

NICOLAS NOVA & DISNOVATION.ORG

A BESTIARY OF THE ANTHROPOCENE



ON HYBRID MINERALS,
ANIMALS, PLANTS, FUNGI...

A BESTIARY OF THE ANTHROPOCENE
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Above: first computer bug discovered by Grace Hopper on Sep 9, 1947.

CHAPTER I

— FOREWORD —
Nicolas Nova

MEDIEVAL BESTIARIES AND
ANTHROPOCENIC HYBRID CREATURES



A BESTIARY OF THE
ANTHROPOCENE

(FOREWORD)

—NICOLAS NOVA



“Staying with the trouble requires learning to be truly present, not as a vanishing pivot between awful or Edenic pasts and apocalyptic or salvific futures, but as mortal critters entwined in myriad unfinished configurations of places, times, matters, meanings.”¹

—Donna Haraway, *Staying with the Trouble*. (2016).

BEARS, DRAGONS, WILD BOARS, PIGS, LIONS, UNICORNS, WORMS, hedgehogs, butterflies, ravens, such were the creatures one could find in medieval bestiaries. Real beasts next to imaginary ones; ordered with a hierarchy of land animals, birds, serpents, and sea organisms; and described with all sorts of details that attest to the symbolism attached to this menagerie. On the vegetal side, herbaria compiled textual and visual depictions of plants with an emphasis on the properties of each species, the illnesses they are most suitable for, and how to prepare curative potions with them. Lapidaria, in the Middle Ages, were also treaties documenting intriguing information and the known virtues of stones. Overall, the logic at stake in these books is similar, grounded in compiling specimens and their descriptions.

We are now in the 21st century and the world has changed. Our knowledge about the environment has allowed us to discern imaginary beasts from those whose existence was proven, to reach a more systematic way of presenting animals, plants and minerals, and to discover new kingdoms such as bacteria, fungi or protozoa. Advances in science and technology also gave rise to a whole new set of artificial or hybrid cases, from humanoid robots to rock-shaped Bluetooth speakers and cultured meat; not to mention animal prosthetics, genetically engineered creatures, and the industrial production of trees.

In addition, the very same technological “advances” that made these new specimens also contributed to the ever-increasing presence of plastics and pollutants that spread into our environment... leading to microplastic-saturated birds, defunct underground pipes, or radioactive mushrooms. Some of these cases were designed on purpose, while others were just the by-products of technological progress.

NOTES

Such an evolution calls for being mapped out, for revising our bestiaries, herbaria and lapidaria, and for examining the creatures of our era: The Anthropocene. This is the purpose of this book, which compiles hybrid specimens we've encountered in our field observations, as well as in our daily perusal of multiple science reports. In these pages, followed by a series of texts aimed at highlighting various notions to navigate them, we selected sixty cases that are symptomatic, yet not exhaustive, of the rapidly transforming "post-natural" era we live in.

From a temporal perspective, we mostly focused on cases that emerged after the middle of the 20th century. While debates abound about when the Anthropocene actually started we selected it as the beginning of the "Great Acceleration", after the Second World War, to consider how we began consuming resources and creating completely new materials and pollutants at an exponential rate.

Furthermore, all these cases correspond to different levels of hybridisation, with cases that go from the mineral and organic matter to technological systems, attesting to the disruption of the boundaries between the "natural" and the "artificial." In the following pages, they are categorised in common systematic kingdoms, with minerals, plants, animals, and miscellaneous matters. Among each kingdom, cases are presented from the natural world to our increasingly artificial one. We focused only on existing and documented specimens, avoiding speculative creatures such as prototypes from scientific research and art and designs projects, hypothesizing that the existing cases were stunning enough for our purpose.

Designed as a field handbook, this bestiary of the Anthropocene aims at helping us observe, navigate, and orientate into the increasingly artificial fabric of the world. It aims at encouraging us to pay attention², to perceive the nuances and the assemblage of a *dark ecology* that arose in the last decades³.

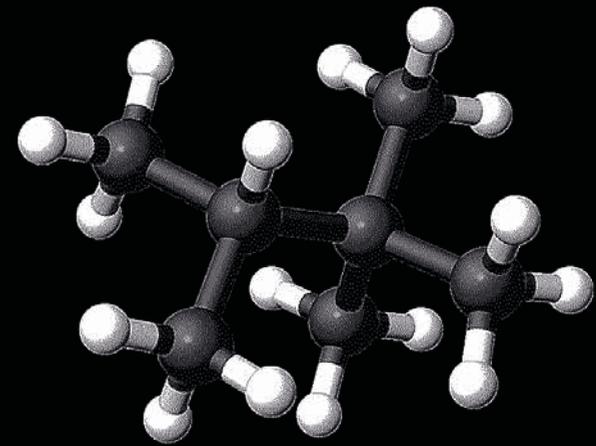
1 Haraway, Donna. 2016. "Staying with the Trouble. Making Kin in the Chthulucene." Durham: Duke University Press, p.1.

2 Which is close to what Anna L. Tsing calls "the arts of noticing". Tsing, Anna. 2015. "The Mushroom at the End of the World. On the Possibility of Life in Capitalist Ruins." Princeton: Princeton University Press.

3 "What is dark ecology? It is ecological awareness, dark-depressing. Yet ecological awareness is also dark-uncanny. And strangely it is dark-sweet. Nihilism is always number one in the charts these days. We usually don't get past the first darkness, and that's if we even care. What thinks dark ecology? Ecognosis, a riddle. Ecognosis is like knowing, but more like letting-be-known. It is something like coexisting. It is like becoming accustomed to something strange, yet it is also becoming accustomed to strangeness that doesn't become less strange through acclimation." Morton, Timothy. 2016. "Dark Ecology, For a Logic of Future Coexistence." New York City: Columbia University Press, p.5.

CHAPTER II

KINGDOM OF
— MINERALS —



HYBRID ROCKS, MOUNTAINS, CRATERS,
BONES AND OTHER MISC. SPECIMENS



II. KINGDOM OF MINERALS

“When archaeologists examine two stones and conclude that one of them is just a rock, but that the other, based on the anomalous regularity of the patterns of chipped-away edges, is a three-million-year-old stone axe fashioned by an antecedent hominid, they are tracing the artificial. Of all the artificial effects and patterns that really matter, the impossible-to-sort absolute boundaries between what is and is not anthropogenic climate change are the most consequential encounter with the artificial.”

