).

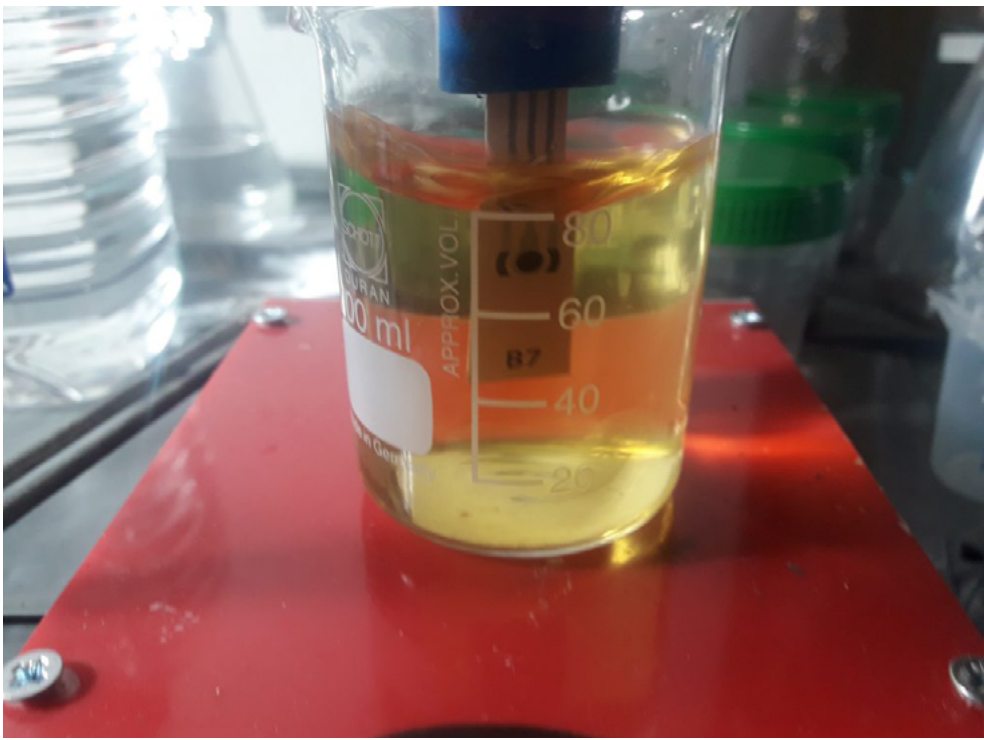
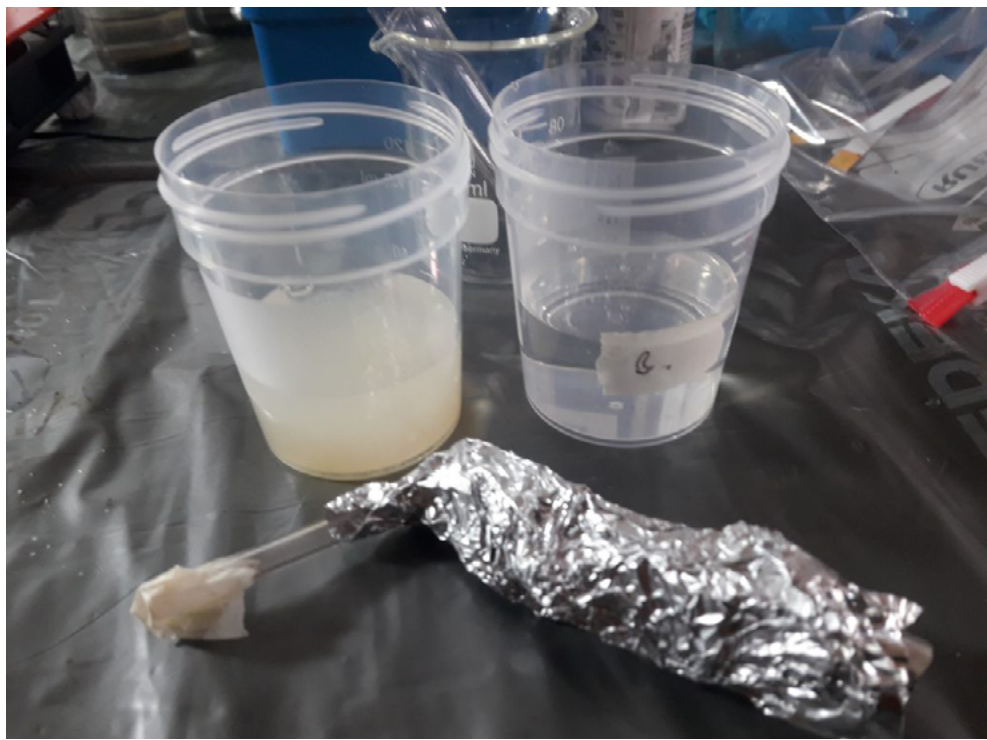
The tree like structures in close up here are from the metal clip used to attach the strip so that it doesn't flop down. Even though in

one case I insulated the strip from the metal (but only with paper so I guess the silver nitrate maybe soaked through). It also occurs to me that the length of the strip and the way it reads vertically with steps and changes is like an image of a descent down a mine, the ascending of the silver nitrate into the moon (or artificial or sun) light.



New silver nitrate tests were placed today on the windowsill with the datura plants. This time I made one with the breath sample (marked B on the tape/container) poured into the silver nitrate solution.

Later in the afternoon, after shopping for coriander, turmeric, green chillis and Naan bread... I made today's voltammetric test. After conditioning showed a very high peak at -1.1v I decided to



use a fresh electrode. This one showed a peak for lead on the first conditioning but this vanished after second set of conditionings. Tomorrow I will change the conditioner and maybe make a new calibration lead test. pH of the urine sample was adjusted to 4 before running out of the acetic acid buffer. We could aim for a lower pH.

Day four: Evening diary

DATE:
November 20, 2020

WRITTEN BY:
Martin

After finishing today's studies I already notice the quarter moon outside the studio window.
On the last day of the sweatshop it will be half moon.



The last day of the sweatshop in the day of the dead in Germany.

Before the evening zoom with the mining “family” I made and started to drink one chelation smoothie (featured). Also took one EDTA capsule alongside 1000mg vitamin C earlier in the day.

Today I was also thinking that during the sweatshop I spend much more time on the computer or phone, uploading or chatting, or answering emails or making video, checking video. More than usual. So the sweatshop which looks at the materiality of technology is also intertwined with its algorithms – with a life of machines, or shutting down and of starting up. During our zoom conversation we were talking about dependencies of metals on others, how one influences the uptake of another, how some are used to purify others. Could this be not be extended to algorithms – what are the metallic or planetary dependencies and affinities within software? Can these also be forms of cooking?

Evening meal was: coriander, chilli and lime chutney, raw beetroot, asparagus, onion and chickpea salad, boiled potatoes and naan bread.

Day five: Chelation dreams

DATE:
November 21, 2020

WRITTEN BY:
Martin



Two dream fragments from last night which relate to these sweatshop days (typing these notes as I drink early afternoon chelation smoothie and after one EDTA capsule):

1. Two containers (large, glass or plastic) whose mostly liquid contents need to be sorted out somehow. I am immersed in both containers but also in the room (an underground gothic club). Constantly large white feathered birds like ducks or geese flap over me and push me down, struggling to get away. I have to grab them and throw them off but I'm frightened of harming them. Later I see these white birds tucked into a box, like a christmas present or for nesting. The largest one has an orifice opening like a mouth



in its belly for excretion. Like a big mouth we watch. This makes me think of the cycles of *Tiny Mining* – definitely becoming more aware of ingestion and excretion – again descending and ascending, what is brought into the mine (rain water, air, a mixing of minerals, a churning) and what descends or is excreted as tailings or carried off in those little trains as precious ore. Dispersed thoughts. I am more focused on the materials of ingestion and excretion and a balancing between them. But again, as last night thinking of all this digital processing – of uploading to google docs, the hard drive churning materially, exhausting, of all this material hardware. *Tiny Mining* needs to be taken off the grid.

