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TERRAFORMINGS

VINCENT BRUYERE

Abstract: *Terraforming, or planetary engineering, is a speculative domain of activity entertaining colonial solutions to extreme disaster and systemic crises in the age of spatial exploration. Since the 1940s, terraforming has provided an extremely fertile playground for science fiction writers, whose terraformed worlds have blown up to planetary dimensions the historical and narrative contours of a novelistic tradition born at the beginning of the eighteenth century on Robinson Crusoe's island. It is my contention that the speculative existence of terraformed worlds is always already informed by a cultural memory of oikos—the inhabited world. No less experimental in tone and intent than terraforming itself, this paper seeks to transform terraforming into a critical tool in visual culture: a mode of handling texts and images whose temporal parameters exceed that of traditional historiography.*

Abstract: *La biosphérisation, ou terraformation, désigne le domaine d'activité scientifique qui se donne comme objectif d'imaginer des solutions coloniales à des désastres extrêmes et à des crises systémiques à l'âge de l'exploration spatiale. Depuis les années 1940, les mondes terraformés sont au cœur de l'écriture de science-fiction, où ils donnent une nouvelle dimension à cette histoire du roman initiée au début du dix-septième siècle sur l'île de Robinson Crusoe sous les traits d'un projet colonial. En ce sens, l'existence des mondes terraformés, bien que spéculative, est toujours déjà enrichie d'une mémoire culturelle de l'oïkos—le monde habité. Largement poursuivi dans cet article, lui-même de forme expérimentale, cherche à transformer la notion de biosphérisation en un outil critique qui servira à approcher et assembler un ensemble de textes et d'images dont les ramifications temporelles excèdent leurs cadres historiques.*

World-making, “making things happen,” is one of the things our species does, and enjoys doing. We also enjoy (in the strong sense) bringing the past along with us, an effort that also requires imaginative activity. (Fradenburg 69)

Terraforming, or planetary engineering, exists at the juncture of two forms of enjoyment: imagination and memory. It is a speculative domain of activity entertaining colonial solutions to extreme disaster and systemic crises in the age of spatial exploration (Sagan and Druyan 329-49). In its colonial incarnation, terraforming envisions hospitable planetary systems and converted environments in preparation for a time where conditions of life on Earth will have become impossible. Since the 1940s, terraforming has provided an extremely fertile playground for science fiction writers, whose terraformed worlds have blown up to planetary dimensions the historical and narrative contours of a novelistic tradition born at the beginning of the eighteenth century on the island of Robinson Crusoe (Heise; Pak).

Walter Benjamin saw in the rise of the novel in Europe the “earliest symptom [of the industrial transformation of society] whose end is the decline of storytelling” (87). In the spirit of Benjamin’s ecology of narrative forms, what historical transformation shall we divine behind the incipient rise of terraforming in the history of the novelistic enterprise? A geological or deep-historical transformation perhaps, if, as Benjamin also argues, “one must imagine the transformation of epic forms occurring in rhythms comparable to those of the change that has come over the earth’s surface in the course of thousands of centuries” (Benjamin 88). As such, terraforming invites geological time in the history of mimesis to open up a natural history of representation. Once again Benjamin can help us understand this extension of natural history to the history of mimesis. For him, the distinction between *Naturgeschichte* and *Historie* does not hinge on a distinction of agency (i.e., the idea that nature, rocks, season, and so on have no agency, see Povinelli 30-56). In this configuration, natural history (*Naturgeschichte*) does not only refer to the discourse of knowledge that emerged in Europe during the eighteenth century; but can apply as much to an explanation of those moments when human-made artefacts are reclaimed by nature in the process of their ruination (Santner 16-17). Or when the work of mimesis is

less predicated on the imitation of forms than on the imitation of a quasi-geological process depositing time into human-made strata. If there was a time when the “patient process of Nature ... was once imitated by men [in the form of] miniatures, ivory carvings, elaborated to the point of greatest perfection, stones that are perfect in polish and engraving, lacquer work or paintings in which a series of thin, transparent layers are placed one on top of the other” (Valéry qtd. in Benjamin 92), today, the same display of miniatures, ivory carvings, and polished stones, next to the intricacy of a printed circuit board (PCB, compose a technofossil record: a preview of humanity in its fossil state (Zalasiewicz et al.)

Taken out of its context within planetary engineering and science fiction, terraforming becomes something like a critical tool: a mode of handling texts and images whose temporal parameters exceed that of conventional historical periodization and a way of querying literary and visual scenarios of being historical and hospitable in a time when both historicity and planetary hospitability are increasingly challenged by, “anthropogenic explanations of climate change,” which “spell the collapse of the age-old humanist distinction between natural history and human history” (Chakrabarty 201).