SPECIMEN N°01		CHICKEN BONES
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	MINERALS	
CATEGORY	ROCKS	

CHICKEN BONES AS A FOSSIL MARKER OF HUMAN ACTIVITY



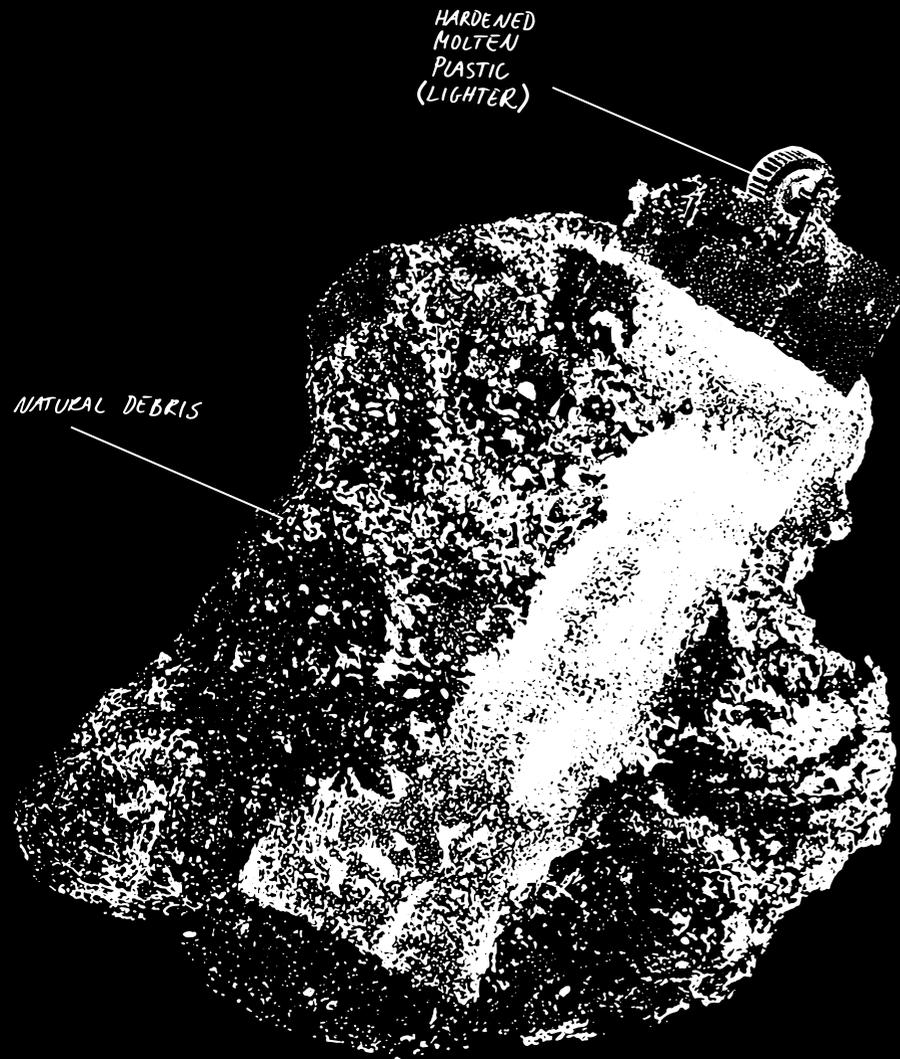
INDUSTRIALLY RAISED CHICKEN

"BROILER-FRYER"

Changing patterns of breeding and food consumption have profoundly impacted the Earth's surface and its geological processes. The most common illustration of this is the case of chickens, which became a defining feature of the Anthropocene. Researchers have shown that modern meat chickens, which are radically different from their predecessors, are so pervasive that they could be a marker species for our human-influenced epoch¹. Compared to their ancestors in Roman times, chickens currently sold in supermarkets have a different skeleton, bone chemistry and genetics caused by human-directed changes in breeding, diet and farming practices. Their size has doubled since the Middle Ages, their body mass has multiplied fivefold over the course of the 20th century, and their growth rate and population dramatically increased after the Second World War. So much so that their combined mass exceeds that of all other birds on Earth. As a consequence, the tremendous amounts of chicken bones discarded worldwide can be seen as a key fossil evidence for the future geological record. This new chicken "morphotype" may then reflect the unprecedented human reconfiguration of the Earth's biosphere, now dominated by their massive consumption.

¹ Bennett, Carys, Richard Thomas, Mark Williams, Jan Zalasiewicz, Matt Edgeworth, Holly Miller, Benjamin Coles, Alison Foster, Emily Burton, and Upenyu Marume. 2018. "The Broiler Chicken as a Signal of a Human Reconfigured Biosphere." Royal Society Open Science 5. <https://doi.org/10.1098/rsos.180325>.

SPECIMEN N°06		PLASTIGLOMERATE
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	MINERALS	
CATEGORY	ROCKS	



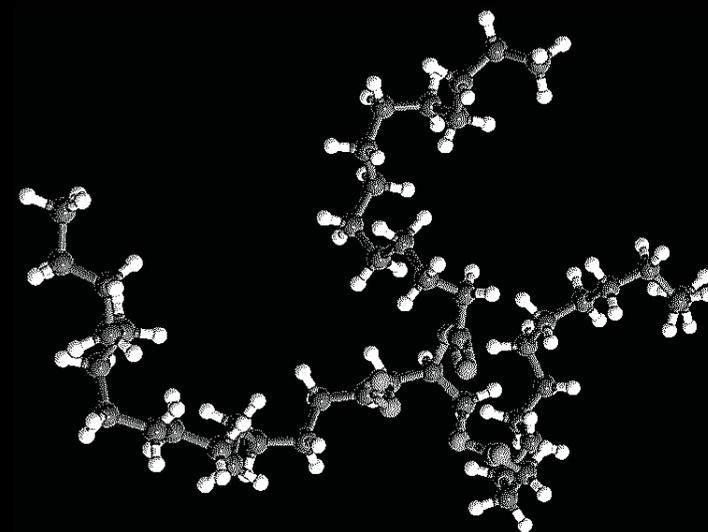
Coined by a team made of a geologist, an oceanographer, and a sculptor,⁴ the term “plastiglomerate” refers to a new kind of rock made of melted plastics, marine debris, basalt, and wood combined into a single substance by bonfires. Such a kind of geological formation, neither stone, nor plastic, was recently found on Hawaiian Beaches, possibly a terminal point in the worldwide circulation of garbage. Plastiglomerates can be seen as one of the many disturbing-yet-material markers of the Anthropocene, this new epoch viewed as the period during which human activity has been the dominant influence on the climate and the environment. Plastic is a century old but these peculiar Hawaiian rocks show that it can quickly be integrated with other matter through geological forces. They give us the impression that both consumer society and metamorphism can be combined to forge the relics of our industrial civilizations. Such process happens almost in real-time, compared to geological timeframes. Labelled as “plasticrust” by geologists, a similar phenomenon has been observed in Madeira, where a coating of plastic particles, originated in the ocean, adhered directly onto rocks along the shoreline⁵.

To some extent, plastiglomerate is the visible manifestation of a phenomenon that exists at a much smaller level almost everywhere on this planet: the integration of micro-plastic particles in our environment, in the food we eat, in the water we drink, and eventually in our bodies. This is why plastiglomerate embodies the general condition of our world, a hybrid of synthetic polymers and organic compounds.

4 Corcoran, Patricia, Charles Moore, and Kelly Jazvac. 2014. “An Anthropogenic Marker Horizon in the Future Rock Record.” GSA Today 24: 4-8. <https://doi.org/10.1130/GSAT-G198A.1>.

5 Gestoso, Ignacio, Eva Cacabelos, Patrício Ramalhosa, and João Canning-Clode. 2019. “Plasticrusts: A New Potential Threat in the Anthropocene’s Rocky Shores.” Science of The Total Environment 687: 413-15. <https://doi.org/10.1016/j.scitotenv.2019.06.123>.

CHAPTER III
KINGDOM OF
— ANIMALS —



HYBRID EAGLES, GOATS, DOLPHINS, CRABS,
TURTLES, CATERPILLARS, COWS, RATS,
& OTHER MISC. SPECIMENS



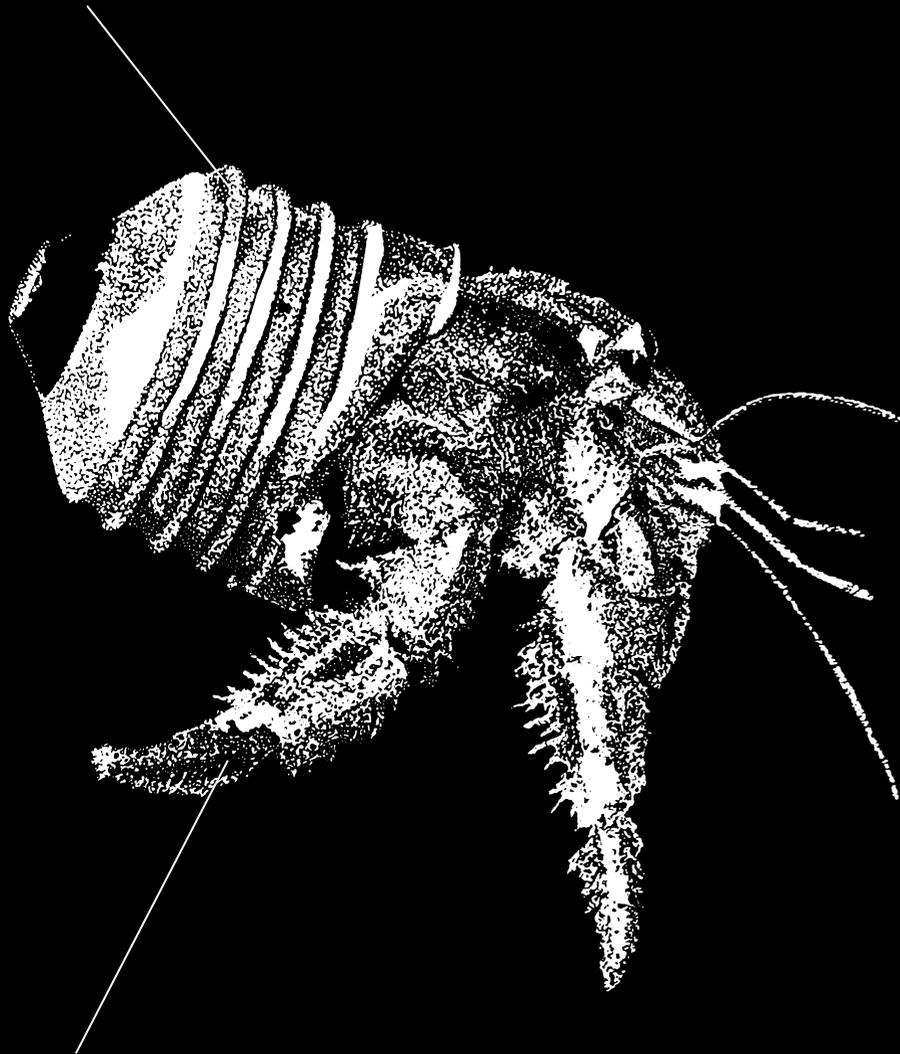
III. KINGDOM OF ANIMALS

“The mass of humans (32%), along with that of their domestic animals (65%), now makes up 97% of the total biomass of land vertebrates, leaving only 3% for the remaining 30,000 land-dwelling vertebrate species.”