2. I fill my mouth with what I think is the chelation smoothie in order to spit it out into a tray for some process but as I spit it

out I realise it is the wrong container I have been drinking from and that I have taken an acid test solution which has small iron or lead balls suspended in it (like in the featured image here from Donum Dei). So I keep on spitting it out but I am worried as it is poisonous although I think that I didn't swallow anything.



Today's piss samples are noticeably darker orange and with a different smell.

Day six: Diary

DATE:
November 22, 2020

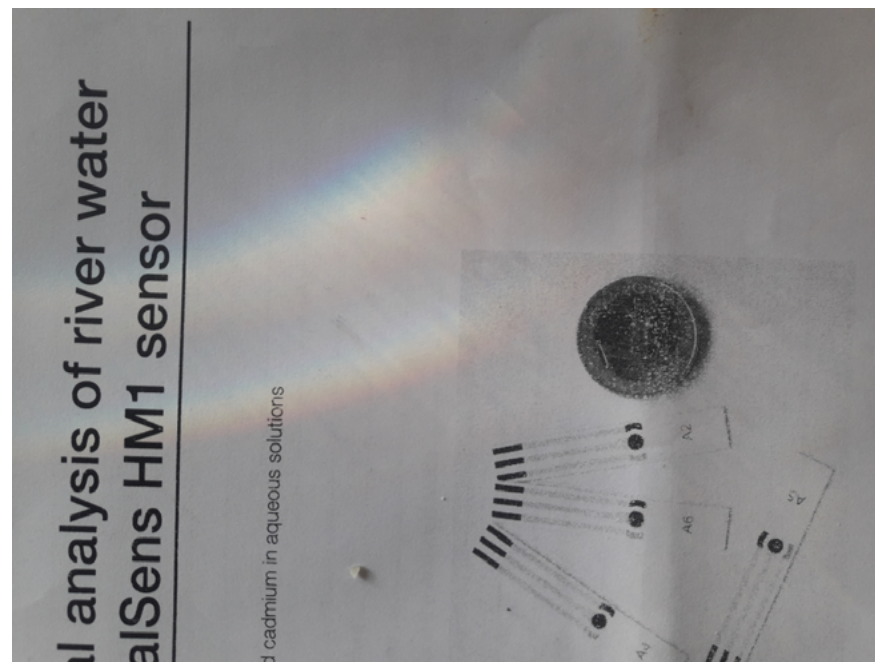
WRITTEN BY:
Martin

Sunday – the day of gold!

- Ingestion
- Computation/algorithm
- Excretion

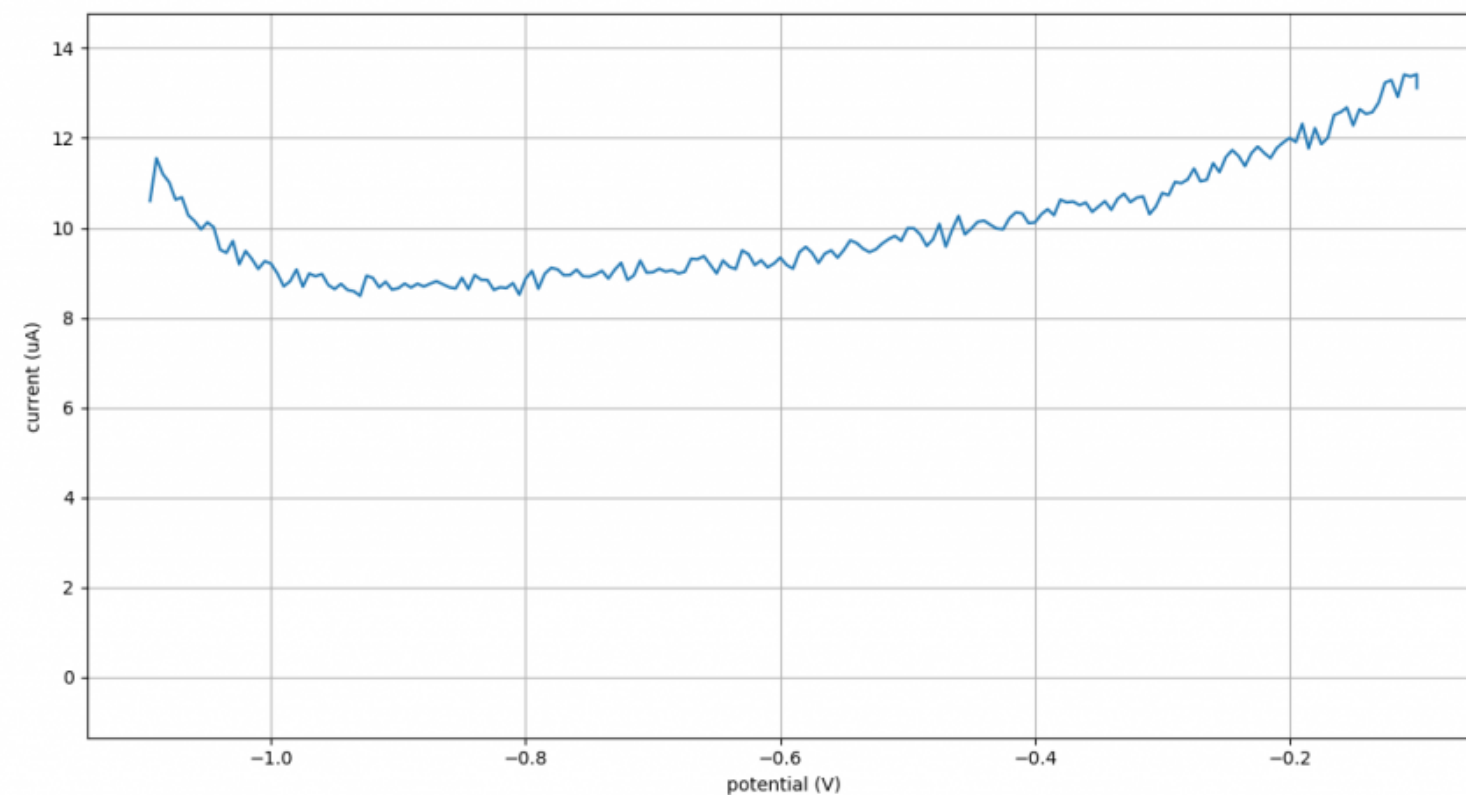
Pee semiconductor! I'm still thinking on the relation of computation (and not just materially) to the cycles of *Tiny Mining* and the descent into the physical mine – the maps of that descent in silver, in gold

Checking the silver nitrate tests – with breath showing a long worm descent and one smaller worm. Control is not so interesting. Control container was very clear, breath as yesterday showing a few small crystals in otherwise clear solution and urine is silver/grey.



Bright, golden sunlight in the studio casting small rainbow in the heavy metal HMI sensor protocol.

Preparing for the last potentiostat/voltammetric test with this morning's sample (today it is un-refrigerated). So we first measure pH – 6.2 of undiluted urine. We start with new electrode, new conditioning solution and conditioning steps. Still no lead:

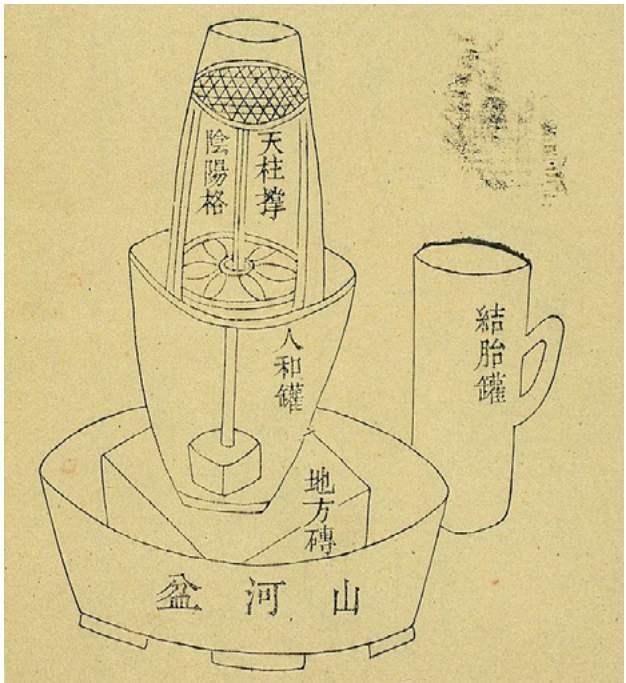


And while cleaning up, as if to signal the conclusion of mining activities – while clearing up I dropped the pH probe on the floor. It shattered without a sound.