Fig. 1: Still from *The Birds* Alfred Hitchcock, dir. US, 1963.

As an evolutionary pressure, long-term patterns of rising temperatures are creating pathways for fungus to colonize warm-blooded creatures and, in the process, rekindling human interest in parasitology and mycology (Kupferschmidt). In Siberia, thawing tundra provides ancient microorganisms trapped in permafrost with ecological opportunities to rise, thus breaking new grounds for potentially disastrous outbreak scenarios (Sirucek). In a scene, which, in retrospect, offers an image of uncanny resemblance to these tales of disturbed and dislocated fungi and microorganisms in search of new homes, Alfred Hitchcock concludes *The Birds* (US, 1963) with a depiction of quiet evacuation. As the surrendering survivors make their way out of the story, they leave behind the landscape of a world that does not want them in it. However, until the end, the screen that contained their cinematic life, will remain framed by the assumption that there is still a world outside Bodega Bay from which to watch and even mourn those who did not survive the feathered assaults. In other words, the world the evacuees leave behind remains a screen upon which reality endures as a representational problem. There must be a world in which to register the loss of a particular sense of dwelling as they knew it. What comes after or later—should the birds’ rampage escalate into a planetary crisis—is for another ending to tell. This ending is the starting point of Alan Weisman’s *The World Without Us* (2007), in which a hypothesis hands over the world to a thought experiment—“what would happen to the Earth if all humans were to disappear overnight?”—allowing for a terraforming story in reverse to be told. The tableaux with which Hitchcock and Weisman leave us look like a still life painting by Balthasar van der Ast (1593-1657), in which critters invade the frame to take possession of what was formerly a human domain of representation.



Fig. 2: Detail from Balthasar van der Ast, *Still Life of Flowers, Fruit, Shells, and Insects* (c. 1629). 7 1/8 × 29 1/4 in. (43.5 × 74.3 cm). Birmingham Museum of Art. <https://artsbma.org/collection/still-life-of-flowers-fruit-shells-and-insects/>; https://commons.wikimedia.org/wiki/File:Still_Life_of_Flowers,_Fruit,_Shells,_and_Insects_-_Balthasar_van_der_Ast_-_Google_Cultural_Institute.jpg#file

Commenting on Juan Sánchez Cotán's still life painting, Charles Sterling writes: "All Cotán's *bodegones* consist of simple, wholesome food standing on a still or held in the air by the hand of a geometer and poet adept at ordering a world of marvels: did he not suspend a quince and a cabbage at the end of a string, where they turn and glow like planets in a boundless night?" (95)



Fig. 3: Juan Sánchez Cotán, *Quince, Cabbage, and Cucumber*, 1602, oil on canvas, 68.9 cm x 84.5 cm. San Diego Museum of Art. https://commons.wikimedia.org/wiki/File:Quince,_Cabbage,_Melon,_and_Cucumber,_by_Juan_Sanchez_Cotan,_c._1602_-_San_Diego_Museum_of_Art_-_DSC06624.JPG

Glowing planetary views released by terraforming projections compose something akin to Cotán's suspended still life. In that regard, terraforming is a mode of assembling images of earth-like structures to simulate the allure and allurements of Venus or Europa (one of Jupiter's moons), endowed with a breathable atmosphere. Digital images of terraformed worlds transform interstellar chiaroscuro into a cinematic space: terraforming runs the trajectory of planetary life

like a movie. And like a cinematic image, the planetary glow of terraformed worlds exists in a space of constant referral and return to the big picture: Earth.