SPECIMEN N°23		TRAPPED HERMIT CRAB
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	ANIMALS	
CATEGORY	ANIMALS WITH PLASTIC	

Hermit crabs are crustaceans with spirally curved abdomens that are protected from predators by a salvaged empty seashell carried by the animal, into which its whole body can retract. Since suitable intact shells are sometimes a limited resource, vigorous competition often occurs among them. Not used to plastic, hermit crabs can confuse the debris—bottle caps, straws, cups, boxes—washed up on beaches and seashores with sea shells and crawl into it, causing them to frequently get stuck and starve to death. This dramatic situation is worsened by the fact that when one crab dies, it emits a signal alerting others there is a new shell available for them. This chain reaction leads scores of crabs to come scurrying across the island and fall into the plastic trap, killing thousands of them in recent years¹⁴. While this situation was only documented in the Cocos (Keeling) Islands in the Indian Ocean and Henderson Island in the South Pacific, it is likely to be an issue anywhere hermit crabs live alongside plastic rubbish.

LIGHT BULB BASE
USED AS A SHELL



HERMIT CRAB

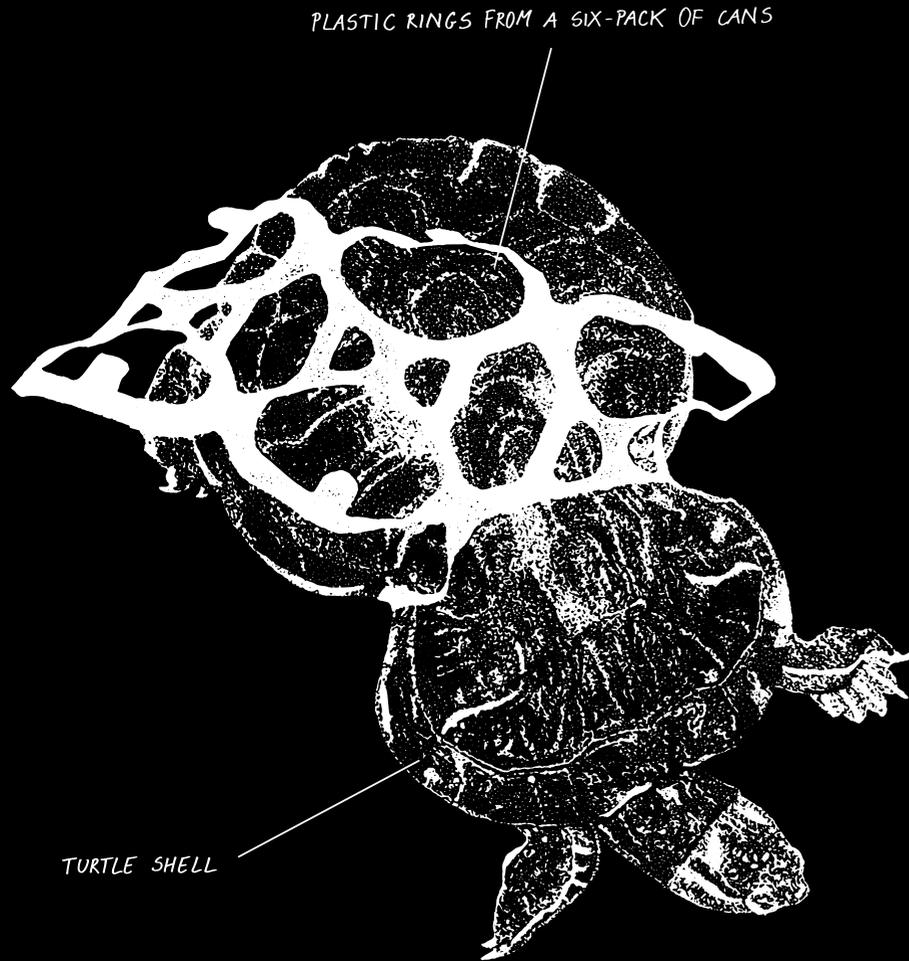
14 Lavers, Jennifer, Paul Sharp, Silke Stuckenbrock, and Alexander Bond. 2019. "Entrapment in Plastic Debris Endangers Hermit Crabs." Journal of Hazardous Materials 387: 121703.

SPECIMEN N°24		STRANGLED TURTLES
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	ANIMALS	
CATEGORY	ANIMALS WITH PLASTIC	

STRANGLED TURTLES

71

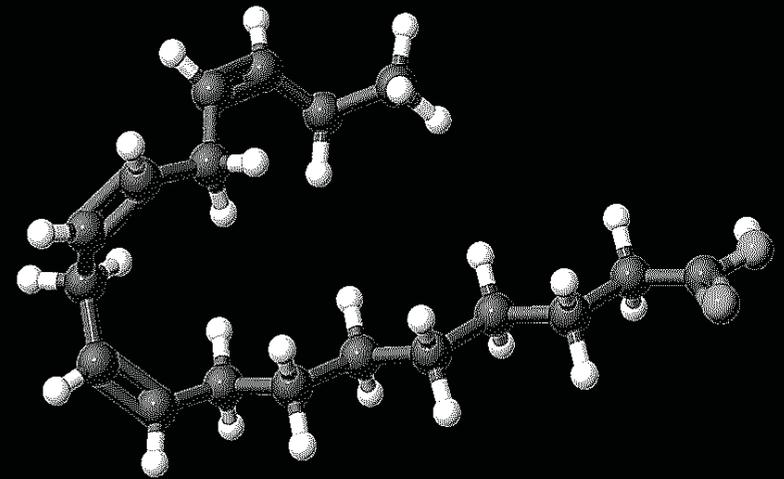
Fishing lines, soda rings, and remnants of plastic rubbish can have dramatic effects on animals such as turtles, strangling the marine reptiles or constricting their shell. The story of Peanut, a red-eared slider turtle, was widely shared as an illustration of the consequences of plastic pollution among marine wildlife. Thirty years ago, she got caught in a plastic ring from a six-pack of cans that washed up in her habitat. As she grew, the plastic tightened around her, and made her shell and body develop into the shape of a peanut. While veterinarians removed the plastic ring, her peculiar look remained. They also noticed that her lungs were damaged because of it. Peanut is still alive today and she continues to grow. She later became the mascot for the litter prevention and clean-up campaign of the state of Missouri in the USA.