Again more aware of the evening light, bare trees against the sky.

Mercury

Cinnabar, a naturally occurring mercuric sulfide (HgS), has long been used in Chinese mineral medicine for more than 2000 years for its sedative and hypnotic effects. Alongside arsenic it was used within elixirs of immortality and resulted in cases of elixir poisoning. Both arsenic and mercury can also preserve the bodies of the dead from decay. The Almaden mercury mines (in Spain) are the oldest (2,000 years) continuously active mines in the world. They played an important role during the colonial period as mercury was used in America in the amalgam method to extract silver and gold.



Toxicology and location

Most of the metallic mercury will accumulate in the kidneys, but some metallic mercury can also accumulate in the brain. Most of the metallic mercury absorbed into the body eventually leaves in the urine and feces, while smaller amounts leave the body in the exhaled breath. Elemental and methylmercury are toxic to

the central and peripheral nervous systems. The inhalation of mercury vapour can produce harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal. The inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested.

Erethism, also known as erethism mercurialis, mad hatter disease, or mad hatter syndrome, is a neurological disorder which affects the whole central nervous system, as well as a symptom complex, derived from mercury poisoning. Erethism is characterized by behavioral changes such as irritability, low self-confidence, depression, apathy, shyness and timidity, and in some extreme cases with prolonged exposure to mercury vapors, delirium, personality changes and memory loss.

Insufficiency / Mining Side Effects

None.

Private mining applications

Chinese traditional medicine.

Conferring immortality.

Industrial scale mining

Mercury mining is no longer profitable, but its use continues within illegal, solo gold mining operations.

Protocol diet

Fish that typically have higher levels of mercury include king mackerel, marlin, orange roughy, shark, swordfish, tilefish, and ahi and bigeye tuna. Many of these types of fish are used in sushi. Oysters.

Protocol chelation agents

Spirulina powder, Vitamin C, wheat germ oil, sunflower seeds, avocado, coriander, onions, garlic.

Experimental approaches

Divinatory film development using plant

materials, vitamin C and washing soda.

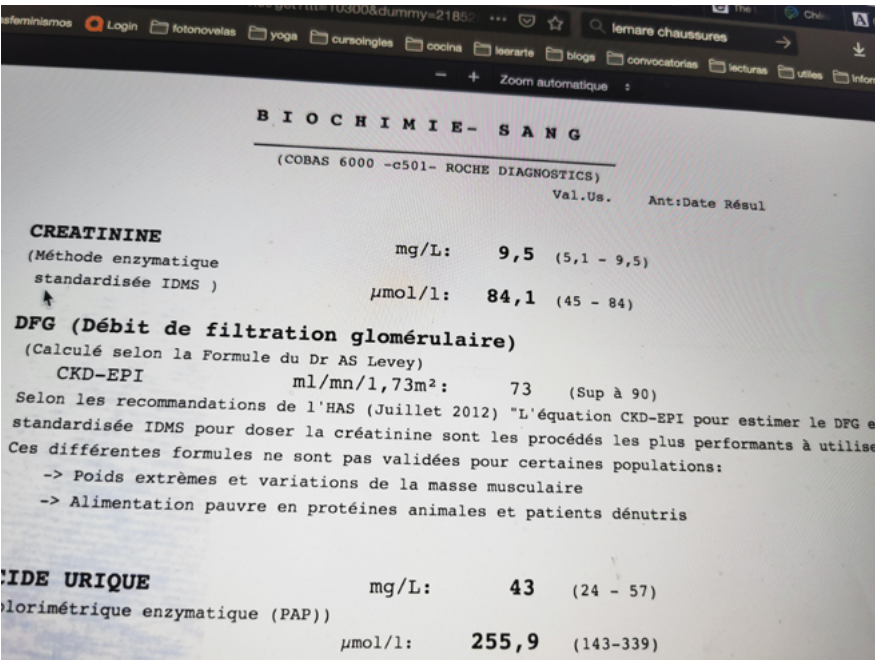
Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argentine packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottle for sweat and breath collection, sweat scraping tool, spirulina, vitamin C powder, cinnabar (mercury ore) sample, washing soda, black and white film material.

La nuit # 1

DATE :
November 18, 2020

WRITTEN BY :
Aniara



Me dormí rápidamente pensando en el efecto afrodisiaco que popularmente se le atribuye a las ostras. Verificaré mi libido los próximos 3 días.

Mis sueños fueron intensos pero solo recuerdo grandes discusiones sobre como formar un grupo para hacer música. El lugar era amplio, una casa o edificio en el que se tenían varias discusiones sobre nuestra performance musical. La cosa fundamental del sueño y mi recuerdo más vivido fue hacer parte de un espectáculo en el cual yo tocaba el fagot y recibía instrucciones de unx amigx compositxr.

Yo? fagot? pero si no toco ningún instrumento musical! Fue realmente un placer tocar ese instrumento y sentir el gusto de la boquilla metálica en la boca.

En algún momento me desperté y sentí mi vientre un poco pesado, me pregunté si iba a vomitar o algo, pero sabía que lo que pasaba tenia que ver con mi sensación de estar exagerando, 12 ostras y 200 gramos de atún!!!! ???? También me daba ansiedad estar haciendo todo mal, equivocarme en los protocolos, no hacer bien los experimentos, no encontrar las plantas justas etc etc etc, luego mi ansiedad se diluyo en un sueño profundo y tranquilo.

Apuntes entre la luna nueva y el primer día TM

DATE:
November 18, 2020

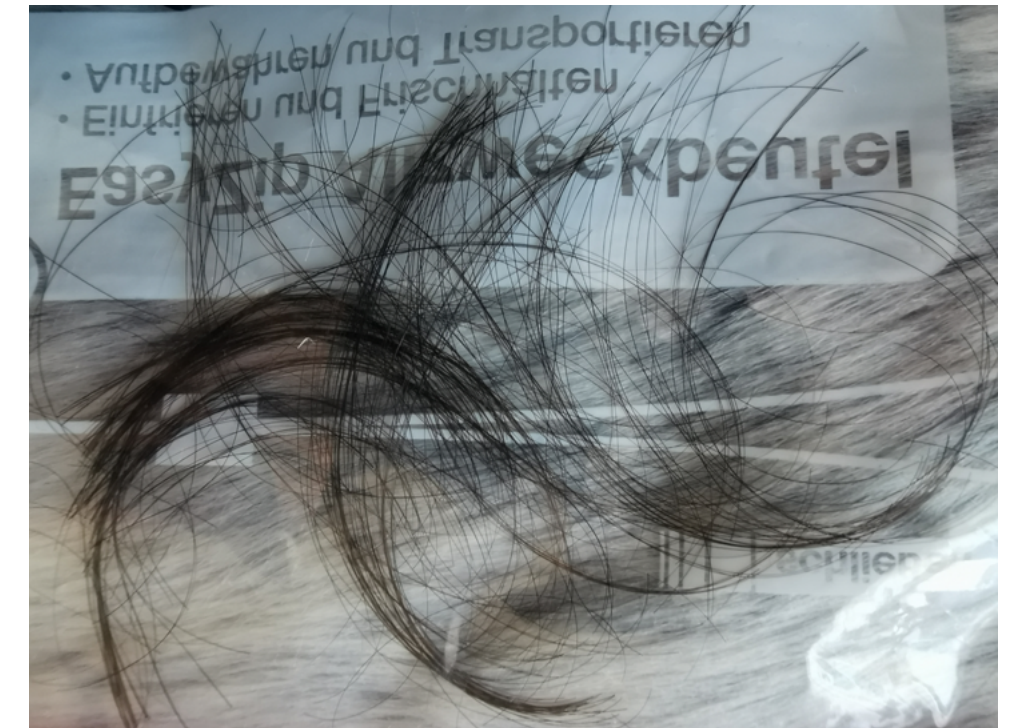
WRITTEN BY:
Aniara

El domingo de luna nueva mi hija y yo decidimos descansar viendo 2 comedias adolescentes en la cama. Recibir la luna nueva en Escorpio sin casi movernos bajo la manta, porque es mejor no agitar aguas profundas y olvidarnos de que estamos confinadas mientras nos nutrimos de pasta con verdu-

ras, chocolate caliente y sopa de calabaza.