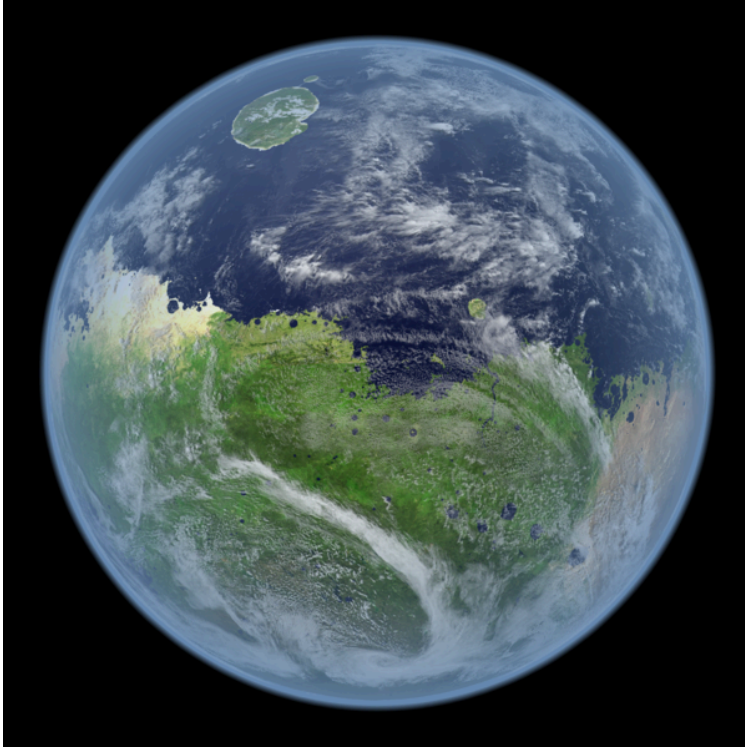


Fig. 4: Kevin M. Gill. "A Living Mars," (2012). <https://www.flickr.com/photos/kevin-mgill/8165909516>

Terraforming an inhospitable planet consists in editing out the planetary scenes that do not add up to Earth-like conditions, thus leaving an infinite number of extraterrestrial sequences to a darkest night of possibility. In that sense, terraforming images colonize what was sublime in Immanuel Kant's night vision of a star-studded sky: "If we call sublime the sight of a star-studded sky, we must not base this judgment on a notion of the stars as worlds inhabited by rational be-

ings.... We must instead consider the sky as we see it, as a wide vault that contains everything” (Kant qtd. in De Man 126). Terraformed worlds turn the vaulted night containing Kant’s musings about a world potentially emptied from human meaning and other teleological projections into a monument to world-making, whose design would be entirely ours.

If there is a cinematic terraforming—a space of constant referral and return to the Earth—there is too, at least as a theoretical possibility, an “acinematic” counterpart to it (Lyotard, “Acinema”). In this pyrotechnic version of planetary engineering, images of terraformed worlds glow in a boundless night but by burning through the transformative potentials of imaginary worlds. This version of terraforming speaks to a certain experience of the world at odds with the image of the “Blue Marble,” of the Earth as contained sphere, as form of containment, where precisely “what is contained is explosive and metamorphic” (Pinkus 66). Or to paraphrase Jean-François Lyotard: acinematic terraformed worlds glow like an incandescent matchstick that a child ignites gratuitously (Lyotard, “Acinema” 350), for nothing, for the heck of it (“*pour des prunes*”), with nothing in return but the sheer visual pleasure to see and be affected by a vision.

Between 1986 and 1991 with *Lime Hills*, Naoya Hatakeyama photographed limestone quarries in a recognizable landscape format, where rock formations stand still even if conspicuously carved, displaced, and remodeled by human activity. With stunning images of projected rocks and debris in suspended animation, the series *Blast* constitutes a further development in Hatakeyama’s landscape photography reaching a point where it will seem quite appropriate to ask what is left of the landscape, both the format and the surface, or whether we have moved beyond it. The question reads at multiple levels by virtue of the semantic and historical layers of the term “landscape,” but the paradox remains that, no matter how damaged or sullied the represented surface is, a blasted landscape remain a landscape (Mitchell, “Imperial Landscape” 15). What ends up being blasted by Hatakeyama is the history of landscape as an interface between land and a certain way of life. With *Blast*, the sub-surface surfaces in an extractive present that marks the passage between surfaces in the same way that in Émile Benveniste’s linguistics the present as

tense marks the passage from past to future, and the coincidence between “the event described [and] the instance of discourse that describes it” (227). The extractive present is the other side of the exhausting present. It designates the fact that ongoing extraction is not necessarily a display of technique and mastery, but a state of affairs in which solutions are not sought, where a present dispenses itself from having to change by keeping on drilling and fracking.



Fig: 5: Naoya Hatakeyama. *Blast #15* from a series of 17 chromogenic prints. 8 in. x 10 in (20.32 cm x 25.4 cm). San Francisco Museum of Modern Art, promised gift of Kurenboh © Naoya Hatakeyama, courtesy Taka Ishii Gallery. <https://wsimag.com/art/18495-the-show-that-lost-itself>

For anthropologist Anna Tsing, the future of the landscape also lies in its blasting. It pertains to a possibility to form transformative relationships across species (ponderosa pines, matsutake mushrooms, and humans), across scales (atmospheric, diasporic, and environmental), and across territories (Japan, Finland, and Oregon)—this possibility can be toxic or beneficent, depending on the circumstances (Tsing 87-88). The blasting is thus a modality of what Lyotard calls the “*dépaysement*” (Lyotard, *L’inhumain* 194)—literally “unlandscaping,” and rendered as “estrangement” in translation (Lyotard, *The Inhuman* 183). This un-landscaping is the condition of possibility for landscape insofar as it brings forth a materiality that is not neces-

sarily that of the place—the face of a mother, for example, can be a landscape for her baby (Lyotard, *L'inhumain* 199)—and puts a place, a surface, a matter, an entire geography, out of reach.