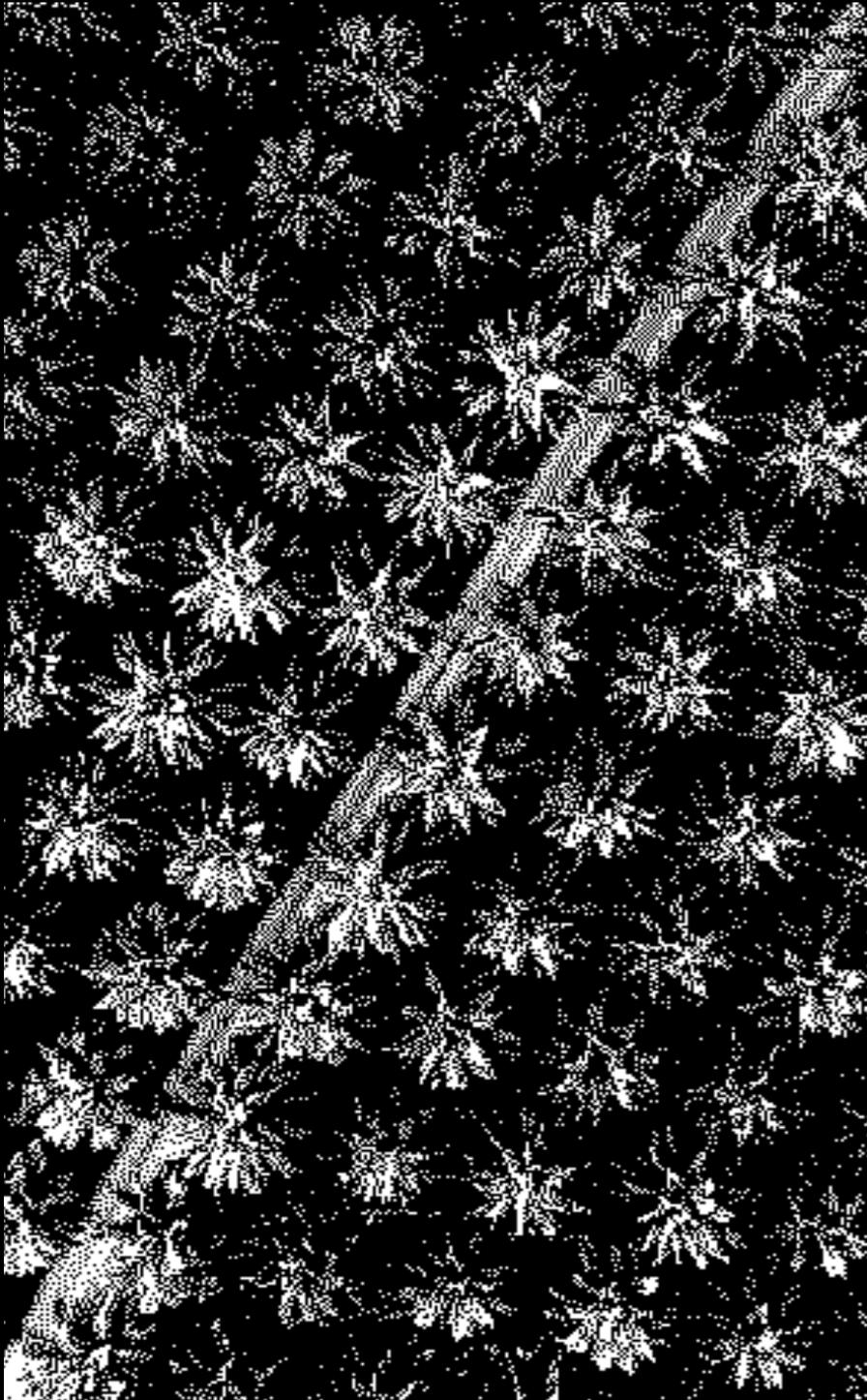
"PEANUT TURTLE"

CHAPTER IV

KINGDOM OF
— PLANTS —



HYBRID TREES, BUSHES, FLOWERS, SEEDS,
AND OTHER MISC. SPECIMENS



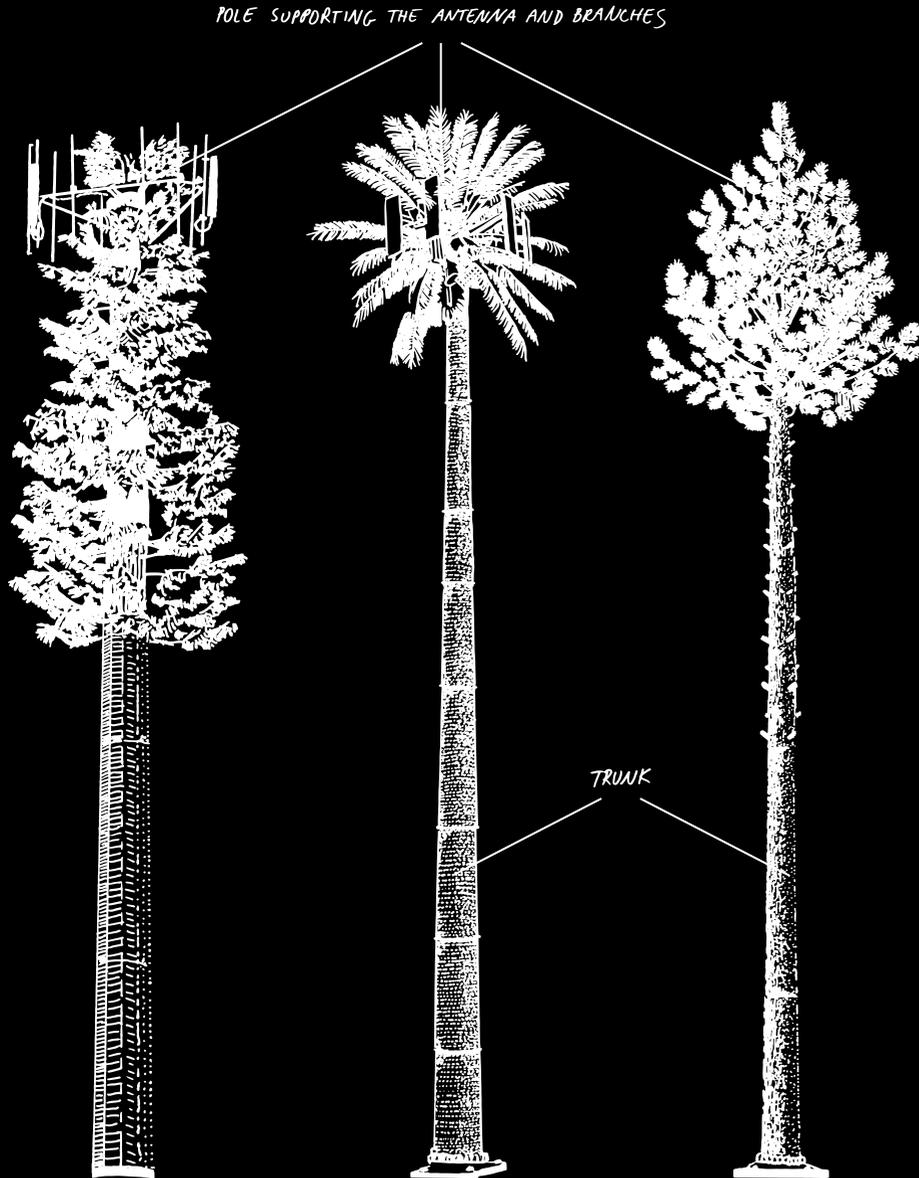
IV. KINGDOM OF PLANTS

“We have always been biohackers. For 10,000 years creative individuals and groups have bred plants, selecting for desired traits and sharing this information on to future generations in the form of saved seeds. Although the methods for saving and sharing seeds are quite straightforward, most commercial farmers in the world today don’t save seeds because of legal restrictions, inconvenience, or the preference for hybrid varieties which don’t breed true and must be purchased each year. However, the majority of the world’s farmers are small-scale food producers, including peasants, indigenous peoples and family farmers who don’t profit from the industrialized food system. Small scale farmers and independent plant breeders create and maintain open seeds—biotechnologies that are social, slow and (usually) open source.”