Atardecer de luna nueva y mercurio en escopio.

El lunes, oh desastre! Cociné una salsa con 3 cucharadas de cilantro picado lo que me hizo recordar que entraríamos a la mina a la mañana siguiente y que había olvidado



que tenía un control médico exhaustivo que empezaba 11 minutos antes que nuestra cita unboxing a la que faltaría. También estaba obligada a ayunar hasta la 1 pm, momento en el cual me darían un desayuno industrial donde la glucosa era la reina. Igual me pregunté que minerales se encontraban en las semillas de linaza que estaban pegadas de mala manera a la baguette.

La cosa divertida es que tengo el hígado y los riñones como un queso gruyere, es una condición genética que ya conocía, pero fue impresionante volver a ver en la ecografía todos esos agujeros rellenos de líquido que por ahora son inofensivos pero que tal vez en 15 años me obligaran a dejar la sal, las carnes rojas, el alcohol y algunas cosas más para evitar sobre cargarlos, es lo mismo que han hecho mi madre y mi abue-

la. Pero mientras tanto aquí vamos a extraer Mercurio, uno de los metales más nocivos para los riñones.

Hoy me dan los resultados de los exámenes de sangre, me dan ganas de hacerme otros el lunes próximo para ver como la dieta modificara o no los resultados.

Paciente.

Dieta: Varias veces he experimentado con mi metabolismo haciendo dietas específicas y ejercicios, me gusta tomarme las dietas muy en serio, hacerlas permite concentrarse en la percepción del propio cuerpo, amplifica las sensaciones de ti misma y ayuda a que leas el entorno de otra manera. Así que a las 5 pm almorcé arroz integral con tofu ahumado. 15 minutos después mi panza protesto un poco por el desorden en los horarios de comida, supongo.

Luego de un unboxing zoom con Martin, en el que me sentí muy honorada y confusa pasamos a la mesa con mi invitadx: 6 ostras para ellx, 12 para mi, repollo Kale saltado, servido con un chorrito de aceite de ajonjolí, sashimi de atún rojo (pescado que NUNCA como justamente por sus altos índices de mercurio) y de nuevo arroz integral. Tamari, wasabi y un vino espumoso completaban nuestra cena. No paré de conversar sobre lo lujosa que era esta dieta, parece que la minería siempre es cara. Cuando voy a Colombia no como pescado de río, tenemos un enorme problema de contaminación por mercurio debido a la extracción de oro. La colonización nos tiene aún matando -humanos y no humanos- en busca del dorado. (www.upme.gov.co/SeccionMineria_sp/cadena_de_mercurio/Cadena_Mercurio_Tomo_II.pdf).

También tuvimos una reflexión de punki biología sobre como hacen las ostras para metabolizar los minerales y transformarlos en concha. Por ahora aprendí esto:

Le matériau dont elle est constituée est un assemblage intime de carbonate de calcium, composé minéral, et d'une protéine, la conchioline, composés organiques vivants. On parle de matériau biominéral. Chez les bivalves, groupes de mollusques dont font partie les huîtres, le carbonate de calcium peut cristalliser sous deux formes principales : la calcite et l'aragonite, ou nacre. Chez les huîtres comestibles, la calcite prédomine, la nacre n'étant présente que sous forme d'une fine couche à l'intérieur de la coquille.

Y también que la formación de la concha es cada vez más difícil pues el aumento de aci-

dez y temperatura del mar, hacen mas dificil los procesos de calcificación (fuente : www.lasciencesimplement.fr/comment-les-huitres-fabriquient-elles-leur-coquille

Y bueno antes de dormir di la bienvenida y presenté mi hermoso recién llegado Cinabrio a uno de mis altares.

en.wikipedia.org/wiki/Cinnabar



Silver

Silver is a precious, lunar metal. Silver salts are light-sensitive, and are used in photographic film and paper. The electrical conductivity of silver is the greatest of all metals, greater even than copper, but it is not widely used for this property because of the higher cost. Silver bullet: detection of poison and facilitation of passage into the mythical realm of fairies.



Neumond im November 1927

Toxicology and location

The silver ion is bioactive and in sufficient concentration readily kills bacteria in vitro. Silver ions interfere with enzymes in the bacteria that transport nutrients, form structures, and synthesise cell walls; these ions also bond with the bacteria’s genetic material. Silver and silver nanoparticles are used as an antimicrobial in a variety of industrial, healthcare, and domestic applications. Silver compounds are taken up by the

body like mercury compounds, but lack the toxicity of the latter.

Insufficiency / Mining side effects

In large doses, silver and compounds containing it can be absorbed into the circulatory system and become deposited in various body tissues, leading to argyria, which results in a blue-grayish pigmentation of the skin, eyes, and mucous membranes.

Private mining applications

Silver bullets, warding off evil spirits.

Industrial scale mining

Solar panels, LED lighting, flexible displays, touch screens, RFID tags, cellular technology, and water purification.

Protocol diet

Oysters, dark chocolate, shellfish.

Protocol chelation agents

Chlorella, chitosan (prawn and shellfish skins - soup), coriander, garlic, onions.

Experimental approaches

Daily colloidal silver intake, black and white film development in urine and film developer.

Contents of the supplied mining kit

Gloves, sample bags, sample containers, Argotone packaging, heavy metal screen test kit, other metal tests, short printed protocol, silver nitrate(wrapped in silver foil to protect from light), filter paper, small glass sample bottles for sweat and breath collection, silver rods, battery clips, crocodile clips, resistor and LED, rod holder block, black and white film, film developer and fix.