Christina Olson comments on the terraforming properties of Andrew Wyeth's famed painting: "Andy put me where he knew I wanted to be. Now that I can't be there anymore, all I do is think of that picture and I'm there" (Olson qtd. in Griffin 36). There in *Christina's World* (1948), she finds herself immersed rather than standing in the wonderfully textured grassland that occupies most of the pictorial space under a narrow skyline. But Wyeth didn't just vicariously give her the world surrounding her farmhouse, which a form of muscular atrophy paralyzing her lower body prevented her to envision as landscape. He designed for her a pictorial prosthesis to make a genre accessible visually and affectively, charting a space of otherwise in the midst of a disabling environment.

Terraforming, redeployed as a critical tool, is a mode of trying on and testing out the power of images on defining a relation to the world. In an otherwise peripheral scene lost in a corner of the monumental collection of the *Jesuit Relations and Allied Documents*, edited by Reuben Gold Thwaites, a missionary terraforms the planet on which he has landed. Jean de Brébeuf writes in his 1635 report to Father le Jeune, sent from the village of Ihonatiria in the Huron country:

Et quand nous leur preschons vn Dieu, Createur du Ciel & de la terre & de toutes choses; de mesme quand nous leur parlons d'vn Enfer & d'vn Paradis, & du reste de nos mystères; les opiniastres respondent, que cela est bon pour nostre Pays, non pour le leur; que chaque Pays a ses façons de faire : mais leur ayant monsté par le moyen d'vn petit globe que nous avons apporté, qu'il n'y a qu'un seul monde, ils demeurent sans réplique. (Brébeuf 119)

And when we preach to them of one God, Creator of Heaven and earth, and of all things, and even when we talk to them of Hell and Paradise and of our other mysteries, the headstrong savages reply that this is good for our Country and not for theirs; that every Country has its own fashions. But hav-

ing pointed out to them, by means of a little globe that we had brought, that there is only one world, they remain without reply. (Brébeuf 120)

The image of the globe—the orb—is the ultimate rhetorical move, to the point that what Brébeuf displays in the end is less the authority of a conversion narrative than the silencing power and “dispossessing evidence” of an image (Sloterdijk 26). But the conversation is not over. The absence of a dialogue on the plurality of worlds and the difference between globe and planet defines the borders of an ongoing zone of conflict we call the present. The concluding clause, “*Ils demeurent sans réplique*,” marks the spot left by a missing theory of the world. Moreover, it signifies to a theory of the world its limit, without logical transition, and indeed without a reply, without an image of the globe; for another translation might read: “They dwell without replica”—a proposition that centuries later in the context of postcolonial theory speaks to Gayatri Spivak’s own anthropology of dispossession by the globe:

I propose the planet to overwrite the globe. Globalization is the imposition of the same system of exchange everywhere. In the gridwork of electronic capital we achieve that abstract ball covered in latitudes and longitudes, cut by virtual lines, once the equator and the tropics and so on, now drawn by the requirements of Geographical Information Systems... The globe is on our computers. No one lives there. It allows us to think that we can aim to control it. The planet is in the species of alterity, belonging to another system; and yet we inhabit it, on loan. It is not really amenable to a neat contrast with the globe. I cannot say “the planet, on the other hand.” When I invoke the planet, I think of the effort required to figure the (im)possibility of this underived intuition. (72)

What the Jesuit missionary claims to have foreclosed with a portable image of the world, a miniaturized version of totality, defines a discursive space presently occupied by ecology and conservation biology, climatology, planetary engineering, design theory, environmental ethics, cultural anthropology, predatory capitalism, and even to some

extent comparative literature—each of these fields raising the question of how many worlds the globe can accommodate?

Under what conditions does an image, a surface, or a volume become a territory?

BPA, or bisphenol A, is an organic compound used to produce solid transparent plastic. Patricia Hunt identified its endocrine disrupting properties in the late 1990s, when a control group of mice she used to study chromosomal anomalies in eggs started to present a high rate of chromosomal abnormalities that could only be explained by the plastic environment in which the control group was conditioned (Landecker). The disturbance registered within the experimental setting at the level of the distinction between background and foreground, that is, between what is inert and what is active (Csordas). It revealed the neutral space of the lab—a space within which objectivity depends on standard protocols of isolation—to have its own environmental dimension as a milieu of life. But it also revealed that the plastic consuming control group outside the lab setting is yet another test group enrolled in an open-ended experiment where toxic modes of belonging give to the floating world of its refuse the consistency of a territory.