SPECIMEN N° 49		ANTENNA TREE
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	PLANTS	
CATEGORY	CAMOUFLAGED TECHNOLOGIES	

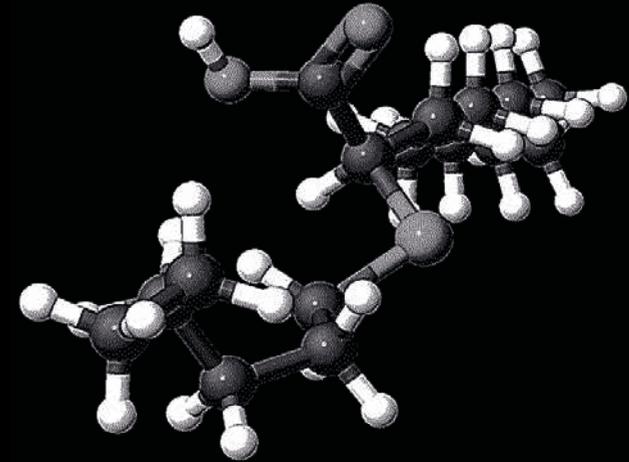
The ubiquitous presence of cell phone towers in urban and rural landscapes has led to protests against their visual character (perceived as ugly by the people living nearby) and the electromagnetic waves around them. A side effect of our society's longing for uninterrupted connectivity, the design and building of phone towers are now influenced by various strategies. One of them consists in the use of camouflage techniques, and obviously, the "natural" metaphor plays an important role here. Along with green carpets and synthetic lawns, mobile phone towers disguised as trees are perhaps the most common example of the nature/technology mishmash nowadays. Designed in order to make telecom infrastructure less visible and offensive to people living around them—a tactic also employed for oil rigs—such kind of concealment was first proposed by South African engineers in the mid 1990s. Noting the analogy between palm trees and phone masts, the team, commissioned by Vodacom to solve this visual pollution, decided to give them a sylvan character by adding glass fiber trunks and plastic leaves to the usual pole silhouette of the existing antennas.

Fake tree-masts, like oil rigs camouflaged as palm trees, can be seen as a very pragmatic and quite socially accepted form of nature/technology integration. As pointed out by Rick Miller and Ted Kane²¹: "the result is the camouflaged cell phone tower, the by-product of the only position available to communities who oppose cell phone towers, that is to demand their invisibility. Hiding its presence from public view, the ubiquitous cell phone tower camouflaged as a palm tree becomes an appropriate icon for the private infrastructural network of our day." After a few years of their existence, it is interesting to observe how wildlife behaviours around these structures have evolved in unexpected ways, looking so real that birds built nests in them, and elephants use them as scratching posts.

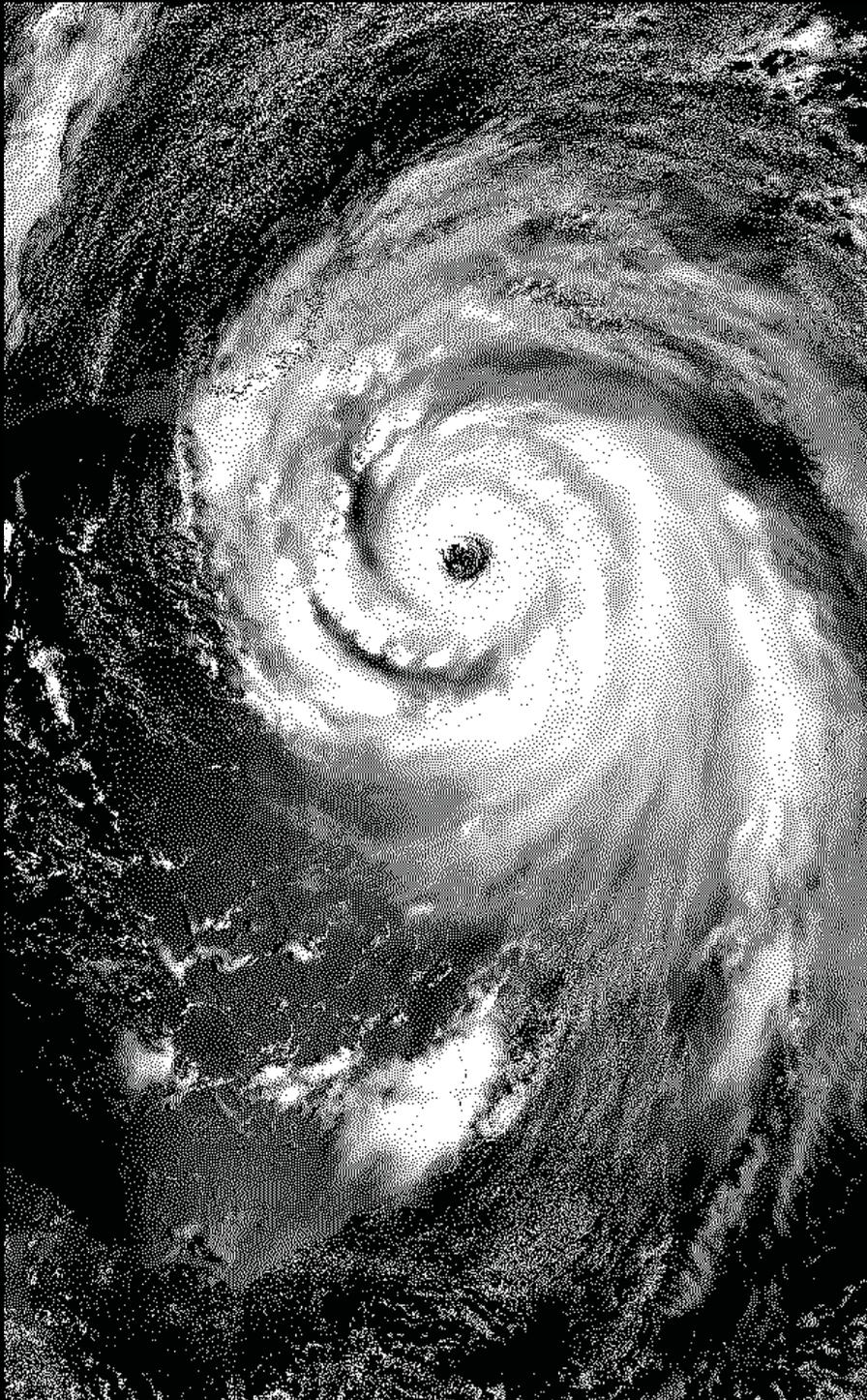


21 Miller, Rick, and Ted Kane. 2008. "Mobile Phones. Cell Structure." In *The Infrastructural City: Networked Ecologies in Los Angeles*. Barcelona: Actar.