First thing: Colloidal silver beverage

DATE:
November 19, 2020

WRITTEN BY:
Alfonso

three nine-volt batteries

copper cable

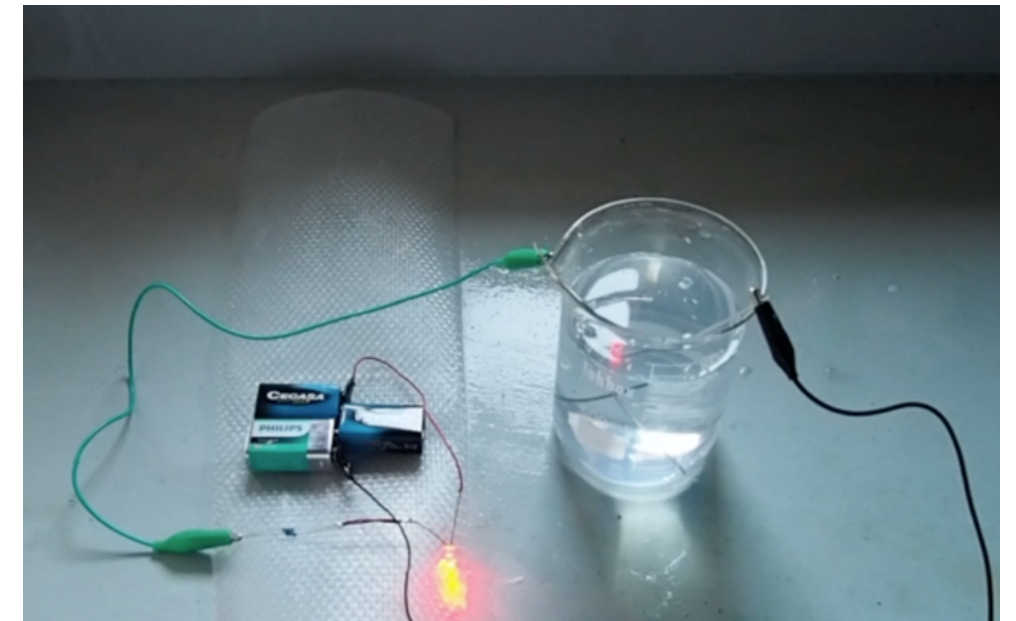
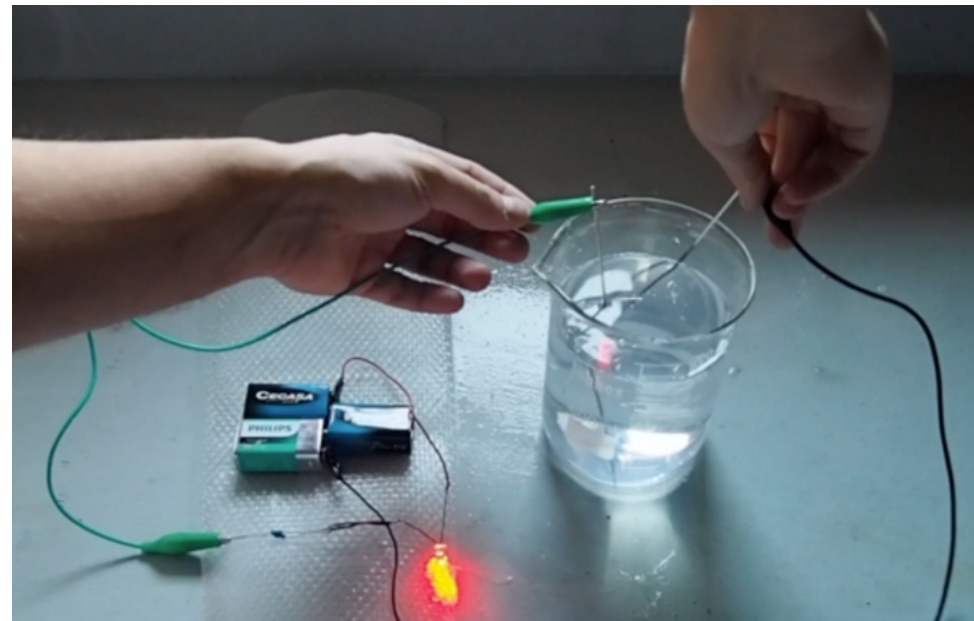
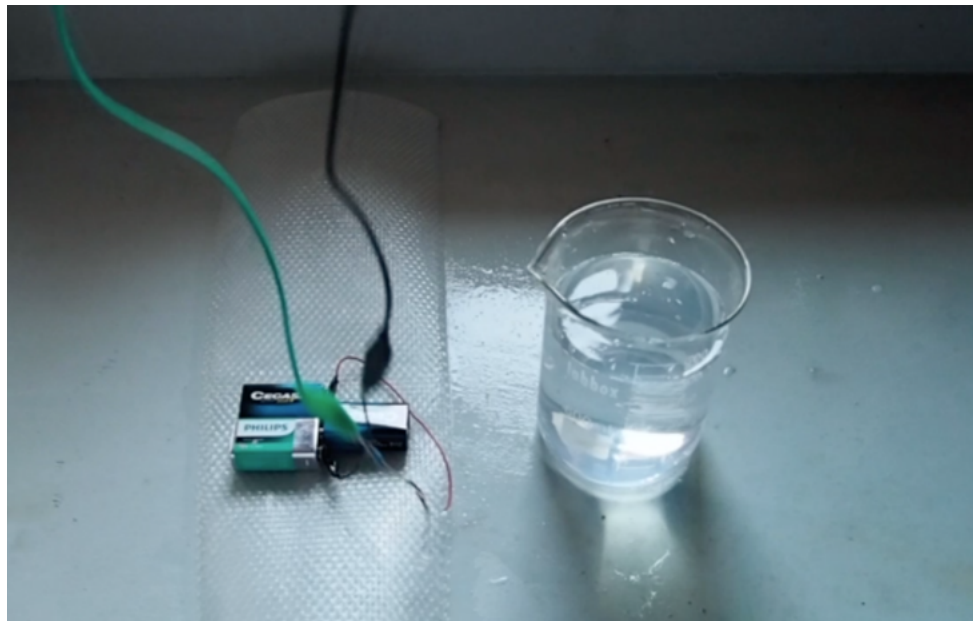
alligator clips

LED

1/4 resistor

distilled water

silver strips

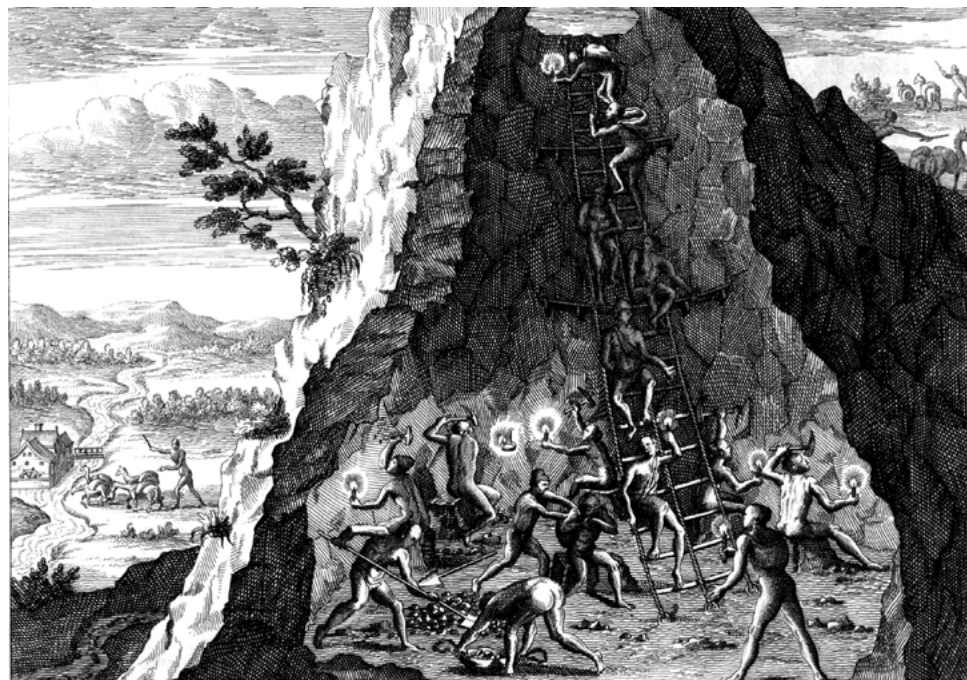


Silver is one of the most efficient disinfectants, it has germ-fighting abilities that deactivate important microbial enzymes. The question is if in this untiring process of ingesting it could potentially get attached in DNA replication. Cyrus the Great, king of Persia from 550 to 529 BC, proclaimed that his health came by drinking only boiled water that was stored in silver flagons. The water dissolved part of the silver particles getting deposited in his skin. During the Middle Ages, monks popularized the use of silver nitrate as a disinfectant, a salt formed by reacting silver with nitric acid. Through the 1960s, most American new-borns received silver nitrate eye drops at birth to prevent eye infections. All these babies grew up with silver in their eyes. In the early 20th century, the explosion of science into the use of silver in the human body was immense. As Henry Crooks wrote in 1910, “no microbe is known that is not killed by colloidal silver in laboratory experiments in six minutes.”

Native silver

DATE:
November 19, 2020

WRITTEN BY:
Alfonso



The improbability of finding pure silver grains in nature made us think that locating them must be fiction. This precious metal is usually found hybridised with gold, copper, lead or zinc. Silver is impure, but humans make it pure. Its name refers to its reflection and essence of colour. *Argentum* is a mirror.