Regardless of its consistency, motility, and dimensions, the Garbage Pacific Patch achieves a form of territoriality when an unmappable substance, trapped by the North Pacific Gyre, appears embedded in the bird's remnants photographed by Chris Jordan. It becomes territorial when albatrosses at Midway Atoll feed their chicks with plastic pellets and DDT and PCB-laden food (Van Dooren 21-44).



Fig. 7: Chris Jordan, *Midway: Message from the Gyre*, 2009. <http://www.chrisjordan.com/gallery/midway/#CF000313%2018x24>

“**W**hat does it mean,” asks Adriana Petryna, “to be alive in a heavily contaminated environment controlled by science and the sovereign power of the State?” (196). She recalls the story of how she met Anna and her family while conducting fieldwork in southwestern Ukraine in 1992. She listens to them in their small kitchen as they rehearse for her the story of how the Chernobyl incident entered “the history of their own mortality” during a trip to Kiev in May 1986 (214). Their history totters through a space of disjuncture opened between a demand for truth and accountability (exacerbated by the volatile nature of radiation) and a demand to live, or in other words, a demand to learn from the past that is also a demand to live with it. Then comes Petryna’s turn to narrate and bear witness:

Anna told me that the number of suicides occurring off the bridge by local inhabitants had risen that year from one to ten. She explained that most of those individuals were older and, in

her opinion, could not cope with the unpredictability of the future and their lives any longer. The moon was full. As we continued walking, Anna started to repeat in English, “I am crazy, I am crazy.” This startled me, but she was unaware of my reaction and began telling me dreams of launching into flight. She loved to fly, she said, as she floated her hand over the bridge and in the night air. My eyes moved restlessly, not knowing what part of Anna’s body to look at. Maybe her eyes, because here was the linchpin of a specific kind of rationality and assurance that would at least get us off the bridge and back into this world—this world changed by radiation whose untameability had so baffled early researchers... I was asking her to trust me (to believe in my belief that it is possible to live in a place where uncertainty of this kind can prevail), to locate her willingness to live in me, at least momentarily, so that we could get off the bridge. (211-12)

In this passage, the notion of terraformed world becomes a theoretical proxy in Adriana’s bridging address (“I was asking her to trust me”) for how representational objects and formulas add up to something quite brittle, both materially and affectively, and yet sturdy enough to be held in, or to hold on to, in a toxic environment that does not want her—or any of us for that matter—in it, even if it is only provisionally or vicariously.

Gabrielle Roy’s novel *The Tin Flute* (*Bonheur d’occasion*, 1945) contains a two-page, semi-grotesque pastoral fantasy that re-roots the generic premises of the French-Canadian colonial novel (“*roman de la terre*”) in the urban wasteland of 1940s Montreal. Set in the middle of a novel of social exhaustion and impoverished agency, this fantasy tells the tale of a pieced-together world of trash, salvaging in the process leftover narratives of a good life:

C’a été un temps qu’y avait un vrai village là-bas : un ramassis de bâtisses un peu plus hautes que des niches à chien. T’avais pas besoin de demander un permis pour te bâtir ni de chercher des planches bien longtemps. Mon vieux, c’était une vraie bénédiction tout ce qu’y avait su la dompe de matériaux: des montants de lits, des morceaux de tôle, pis du gros carton pas

trop sale. Tu rapaillais là-dedans, à ton choix, une feuille de tuyau, quatre plaques de tôle pour la couverture, et tu choisissais un lot à une place pas trop puante, drette au bord de l'eau. (274-75)

Those days there was a whole village in that place, a collection of shacks about the size of a dog kennel. You didn't need a building permit and you didn't have to look far for boards. I tell you, you can't believe all the material there was at that dump: bed frames and sheets of galvanized iron, and heavy cardboard, not too dirty. You'd piece together bits of pipe, four sheets of tin for the roof, and you chose a lot where it didn't stink too bad, right down by the water. (307-308, modified translation)

The tale functions as a provisional and precarious translation of the rhetoric of home and settlement within a world of industrial displacement and waste. It pays off its debt to an affective geography of belonging and agency showcased in an earlier generation of novels like Antoine Gérin-Lajoie's *Jean Rivard, Settler* (1862), in which a self-made, ax-wielding, and able-bodied hero leaves the ploys of the urban *bildungsroman* behind to find in woodlands his way to domesticity and reproduction.