CHAPTER V
KINGDOM OF
— MISCELLANEOUS —



HYBRID VIRUSES, MUSHROOMS,
CLOUDS, AND OTHER MISC. SPECIMENS

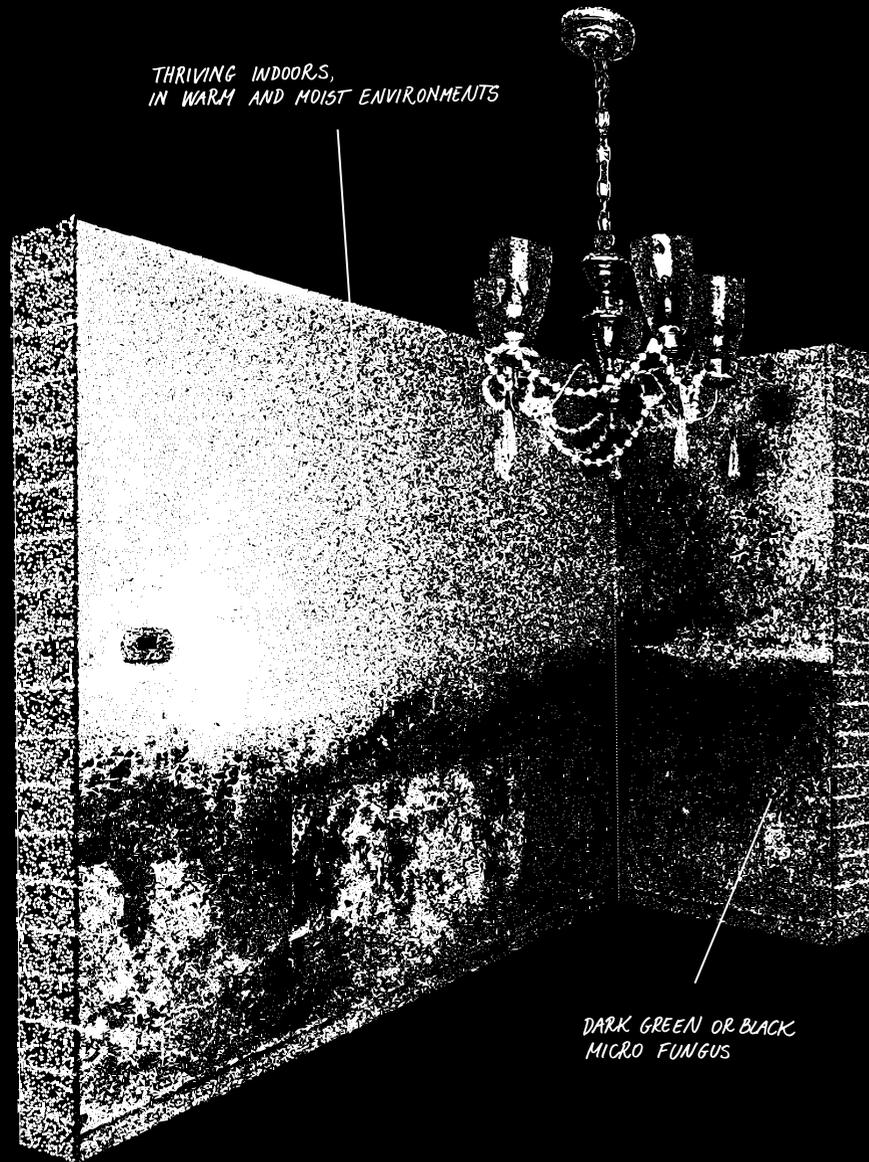


V. KINGDOM OF MISCELLANEOUS

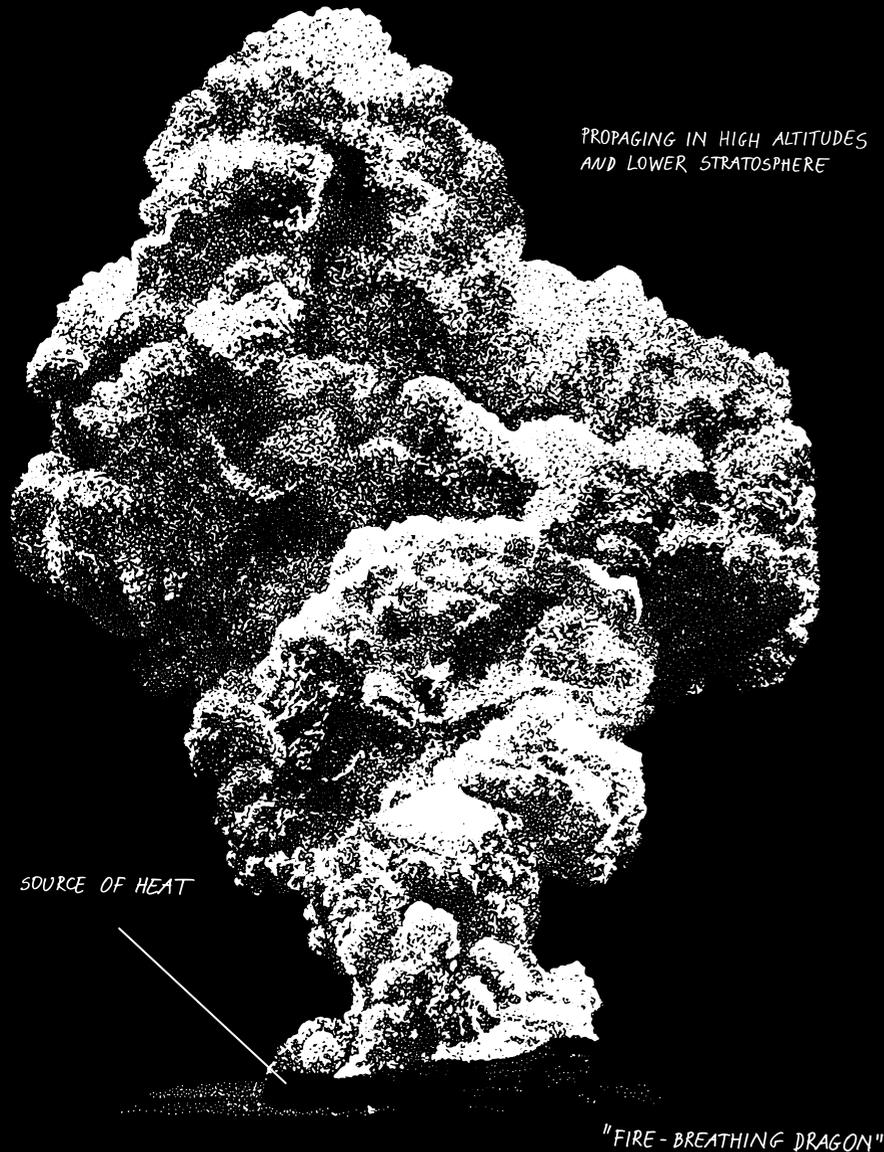
“Since the Second World War, the planet has gradually become a life-sized laboratory. The previous model of the ‘factory planet’ has given way to the ‘laboratory planet’. The planet has been captured, transformed into capital and put to work becoming a stranger to itself in the process, or being managed like any other innovative company. We are the laboratory subjects, but can we somehow regain possession of this immense, autonomous machine that has now taken on a momentum of its own? Can we change the destiny and the choices of this laboratory?”

SPECIMEN N° 50		BLACK MOLD
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	MISCELLANEOUS	
CATEGORY	MICRO-FUNGI	

“Black mold” refers to several species of micro-fungus that have a dark-green or black appearance and thrive in warm, frequently moist environments, including baths, showers, toilets, kitchens, and basements. The most common indoor molds belong to the *Cladosporium*, *Penicillium*, and *Aspergillus* genre. While it was originally discovered on the wall of a house in Prague in 1837 by August Carl Joseph Corda, black mold proliferates in buildings and homes, growing around leaks in roofs, windows, or pipes, or where there has been flooding; especially on building materials that provide suitable nutrients that encourage mold to grow (such as wood, dirt, dust, paints, wallpaper, insulation materials, drywall, carpet). Depending on people, exposure to moldy environments may cause a variety of health effects. Scientists found there was sufficient evidence to link indoor exposure to mold with asthma symptoms or upper respiratory tract symptoms, such as chronic coughing and sneezing.



SPECIMEN N° 56		PYROCUMULONIMBUS CLOUD
A BESTIARY OF THE ANTHROPOCENE		
KINGDOM	MISCELLANEOUS	
CATEGORY	ANTHROPOGENIC CLOUDS	



Labelled on NASA's official website as the "fire-breathing dragon", the pyrocumulonimbus cloud, also known as the cumulonimbus flammagenitus cloud (CbFg), is a type of cloud that forms above a source of heat, such as a wildfire, volcanic eruption, or atomic blast. Propagating at high-altitudes, this kind of cloud formation reaches the upper troposphere or even lower stratosphere and may involve precipitation, hail, lightning, extreme low-level winds, and in some cases even tornadoes (a process known as pyro-tornadogenesis). The combined effects of these phenomena can greatly increase fire-spread and cause direct dangers on the ground in addition to "normal" fires. While researchers considered pyrocumulonimbus clouds to be very rare, they noticed how they have become more common in the last ten years, associated with extreme weather events such as wildfires in Australia or California. Despite precedents, the World Meteorological Organisation (WMO) recognised in 2017 that any Cumulonimbus cloud that is clearly observed to have originated as a consequence of localised natural heat sources will be classified by any appropriate species, variety, and supplementary feature, followed by the term flammagenitus.

CHAPTER VI

— OBSERVATIONS —

MEDIEVAL BESTIARIES, NEGATIVE COMMONS,
LABORATORY PLANET..

ON TEMPORALITIES

(TOWARDS A
GESTALT SWITCH)

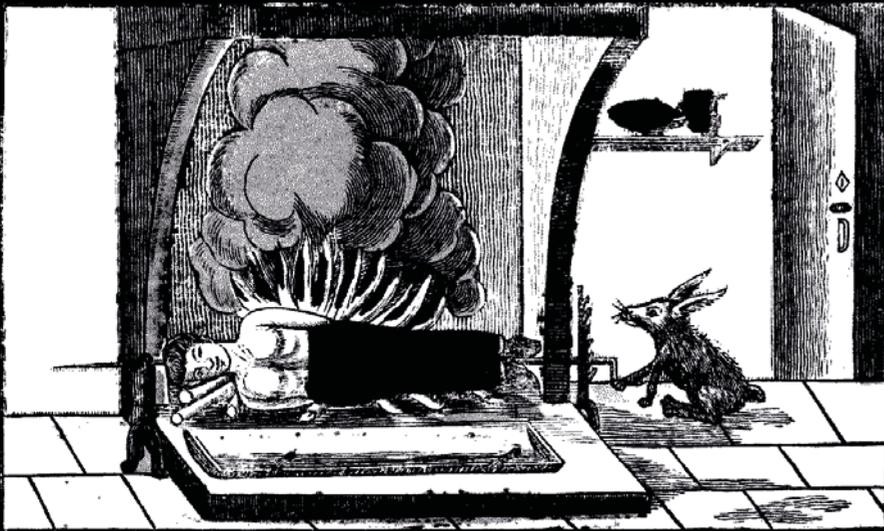
—GEOFFREY
C. BOWKER



The bird that kills the hunter.