Ag

eleven

forty-seven protons in the nucleus

one hundred and seven point eight six eight grams per molecule

ten point five grams per cubic centimetre

ten point three cubic centimetres per molecule in an atom

two thousand two hundred and twelve degrees Celsius to boil

sixty-one neutrons

three point two five Mohs of resistance

face-centred cubic crystals

soft

ductile

tarnishes

five shells per atom

two

eight

eighteen

eighteen

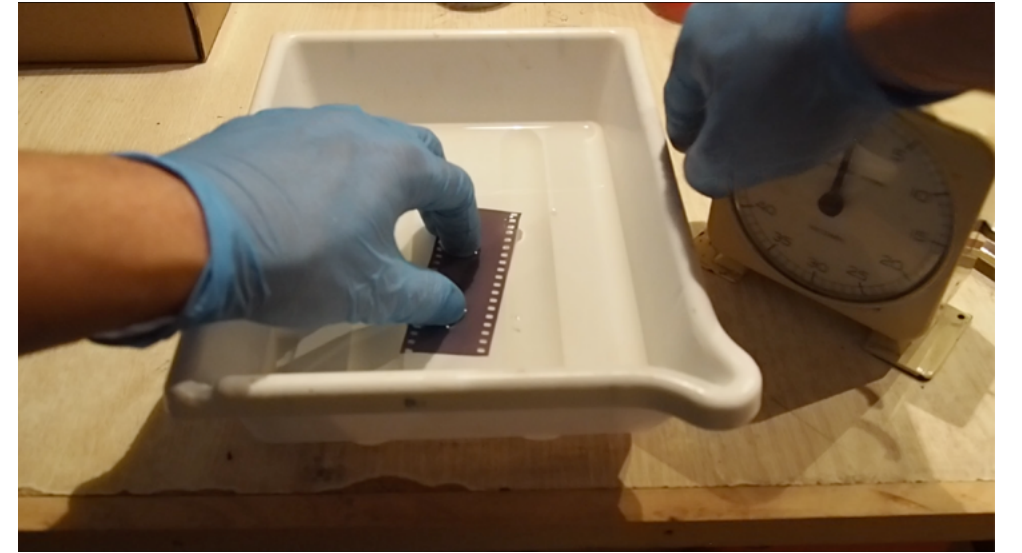
one

relatively abundant in the solar system:

minus zero point three one three L.O.G.

minus one point two L.O.G. in the earth's crust





Two dreams of silver nitrate

DATE:
November 20, 2020

WRITTEN BY:
Alfonso

How strange, I can recognize my dreams on the paper but I can't remember them when I wake up. Maybe it is the antiseptic quality of colloidal silver that cleans my dreams away. Seeing these silver papers, I thought of Talbot's Salt Prints. I imagined him in the 1830's seeing the reaction of silver mixed with salt. Silver gets contaminated very easily with other metals, it is the hybrid metal. I see the silver climbing up the paper, mixed with the salt of my urine, my sweat and my breath. I see the reaction of the silver in contact with metals contained in the secretions of my body... Heavy metal dreams that I cannot remember.

Day one: sweat (left). Day one: urine (right).



Day four: Coriander

DATE:
November 22, 2020

WRITTEN BY:
Alfonso



My grandmother used to say that coriander was poisonous if it was eaten in big quantities. I still remember her saying loud in the kitchen, don't put too much!!! It is dangerous... Some in the village said it was abortive and others that it was used to clean the stomach of animals when intoxicated... “La señora Lola” used to run upstairs and get the herbs from the attic, they were drying upside down as mummies covered in fabric and organized by types and uses... And now I find myself eating the amount of coriander they used to give to purge the stomachs of cows.

Day five: A dream

DATE:
November 22, 2020

WRITTEN BY:
Alfonso

I walked inside the house and there was the old doctor. He was retired already, an old friend of the family that used to work with my father. We were in a small house in a little village, I could listen to the neighbour's chickens. We started walking in a long transit, room to room. The house seemed endless. Then we got in an empty room with a big window and we started to practice aikido: receive, return, inside, outside for hours. Tired, I approached a corner in the room, he left the room and come back with a bag full of silver coins and emptied it on the floor.



Day six: The silver body

DATE:
November 25, 2020

WRITTEN BY:
Alfonso

* This text has been composed through fragments from the collective action by Alfonso Borragán, Daguerrolito, Croatia 2017.



Each trace on this silver holds the memory of the body's behaviour. They are the chemical genetic components from which we are made. Geology becomes genetics, an infinite trail of inherited information that we casually walk through seemingly senseless to the fabric of the world.

Here the ingestor's body may be said to know what technological instruments cannot. The body has escaped its self-contained condition, it is no longer master of its own destiny, the skin has been infiltrated—no longer a protective border between one side and another, blurring preconceived delineations. It is in this way that all borders, marks and lines function here, as constantly reassembling alchemic frissons, traces of change.

Swallowing is just another name for the incorporation of *the other*. We might want to estimate the consequence of ingestion, like our mouths, being open to intrusion from the day we are born. The mouth is the site of nurture, breath, aggression, appetite, language, and even knowledge: through our mouths we originally come to know the world and differentiate ourselves from it. Your body is implicated as you peer at these rocks; it is a visceral and never merely intellectual encounter. It reminds you that the mouth is the part of our body where there is the most going on, our most visible and vulnerable of orifices, the seat of so much that is essential to our staying alive.*

Urine dev

DATE:
November 25, 2020

WRITTEN BY:
Alfonso

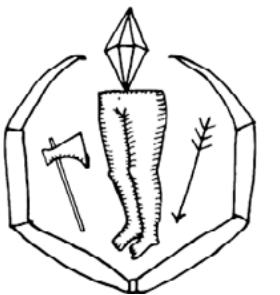


It was definitely the most successful misunderstanding. It is not strange I understand something in a different way, my attention capacity is quite low. I had to do a photographic development on a piece of film with my urine (and developer) and then fix. However, my mind only processed the instructions to apply the developer to my urine, what to me made absolute sense. My urine contained traces or significant amounts of colloidal silver, which in mix with the salts of my urine will catalyst the photosensitive properties of silver. So, I thought it was obvious that if my urine contained more silver, it will be darker in the development process. A successful misunderstanding.



An invitation to join the community

After taking Argotine, if your face and body itch as though insects were crawling over them, if your hands and feet swell, if you cannot stand the smell of food and vomit it up after you have eaten it, if you feel as if you were going to be sick most of the time, if you experience weakness in your arms and legs, if you have to go often to the toilet, or if your head or stomach violently ache - do not be alarmed or disturbed. All these effects are merely proof that the Argotine you are taking is successfully mining your insides.



H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Legend: H-essential; H_p-toxic; Fe-essential or toxic Ba-partially essential

Fig. 2.38. Essential (black) and toxic (grey) elements.

Table 1
Summary of sample metal concentrations in various alcoholic beverages

Alc. beverage	Concentration, mg/L												
	Al	Ca	Cd	Cu	Fe	Pb	Mg	Mn	Ni	K	Na	Zn	Ref.
Anisette Beer				0.1–58	0.2–25	0.086–0.445 ND–0.245						0.1–68	Mena et al. (1997) Reilly (1973), Mena et al. (1997)
Beverage spirits				0.4	0.7	0.165–0.390						0.3	Maranda (1986), Mena et al. (1997)
Brandy		ND–14.8		2.0–14.6	ND–2.30	ND–0.224	2.0					3.0	Cyro (1976), Bakalov et al. (1989), Mena et al. (1997), Soufleros et al. (2004)
Cachaza		1.36–44.6		0.04–14.3	0.01–2.24	ND–0.421							Bettin et al. (2002), Soufleros et al. (2004)
Cognac		6.0–11		0.005–5.31	0.1	0.008–0.420	2.0					0.016–3.0	Cyro (1976), Soufleros et al. (2004), Barbeira and Stradiotto (1998)
Finnish berry liqueurs			< 0.005			< 0.1							Harju and Ronkainen (1984)
Gin		1.0		0.5	ND	ND–0.035	0.5					0.5	Cyro (1976), Mena et al. (1997)
Rum		4.0		0.5	1.0	ND–0.070	2.0					3.0	Cyro (1976), Mena et al. (1997)
Scotch whiskey		0.5–4		0.1–1.7	0.02–28	< 0.005	0.02–4		0.002–0.6		2–24	0.02–20	Adam et al. (2002)
Sherry brandy	0.02–1.58	ND–14.8	5.31–0.30	0.22–5.31	ND–2.03	0.008–0.073	0.06–11.20			0.11–70.06	17.8–635		Camean et al. (2001)
Sugar cane spirits				0.04–7.0	0.01–1.28								Bettin et al. (2002), Soufleros et al. (2004)
Tequila				0.38–11.80									Carreon-Alvarez et al. (2008)
Vodka		3.0		0.5	ND		0.5					ND	Cyro (1976)
Whiskey (regular)		4.0		0.23–0.5	ND–0.1	0.02–0.195	1.0					0.5	Cyro (1976), Mena et al. (1997), Soufleros et al. (2004)
Wine, fruit wine, cocktails	0.017–14.3	3.50–241	ND–0.052	ND–7.62	ND–23.7	ND–1.125	7.8–718	ND–5.5	0.073–19.4	265–3056	ND–310	ND–8.9	Bulinski et al. (1995), Mena et al. (1997), Soufleros et al. (2004), Pohl (2007b), Dugo et al. (2005), Barbeira and Stradiotto (1996)

Note: ND = not detectable.