It is Pierre Nepveu's contention that "Modern Quebecois literature was born the moment it could say: In the beginning we do not exist" (100). The possibility to say "*Nous*," to map its locus, to mourn its sovereignty or to die in its name, organizes a discourse of literary history into categorical oppositions between novel and poetry, epic and lyricism, historical consciousness and the temptation of mythology—between poems by Paul Chamberland, Gille Hénault, and Gaston Miron that, in the mid 1960s, dreamt of foundational narratives and storytelling, and novels that tried to recover the evocative power of the myth. Looking at the opening paragraph of Anne Hébert's novel *Les Fous de Bassan* (translated as *In the Shadow of the Wind*), we might say that at the beginning there was no narrative: "La barre étale de la mer, blanche, à perte de vue, sur le ciel gris, la masse noire des arbres, en ligne parallèle derrière nous" (9) ["A strand of sea poised between tides, white, as far as the eye can see, and against the gray

sky, in a parallel line behind us, the black bulk of trees.”]. In this syntactical environment no verb floats above the primordial waters. No predicate confirms an attachment to the littoral streak.

At the beginning of the film *Pour la suite du monde* (1963) was the word of Jacques Cartier:

Mes petits amis, après avoir lu les grandes aventures de Jacques Cartier, dans son voyage de 1535, j'ai trouvé un bout que je crois qui va vous intéresser. Donc je vas essayer de vous le lire le mieux que m'en pouvoir par rapport qu'il est écrit sur le vieux français: “Le sixiesme jour dudict moys, avecq bon vent, fismes courir amont ledict fleuve environ quinze lieues, et posasmes à une ysle, qui est bort à la terre du nort. Icelle ysles contient environ quinze lieues de long et deux de laize. Et c'est une fort bonne terre et grasse, pleine de beaux et grantz arbres de plusieurs sortes. Et entre aultres, il y a plusieurs couldres que nous trouvasmes fort chargez de noisilles et pource, la nomasmes YSLE ES COULDRES.”

My dear friends, after having read the great adventures of Jacques Cartier, in his voyage of 1535 I found a bit that I think will interest you. I'll try to read it to you as best as I can as it is written in Old French: “On the 6th day of the said month, with a fair wind, we made our way upstream for about 15 leagues and landed on an island off the north shore. This island is about 3 leagues long and 2 leagues wide. The land is good and fertile full of beautiful and tall trees of many kinds. And, among others, there are many hazelnut trees that we found heavily laden with hazelnuts. And for that reasons, we named the place ‘Hazelnut Trees Island.’”



Fig. 8: Still from *Pour la suite du monde*. Dir. Michel Brault and Pierre Perrault. ONF-NFB, 1963.

A voice, a word, a world, and its image come together in a powerful cartographical effect that, on the one hand, locks up the island in its insularity, but on the other, “baits us to ponder the fact that *who we are* or whomever we believe ourselves to be depends, whether or not our locus is fixed or moving, on often unconscious perceptions about *where we come from and may be going*” (Conley 3). A fold on that map, the elusive beluga-whale functions as a collective bait for narratives of origins: who is behind the ingenious yet defunct mode of capture reenacted in front of Pierre Perrault and Michel Brault’s camera to give birth to Quebecois cinéma-vérité? Opinions on the subject diverge and clash. For Alexis Tremblay, one of the elders of the insular community, it is a First Nation legacy. Leopold, his son, credits early Norman settlers for the invention. To settle the debate, the father turns to an ambiguous passage in Cartier’s account much to the disbelief of the son. The “fish” remains elusive until its capture by the ingenious structure made of thin and long wooden sticks planted

in the sand to create a solid littoral net redefining the borders of the island.

In Marguerite de Navarre's *Heptaméron* (1551/1552), water exists in two states. It is a healing element whose properties drive a cosmopolitan crowd to thermal baths in southwestern France. But it is also a destructive force that leaves ten travellers stranded with many stories to tell each other on the premises of Giovanni Boccaccio's *Decameron*. Indeed, the return from the healing waters is interrupted by the surge of water. Streams turned torrents redraw topographies and rewrite the Scriptures—"il sembloit que Dieu eust oublié la promesse qu'il avoit faicte à Noé, de ne destruire plus le monde par eau" ["it seemed as though God had forgotten the promise He made to Noah never to destroy the world with water again"] (1). Healing waters are also at work in the essay Montaigne devotes to his kidney condition (II, 37). But in "Des Cannibales" (I, 31), water exists as a geomorphological force that shapes and reshapes embankments and erodes estates:

Quand je considere l'impression que ma riviere de Dordogne faict de mon temps vers la rive droicte de sa descente, et qu'en vingt ans elle a tant gagné, et desrobé le fondement à plusieurs bastimens, je vois bien que c'est une agitation extraordinaire: car, si elle fut tousjours allée ce train, ou deut aller à l'advenir, la figure du monde seroit renversée. Mais il leur prend des changements: tantost elles s'espencent d'un costé, tantost d'un autre; tantost elles se contiennent. Je ne parle pas des soudaines inondations de quoy nous manions les causes. En Medoc, le long de la mer, mon frere, Sieur d'Arsac, voit une siene terre ensevelie sous les sables que la mer vomit devant elle.