The pig that skins the pork butcher.

Le monde renversé. 1829. De la fabrique de Pellerin.



The hare that cooks the roaster.
 The dog who leads his master to the kennel.
 Le monde renversé. 1829. De la fabrique de Pellerin.

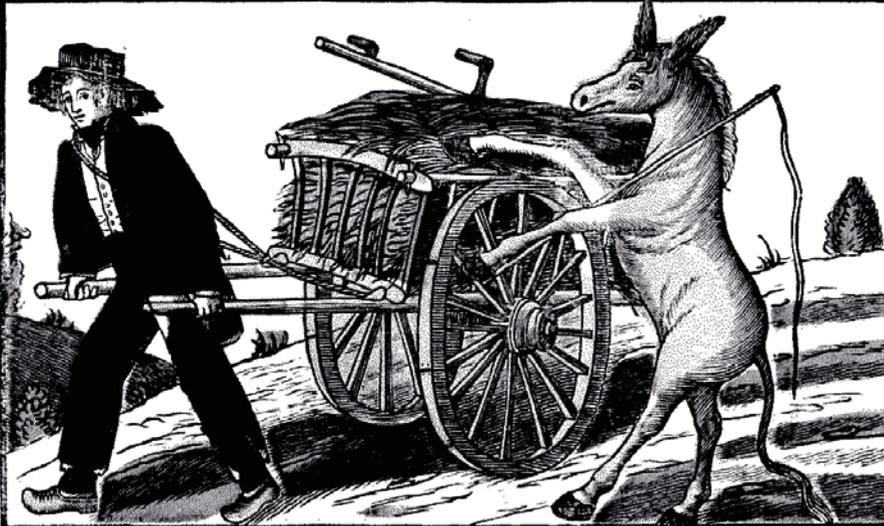
Terraforming Earth

DISNOVATION.ORG With the mediatisation of the notion of the Anthropocene in the last decade came the popularisation of the idea that humans are massively changing the world around them and have been, so to say, *terraforming Earth*; especially since the intensification of fossil fuel use. To what extent can we expand this notion beyond the scope of the Anthropocene?

GEOFFREY C. BOWKER Life has always been about terraforming. It's always been about changing the world around us from the very earliest days. Take the archaea, the first bacteria. They give out oxygen as part of their metabolic process. They kept on giving out oxygen until roughly 20% of the Earth's atmosphere¹ was made out of it. That then created a niche for the eukaryotes, the modern life forms, to come into being because they could then use the oxygen as their own energy source. So the Earth has always been about change, it's always been about us—as living forms—changing the world around us. I like to think about this in a slightly more complex way, though. That in a sense, we ourselves are made up of all forms of life that are changing us all the time. Over 90% of the cells in the human body are made up of microflora and microfauna. One of the earliest examples is mitochondria, which are cells that give you energy within your neural and cellular structure. Originally they were an invasive species that invaded the human body and took it over. At the same time as we're terraforming the Earth, so too is life itself adapting to and changing every specific individual life form all of the time. So the correct unit of analysis here is not nature here, humans there, inside our body here, outside our body there. But it's an understanding of the dance of life and the way in which this dance works.

Geodiversity

D Earlier you mentioned the relation between the continuous human driven process of terraformation and its myriads of consequences on “geodiversity”. We often hear about the consequences of human activities on biodiversity, but less so on geodiversity.



Horses in the stagecoach being dragged by travelers.
The horse that takes care of the groom.
Le monde renversé. 1829. De la fabrique de Pellerin.

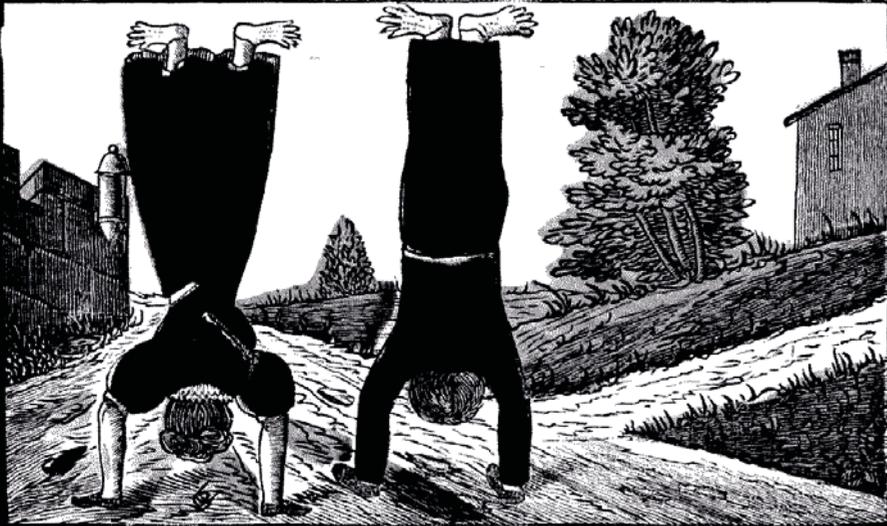
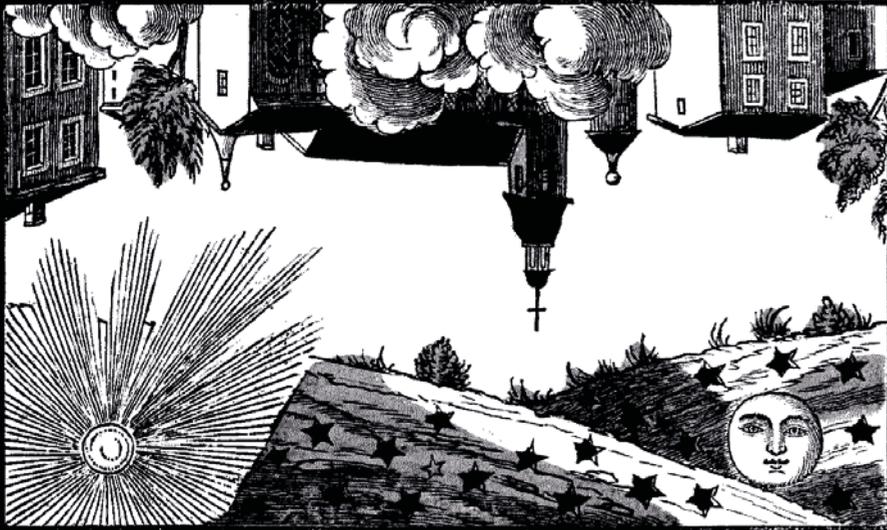
GCB There's a saying in Anthropocene study circles that geodiversity begets biodiversity. That you need to have a diverse geological setting in order to create the set of niches that you need for various life forms to specialise. So, again, it's not thinking about Earth as the background for life, it's about geological diversity, which is as central to our being as biodiversity is. We can think of a couple of examples in which it has changed over the last couple of centuries. For instance, we use concrete everywhere, we move sand everywhere, we flatten the landscape, so that the sources of biodiversity disappear. One of the most popular but worst forms of fishing is dredging sea mountains. As they dredge their sides, they strip the life off them and they flatten them into useless hunks of rock. So we are turning something which was a living and beautiful part of the genuine bio-geodiversity of the Earth, and we're turning it into something which is just flat and standardised.

But this flattening can lead to some strange results. For example a few years ago it was found that archaea were doing very well on some streets in Paris. The reason for that is that lots of guys there would piss on the walls (however they're much cleaner and more standardised now). But their urine created an acidic background, a little geodiverse niche within buildings, that allowed for those kinds of bacteria to flourish. It's a somewhat perverse example, but generically, we need to deal with geodiversity just as much as we deal with biodiversity.

Need for Adaptive Change

D Interestingly, this notion of geodiversity provides us with a useful perspective to better grasp the friction space between historical, societal, political and economic decisions and their consequences on the living. But from this standpoint, one could start to wonder if the narrative of the "preservation of biodiversity" is even the right lens to have agency on such issues.