Lead People

Lead people are usually grumblers. Everything seems to be the last straw with them. The most thankless tasks are put aside for them. Relations only visit them when there is a death or an inheritance, or when they are short of money and business is bad. Then lead people are expected to dish out advice. The rest of the time, relations consider them too dull and boring. True, they have a thousand and one complaints, there is always something they can't eat or are allergic to. Their morals are extremely strict: everything is forbidden, especially on Sundays. They will stare wretchedly out of the window as others go off to swim or dance. Their lives are made up of duties. The clock and the calendar rule; everything is decided months in advance and attended to conscientiously. Lead people are steady, reliable, incorruptible, hold responsible positions and live up to their responsibilities.

Lead people are ruled by time. They look to the past and any old debts they still have to pay; they look to the future and how they will leave their affairs in perfect order for their heirs. In so doing, they miss out on the present which slips by without their noticing.

As a pillar of the existing society (remember the lead in the foundations of tall buildings!) they support accepted ways of doing things, worthy traditions and, of course, empty conventions and inhibiting dogmas. Alone in their studies they write very thorough textbooks and don't notice that their children are growing up.

Sometimes the burden of life becomes too heavy for them and they sink into depressions where they constantly come up against grey walls of difficulties and impossibilities. But they never give up. After a failure they will pick themselves up and start all over again.

They are a model of self-discipline. A name on a commemorative plaque on the house where they were born. A name in a chronicle.

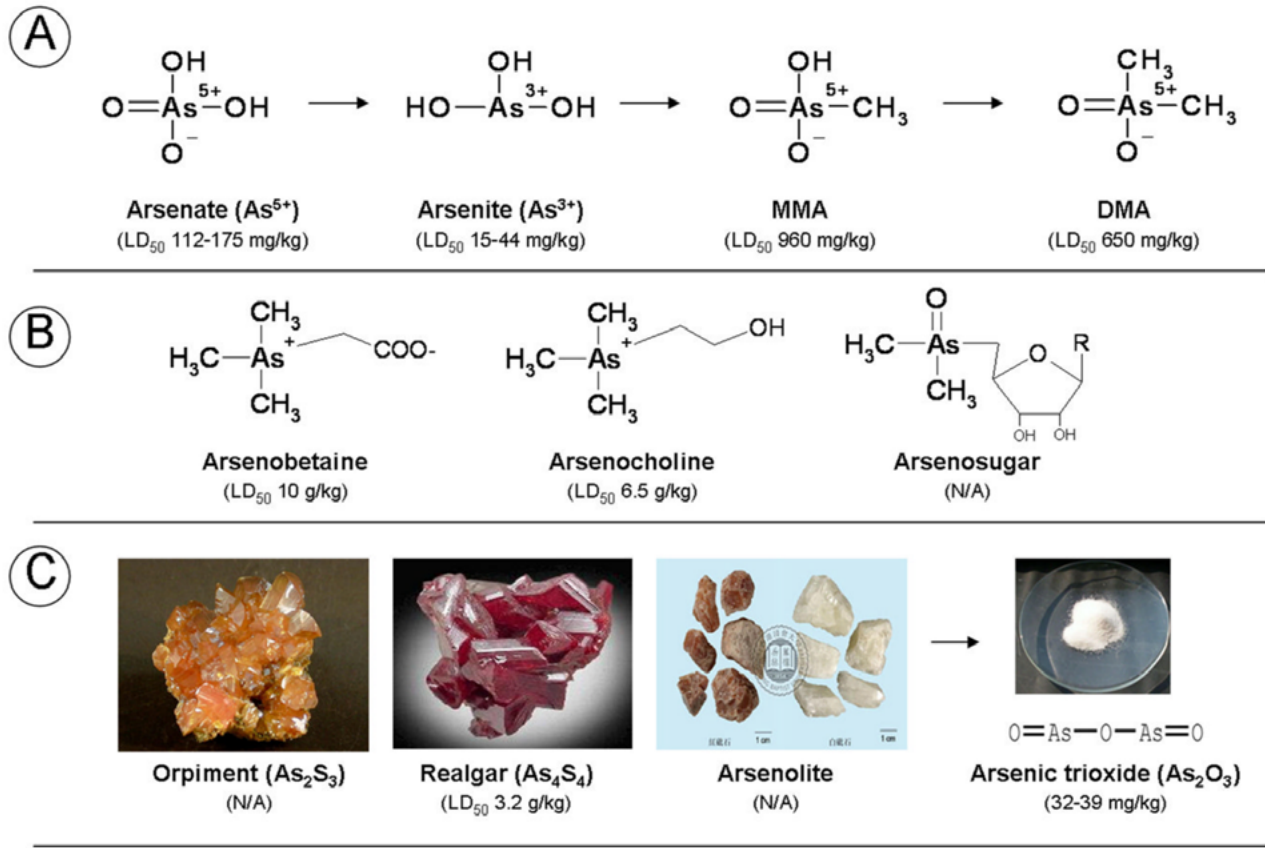


Fig. 1. Acute oral toxicity (LD₅₀) of arsenicals in rodents. A: common inorganic arsenicals and their organic arsenical metabolites; B: arsenic species in seafood; C: mineral arsenicals. N/A: LD50 data is not available

Table 1. Some abbreviations and terms relating to toxic effects of metals.

Abbreviation	Definition
NOAEL	No-observed-adverse-effect level. The actual doses (levels of exposure) used in studies that showed no observable adverse effects to the organism.
LOAEL	Lowest-observed-adverse-effect level; LOAELS have been classified into “less serious” or “serious” effects. “Serious” effects are those that evoke failure in a biological system and can lead to morbidity or mortality (e.g., acute respiratory distress or death). “Less serious” effects are those that are not expected to cause significant dysfunction or death, or those whose significance to the organism is not entirely clear.
MRL	Minimal Risk Level; an estimate of daily <u>human</u> exposure to a substance that is likely to be without an appreciable risk of adverse effects (noncarcinogenic) over a specified duration of exposure
CEL	Cancer effect level
LD ₅₀	Lethal dose that leads to 50% mortality

Note: Other web resources that provide definitions of terms used in toxicology are <http://extoxnet.orst.edu/tibs/standard.htm> and <http://www.atsdr.cdc.gov/glossary.html>.

TABLE 3: Continued.

Study	Country, participants	Study design and intervention	Key findings (concentrations µg/L unless otherwise indicated)
Haber et al., 1985 [26] (in German-used extended abstract)	Germany 4 groups of 8 males 2 groups with occupational lead exposure 2 control groups	Comparison of precisely defined physical work (intensive cycling and extended rowing in a pool), examining lead excretion in persons with elevated blood levels compared with nonexposed controls	Aerobic endurance training (rowing) caused a significant drop in the blood lead level in the occupationally exposed group (mean 430 (range 320–580) decreased to 370 (240–450)) (<i>P</i> < 0.05) Endurance training was more effective than shorter, more intensive training (cycling) Urine lead levels were not significantly affected by training
Cohn and Emmett, 1978 [33]	USA 6 males 3 females	Total body washdown and arm bag techniques	The mean concentration of lead in sweat was similar to that in urine (1) Total body sweat lead mean: (i) males: 24 (SD 16) (ii) females: 53 (range 40–60) (2) Body minus 1 arm/arm bag sweat lead 60 (SD 16) (40–120)/83 (86) (20–250)
Hohnandel et al., 1973 [38]	33 healthy males 15 females	15 min of arm bag collection	Mean sweat lead: (i) males: 51 (range 8–180) (ii) females: 120 (SD 72) (49–280)

TABLE 4: Studies of mercury excretion in sweat.