When I consider the inroads that my river, the Dordogne, is making in my lifetime into the right bank in its descent, and that in twenty years it has gained so much ground and stolen away the foundations of several buildings, I clearly see that this is an extraordinary disturbance; for if it had always gone at this rate, or was to do so in the future, the face of the world would be turned topsy-turvy. But rivers are subject to

changes: now they overflow in one direction, now in another, now they keep to their course. I am not speaking of the sudden inundations whose causes are manifest. In Médoc, along the seashore, my brother, the sieur d'Arsac, can see an estate of his buried under the sands that the sea spews forth. (151)

In the context of the still recent discovery of the Americas, whose rumored marvels pervade the essay, erosion signals the emergence of a world that resists appropriation and even Montaigne's call for topography: "Il nous faudroit des topographes qui nous fissent narration particuliere des endroits où ils ont esté" ["who would give us an exact account of the places where they have been"]. Here, topography is not simply a descriptive and narrative enterprise. It is a response to the perceived plasticity of the surface.

What it means for the earth to slip under one's feet is bracketed in the first sentence of the essay:

Quand le Roy Pyrrhus passa en Italie, apres qu'il eut reconneu l'ordonnance de l'armée que les Romains luy envoioient au devant: Je ne sçay, dit-il, quels barbares sont ceux-ci (car les Grecs appelloyent ainsi toutes les nations estrangieres), mais la disposition de cette armée que je voy, n'est aucunement barbare.

When King Pyrrhus passed over into Italy, after he had reconnoitered the formation of the army that the Romans were sending to meet him, he said: "I do not know what barbarians these are" (for so the Greeks called all foreign nations), "but the formation of this army that I see is not at all barbarous." (150)

What Pyrrhus sees and recognizes, the difference between what he sees and recognizes are relational propositions contingent upon the lexicon available to him to designate foreigners. The footing Pyrrhus finds in language is positional. Throughout the essay "Des Cannibales," Montaigne describes old and new worlds at war, from the military organization of Tupi societies in Brazil to the civil unrest in sixteenth-century France. Erosion is a different kind of war that entails a different form of geopolitics—a politics of strata rather than a poli-

tics of territory (Clark 2830). Or in Jussi Parikka's words: "The water that was understood as anomalous, or difficult to control and define in the political space of old Europe, becomes once again a determining factor of the geopolitical Earth, but this time because rising ocean surfaces flood coastal areas and metropolises" (37).

Plastiglomerate is an emergent geological formation composed of melted plastic, beach sediment, basaltic lava fragments, and organic debris (Corcoran et al.). An interdisciplinary team of geologists identified plastiglomerate among specimens collected on Kamilo Beach in Hawaii by as a potential marker of the Anthropocene. By contrast, the geology that subtends the world of nineteenth-century French novelist Emile Zola is emergent by virtue of having entered into the conversation it keeps on interrupting. Minerality is everywhere *Germinal* (1885), deposited, extracted, and vaporized in the form of coal dust that coats every inner and outer surface of the novel. It surfaces in the inaugural dialogue between Etienne, a vagrant looking for a job, and Bonnemort (literally "Good-death"), a retired coal miner:

Une crise de toux l'interrompt encore. – Et ça vous fait tousser aussi ? dit Étienne. Mais il répondit non de la tête, violemment. Puis, quand il put parler : – Non, non, je me suis enrhumé, l'autre mois. Jamais je ne toussais, à présent je ne peux plus me débarrasser... Et le drôle, c'est que je crache, c'est que je crache... Un raclement monta de sa gorge, il cracha noir. – Est-ce que c'est du sang ? demanda Étienne, osant enfin le questionner. Lentement, Bonnemort s'essuyait la bouche d'un revers de main. – C'est du charbon... J'en ai dans la carcasse de quoi me chauffer jusqu'à la fin de mes jours. Et voilà cinq ans que je ne remets pas les pieds au fond. J'avais ça en magasin, paraît-il, sans même m'en douter. Bah ! ça conserve ! (9)