GCB We have this strange arrogance to think that the present time is the ideal time, that we've got the perfect climate and the perfect set of species now. That's a completely ridiculous argument. Climates are



Houses light up the sun and the moon.
Man and woman walk with their legs in the air.
Le monde renversé. 1829. De la fabrique de Pellerin.

always changing, they're going to change over time, they have always changed, and the species that populate the Earth are always going to change too. We tend to imagine that the only way of preserving biodiversity is creating these little pockets. A perfect bubble which is going to preserve the current climate and preserve the current ecosystem to keep things the way they are.

However there's a very strong argument in biodiversity circles that that's not what it should be about. Species are going to die; species die all the time—that's not a problem. Instead we need to create the ability for new species to come into being, and that has some immediately paradoxical effects. The first is that instead of keeping, for example, a giant panda or an elephant, the kind of charismatic megafauna that everyone loves and cares about, which are important, we should rather keep two sister species. Two species that are fairly close to each other in genetic structure, because then they can breed together and create a new species which adapts to the new conditions.

Whatever happens, whether we stop climate change at 2 degrees, 3 degrees, or, much more likely, 5 to 8 degrees now, we're going to be dealing with the need for adaptive change over the next couple of centuries. What we need to be doing is preserving the ability to change, keeping that flexibility and adaptability going, and forgetting about this chimera of trying to protect species which are ultimately doomed to die anyway. Rather than trying to preserve things the way they are, which is really neither desirable nor possible, we should be looking to a future where we're creating the ability for continuous change. Living in an adaptive world means developing new kinds of political, ecological, mythological, and poetic thinking. We need to wrap all of those things together in order to create the best possible set of rules for the future.

Long Term Planning

What is striking with such considerations is that most tools in our current legal and political systems are not built for dealing with long term processes, or at least not with the time scales you're implying here.

GCB For me, in many ways, the temporality question is key in lots of these issues. What time scales are we actually talking about? It's very, very difficult for politicians to think beyond a five-year time frame to plan for the generations ahead, for the next thousand or even two hundred thousand years. It involves a different set of decisions, and I'll give you a contradictory example.

The best way to manage a forest is to take out approximately every fifth tree, which looks enormously ugly for about the next forty or fifty years. But then the forest will actually recover and will grow much better. We balance a short-term gain of keeping a beautiful forest which we can go walking in on weekends, which is the kind of temporality that the politicians like to think about, against a long term gain like what's best for the planet, what's best for the species and what's best for new species coming along. It is actually a very different way of preserving forests.

For example, one of the problematic things about hurricane Katrina in the United States, which brought into focus so many political and economic inequalities in this country, is that no one questioned that we should just rebuild New Orleans in New Orleans. That's not very adaptive. In the very long term we're going to lose New Orleans, like we're going to lose all those low-lying states. That's not just a conjecture, we can't put up walls and we can't send the sea back. We're guaranteed now to have at least several feet of ocean rising over the next century. If that's the case, let's plan for it. How do we develop ways, means, and sensibilities which allow us to think in this longer term? We might need to get rid of this overemphasis on the urgency of all of these questions. Sure, biodiversity and climate change are incredibly important issues. But let's think about solutions which are actually adapted to the rhythm that we need, in order to collectively create the kind of world we want to have in the future. It will involve a new kind of politics which is able to operate at the global level. Since the United Nations has become largely null and void over the last thirty years, we just don't have global bodies anymore that can really do that. We don't have politics or politicians who really think over a long period in this way.

Paradoxically, one of the earliest environmental management programs I know came out of Holland in the 16th century. They knew they had very few trees and yet were reliant on a merchant navy, so they planned the forest for the next two hundred years. In England, at the same time that you built a church you also planted some oak trees around it. This was so that when the wood in the church rotted in a hundred years you could replace it with fresh oak from the mature trees. The ability to think in that kind of term is really difficult. We're used to dealing with crises which just happen with a snap of the finger.

How do we even recognise the crises which are happening at much slower paces, at different rhythms and rates? How many people do you need to have asthma in say Athens or Los Angeles, before it's declared an emergency? We've had a strange discourse in America in recent months about what constitutes a national emergency. Certainly an emergency is not only something that happens to someone immediately, it's also something that can happen very slowly and gradually. They maybe won't even see or sense it in their lifetime. But unless we can attune ourselves to that kind of urgency and those needs for action then we'll always make the wrong decisions when it comes to protecting, preserving and growing our planet.

Rethinking Kinship

D In a way, you put an emphasis here on something much more complex than mere political or technical changes. But rather on a more profound societal need to develop new modalities of perception, new types of sensibilities, and new ways to sense and make sense of extremely slow, large, diffuse, or weak signals. This is a whole paradigm change. Is this something that could be found or learned from different cultures, eras, wisdoms, or perhaps species? How could we facilitate such a profound paradigm shift?

GCB The concept of kinship for me goes back to the work of Donna Haraway and also Adele Clarke. They just came out with this wonderful collection called *Make Kin Not Population*. The idea of kinship is recognising that we don't have any kind of special place in the world.

The old religious idea was this great chain of beings where there were humans on top, then the apes, and then we go down until we get to the bacteria. It's a hierarchical system. That's not the way in which we can and should understand the world, it is much more rhizomatic than that. It's not ordered into such a nice neat hierarchy! Being rhizomatic means we're always connected with each other and with the world around us in all the ways you can't imagine.

One idea I came across a few years ago, and one which I love, is the exposome. There's the microbiome which is the flora and fauna that you have inside your stomach, which is really important in terms of regulating your mood, your intelligence, and now we're finding out more and more about just how important it is. But if you really want to find out what a person's biome is, you need to do it with the exposome: you need to go into their homes and see the ways in which their being is scattered throughout the home. They're leaving bacteria in different parts of it, which collect, which breed, and which then come back into the body. So, in a sense, there's no separation between my house, which is a built object, and me, which is a set of DNA. We need to recognise new kin, we need to recognise that it's about relationships all the way down.

Michel Serres, one of my favourite French philosophers, wrote this wonderful book called *The Parasite*, where he says the fundamental relationship in the world is that of parasitism: it's living forms living off and living with other living forms. If we see ourselves as having parasites within us, then we too are parasitic. We live in this constant world of relationships. That's why we need the artists, that's why we need the storytellers, it's why we need the mythtellers. We need to start telling stories in new ways and we then need to tell those stories to others. I could convince you of this on paper, but it wouldn't change how you were in the world. What we need is what's called in some literature, a *gestalt switch*², to suddenly see the world differently.

But how do you induce somebody, or a group of people, to suddenly see the world differently? You don't just do it by hitting them over the head with facts, you do it by telling stories, sketching out possible

futures, and going through exercises to sensitise people to the world around them and the way in which the magnetic forces, the life-forms, and everything around them interpenetrates them all of the time. Until we have that kind of *gestalt switch*, we're going to still have this mythology of human exceptionalism, which, unfortunately, most Western science is based on: humans are the intelligent, rational creatures that sit above reality.

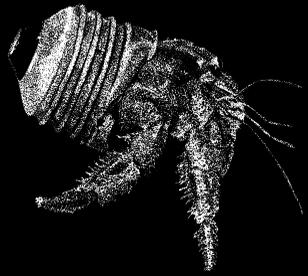
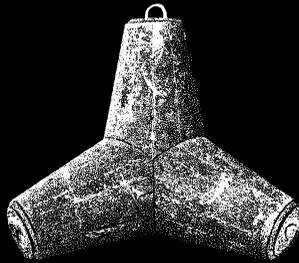
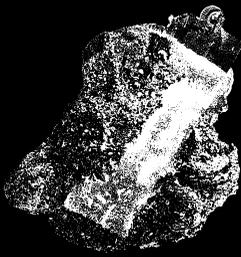
We are not. We're not the only intelligent creatures. I sometimes even doubt that we're the smartest creatures around. And we're certainly not the only creatures that should be in league, working, playing, and developing together in order to address the issues that we're facing, as a world, today.

NOTES

1 https://evolution.berkeley.edu/evolibrary/news/170503_cyanobacteria

2 Giuseppe, Micheli, A. 2012. "Gestalt Switches in the Idea of Context. A Macro Dimension of the World for Every Theory of Action." *Sociologica*, Fascicolo 3.

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