Study	Country, participants	Study design and intervention	Key findings (concentrations µg/L unless otherwise indicated)
Genuis et al., 2010 [3]	Canada 10 with chronic conditions 10 healthy	Sweating induced by exercise or sauna, collected directly into bottle	16 participants had mercury detected in all samples Blood plasma mercury mean 0.61 (range 0.26–1.6) (<i>n</i> = 16) Urine mean 0.65 (range 0.32–1.3) (<i>n</i> = 16) Sweat mean 0.86 (range 0.48–1.5) (<i>n</i> = 20)
Robinson and Skelly, 1983 [39]	USA 21 males at university 7 sampled more than once	Mercury in sweat dripping from forehead or nose, compared with urine	Sweat mean 0.5 (range 0.1–1.4)
Sunderman 1978 [40]	USA 1 case with mercury intoxication	Case report of chelating agents to treat mercury intoxication, followed by a regimen of daily sweat and physiotherapy for a protracted period of several months	Appreciable quantities of mercury were excreted in sweat. With the sweating regimen mercury, levels in sweat decreased to within the normal range
Lovejoy et al., 1973 [41]	USA 3 mercury-exposed workers 3 nonexposed workers 1 control	Participants wore rubber chest waders from 7:30 to 9:00 am Sweat accumulated in the feet was collected, as well as a 16-hour urine sample	Exposed workers: 1.5 h sweat: 120–350 ng mercury 16 h urine: 160–190 ng mercury Unexposed workers: 1.5 h sweat: 5–8 ng mercury 16 h urine: 5–7 ng mercury Internal controls: 1.5 h sweat: 43–70 ng mercury 16 h urine: 30–46 ng mercury Mercury concentrations in sweat > urine for exposed workers; similar for controls

Glossary of terms

Argotine: An open source community pharmaceutical under development which facilitates extraction. Developments favour a nano-chelation agent, which allows re-crystallized elements to be collected, recovered and finally vomited up as “ore”.

Bezoar stone: Agglomerates of partially digested or undigested inorganic/organic materials formed within calcareous concretions in the gastrointestinal tract of animals as well as humans. Bezoar stones have a rich history of collection and use in (alternative) medicines.

Chelation: Chelation is one of the first stages in interior mining. Chelation, derived

from the Greek word for claw, allows for the binding of minerals within the body for subsequent extraction.

Geophagy: The intentional practice of eating earth or soil-like substances such as earth, clay, chalk, or termite mounds. Geophagia is practised across many cultures and has strong links with medicinal practices as well as being a simple hunger suppressor.

Leaching: The loss or extraction of certain materials from a carrier into a liquid. Leaching of toxic minerals occurs when rainwater washes through mining sites. Leaching with simulated human body fluids is used within

in vitro studies to assess the bioaccessibility of certain metals.

Pharmakon: A drug or pharmaceutical which can be seen as both a poison and a cure. A third sense refers to the pharmakos as a scapegoat, a human sacrificed as a means of purification or atonement for a city or community.

Terra Sigillata: A medicinal clay from the island of Lemnos. In the Renaissance, it was seen as a proof against poisoning, as well as a general cure for any bodily impurities, and it was highly prized as a medicine and medicinal component.

About the contributors

Kat Austen is a person. In her artistic practice, she focuses on environmental issues. She melds disciplines and media, creating sculptural and new media installations, performances and participatory work. Austen's practice is underpinned by extensive research and theory, and driven by a motivation to explore how to move towards a more socially and environmentally just future.

Alfonso Borragán's practice is articulated between research, teaching and production. His art practice explores and activates relational processes, both physical and metaphysical, with the earth. His work is developed through long interdisciplinary collective processes with the place and its people. These processes usually manifest in collective actions, ingestions, installations, videos and publications.

Dennis de Bel is a hands-on artistic researcher, educator and radio amateur. His practice oscillates between various configurations of collaborations focusing on collectively exploring hardware, software and various forms of waves. This is actualised through a broad spectrum of talks, devices, dj sets, workshops and exchanges at for example ISEA, Transmediale, Radical Networks and Relearn, including various educational institutions such as Design Academy Eindhoven and the Piet Zwart Institute Rotterdam. In 2017 he co-founded Varia, a physical space to actively develop collective

approaches towards everyday technology informed by experiments with building physical, digital and social infrastructures of affinity. De Bel holds a MA from the Piet Zwart Institute (NL) and most recently participated in the artist in residency program of the Institute for Provocation in Beijing (2018).

Martin Howse is occupied with an investigation of the links between the earth (its living creatures and geophysical phenomena), software and the human psyche through the construction of experimental situations (performance, laboratories, walks, and workshops), material art works and texts. He has exhibited and performed worldwide. He is equally the creator of the ERD modular synthesizer series, and is one of the founders of the *Tiny Mining* community.

Theun Karelse studied fine arts at the Sandberg Institute in Amsterdam before joining FoAM, a trans-disciplinary laboratory at the interstices of art, science, nature and everyday life. His interests and experimental practice explore edges between art, environment, technology and archaeology. Lately he has been creating research programmes that consist of fieldwork as a means of critical reflection. For this diverse teams are established to address specific topics in specific locations by in-situ prototyping, experimentation and direct perception.

Aaron Parkhurst is a senior lecturer in Medical and Biosocial Anthropology at University College London (UCL). He has conducted extensive international research on the anthropology of the body, manage-

ment of chronic illness, and bioethics. He is a researcher with the ERC funded Ethno-ISS project, conducting an ethnography of the human body onboard the International Space Station, and the complex networks of life-science research conducted on the ISS. Dr Parkhurst has worked, researched consulted, and published in health, wellbeing, and culture in the United Arab Emirates, the UK, and the USA; with a foci on chronic illness, bioethics, the intersection of technology and the human body, and outer-space studies. He is editor of the Journal of Anthropology and Medicine, and he convenes teaching in ‘Medical Anthropology’, ‘Anthropology of the Body’, ‘Anthropology and Psychiatry’, and ‘Health technologies’ in the department of Anthropology and at the UCL Medical School.

Aniara Rodado is a choreographer, artist and researcher. From a transfeminist point of view, Aniara explores witchcraft and interspecific relations from the plant world. Her performances, installations, texts, videos, and dance pieces are created under open source code and a preference for old/new technologies and domestic DIY. Aniara is a doctoral student in science and art at the École Polytechnique, Paris.

Ines Tomašek is a medical geologist and volcanologist working on health and environmental impacts of volcanic eruptions using multidisciplinary approaches and methods across geochemistry and particle toxicology. She is based at GReD, a Research Center at Clermont-Ferrand in France.

Agnieszka Anna Wołodźko (PhD) is a lecturer and researcher at AKI ArtEZ Academy of Art & Design, where she has initiated and coordinates BIOMATTERs, an artistic research programme that explores how to work with living matters. Her research focuses on post-humanism at the intersection of art, ecocriticism, bioethics and biotechnology. She is also a curator and writer. Her recent publications include “Demonological re-enchantments : – or how to contaminate through intimate stories of commons without consensus” in *Technoetic Arts: A Journal of Speculative Research* (forthcoming); “Living Within Affect As Contamination: Breathing In Between Numbers” in *Capacious: Journal for Emerging Affect Inquiry*; “Materiality of Affect: How Art Can Reveal the More Subtle Realities of an Encounter”, in *This Deleuzian Century: Art, Activism, Life*, edited by Rosi Braidotti and Rick Dolphijn. Currently working on her book *Bodies within Affect. On Practicing Contamination through Bioart*.

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Colophon

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