A spasm of coughing interrupted him again. – "And that makes you cough so," said Etienne. But he vigorously shook his head. Then, when he could speak: – "No, no! I caught cold a month ago. I never used to cough; now I can't get rid of it. And the queer thing is that I spit, that I spit..." The rasping was again heard in his throat, followed by the black expectoration. – "Is it

blood?” asked Etienne, at last venturing to question him. Bonnemort slowly wiped his mouth with the back of his hand. – “It’s coal. I’ve got enough in my carcass to warm me till the end of my days. And it’s five years since I put a foot down below. I stored it up, it seems, without knowing it; well, it embalms! (6, modified translation)

Minerality is simultaneously extracted, reabsorbed, and spit out again—whether by the industry it fuels or by the coal-coughing creature it simultaneously kills and keeps alive. It marks the soil to form yet another layer and creates another set of relations between cohabiting forms of life, between organic life and mineral life alive of a life that threatens to turn organic life into its archive. It is in that sense that occupational epidemiology and geological medicine documenting toxic forms of mineral exposure (pneumoconiosis) too could be understood as the sites of emergent geologies.

In “Conservation and Color,” Lyotard remarks that in principle, in the confines of a museum, “posed paint will not ‘pass,’ it will always be now” (Lyotard, *The Inhuman* 144). In the Lascaux cave, however, this present is at risk. Its paleolithic paintings are threatened by algae developments and calcite recrystallization. The threats can be linked to the modification of the gaseous composition within the cave following the intensive touristic exploitation of the site since 1948. Now that Lascaux cave paintings are facing extinction, as a headline found on the International Committee for the Preservation of Lascaux (ICPL) website suggests, they come to life, “not just as an object of description ... that comes alive in our perceptual/verbal/conceptual play around it, but as a thing that is always already addressing us (potentially) as a subject with a life that has to be seen as ‘its own’ in order for our descriptions to engage the picture’s life as well as our own lives as beholders” (Mitchell, *What Do Pictures Want?* 49). Breath is both a contaminant and a port of entry into the historical existence of prehistoric paintings whose very “survival” is a matter of intensive care. Air filtration devices, fungicides, biohazard mitigation protocols, and an ongoing replication process mediate the relation of toxic co-presence between the paintings and the CO₂ releasing now: Lascaux 2, a partial three-dimensional repli-

ca, opened in 1983 on the same hill as the original cave. Initiated in 2012, Lascaux 3 is an itinerant, interactive, and international exhibit of movable panels reproducing some of the cave's most famous painted scenes. The latest of the Lascaux avatars—Lascaux 4—proposes a complete replica of the cave and its painting; but it also mimics the sensorial qualities of a subterranean atmosphere. The prehistoric images are safe. They survive elsewhere under various formats. Their relation to time, to loss, and to transformation might be what is presently endangered. They survive in a terraformed state thanks the dematerialization and recomposition of geological structures afforded by cave replicas. Is it another case of reverse terraforming? Here, it is not the future that conservation efforts seek to engineer, but rather a past exposed to the vagaries of an unhospitable present—a terraforming present, as it is, defined by contact, gaseous exchange, and a dark, damp, and muffled assemblage of carnal relations.

No less experimental in tone and intent than terraforming itself, this paper has sought out to register terraforming projects that are not necessarily located in a future planetary state of affairs but in a memory of the inhabited earth at odds with linear and developmental narratives of settlement. For the speculative existence of terraformed worlds is always already informed by a cultural memory of *oikos*—the inhabited world, the world one longs to return to, or for Eugene Thacker, the “*world-for-us*” (by opposition to the world-in-itself and in tension with the word-without-us) (Thacker 4-5). But what is terraforming if not a prosthetic memory of *oikos*—that is, a mode of curating prospects of continuity in the present that disposes of them like end credits?

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NOTES

1. Benjamin equates the decline of storytelling in industrial societies to the disruption of a fragile ecosystem: “the more natural the process by which the storyteller forgoes psychological shading, the greater becomes the story’s claim to a place in the memory of the listener, the more completely is it integrated into his own experience, the greater will be his inclination to repeat it to someone else someday, sooner or later. This process of assimilation, which takes place in depth, requires a state of relaxation which is becoming rarer and rarer. If sleep is the apogee of physical relaxation, boredom is the apogee of mental relaxation. Boredom is the dream bird that hatches the egg of experience. A rustling in the leaves drives him away. His nesting places—the activities that are intimately associated with boredom—are already extinct [*ausgestorben*] in the cities and are declining in the country as well” (Benjamin 91). ↵