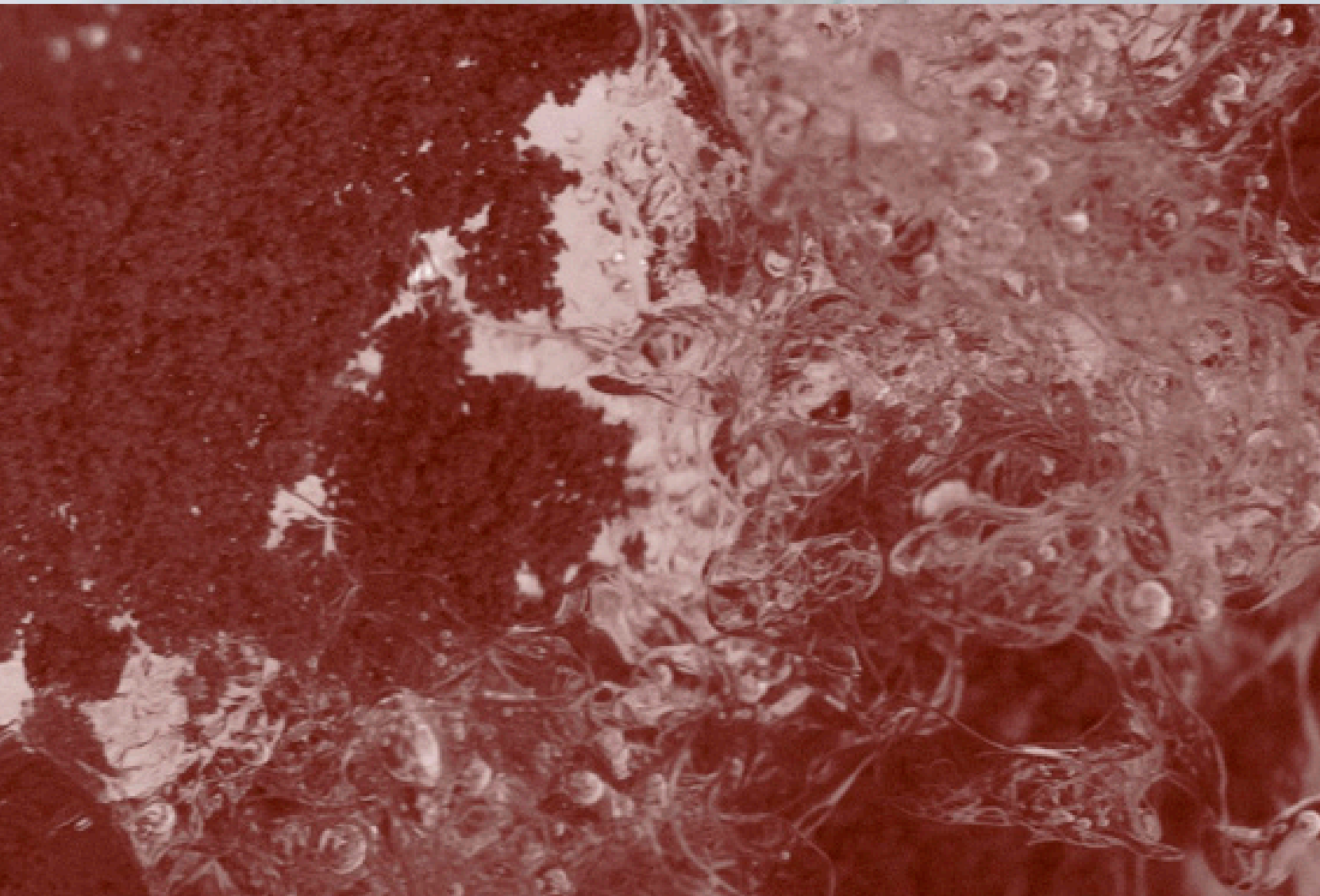




The Glacier is a Being

Julian Stettler





If We Opened People Up, We'd Find Landscapes  
Anne-Sophie Balzer

On the moraine crest there is not much space for creatures on two legs to get comfortable. Julian and I have come a long way. Risen with the earliest birds, we took trains that rushed through the flat parts of this country. Then snaked alongside mountain streams and through Valaise valleys. Squeezed in between early skiers, we took a cable car pulling us up the mountain, then walked for several hours in the scorching sun. Mighty Matterhorn gleaming behind us. The narrow ridge of the moraine leading to Findel glacier is as far as we can go. Our equipment and knowledge are not sufficient to hike the ice in April. Late winter up here. Although we carry avalanche transceivers we'd rather not use them. Tracks in the snow from those who have come before us: groundhogs, mountain chamois, alpine ibex, winged friends. Oh to live here, to lift off and glide across the glacier ahead, crinkly like an unmade bed. Circle some nearby summits, then have the thermal uplift carry us all the way home. To make a home in the folds. A whole flock of chamois stop in their tracks to observe our slow progression up the mountain. Someone else has scrambled up the same moraine and headed on towards the glacier, an impressive balancing act on cross-country skiers. We follow the tracks until we have reached the top. Sitting down carefully on the narrow rim feels like sitting on the back of a horse in side-saddle: wobbly. Like two 19th century women in hooped skirts. This landscape is not made to accommodate us. Wanting to be here regardless means effort. We hold on to our tea cups and reapply sunscreen for the third time, careful not to move too much.

Memories of a past life: Working the early shift at a news agency in Berlin. Three years spent beating myself out of bed at 4 a.m only to arrive at the office at 5, hoping the day would go slow. Slow meant fair weather in the breathless global news cycle: minimal casualties, no cyclones, no Boko Haram hostage situation: though somewhere someone was

always dying at the hands of someone else. The first thing I did right after making coffee and sitting down in front of three screens : windows into the world's troubles and anxieties : was opening a new browser window with the Matterhorn webcam. Morning ritual, coping mechanism, visceral longing for somewhere else. This else a place. A feeling. Dawn would coat everything in hues of rose and blue and when the sun came up between Breithorn and Matterhorn it shone right into the camera eye. The scene was too big and too beautiful not to think of all the worn-out clichés. Our office was located on the fourth floor on busy Friedrichstraße, with windows looking out onto the courtyard: a concrete square with trees in buckets. The disparity between the view out the office window and a sunrise across 4.000 m peaks was so striking that sometimes I would see the Matterhorn when looking up from the screens and into the sad courtyard. Like seeing the color orange after having stared at a blue spot. Webcast into my complementary life.

Sitting on the ridge, breathing in the thin mountain air and feeling the presence of giants. I swivel my head and see at least ten glaciers. Ten out of 1.400 in Switzerland, an incredible number. Still here, still here. Glaciers give birth to this landscape, shape it, leave their ghost prints: streams and rivers, the fertile soil down in the valley, the mountains that mean so much to me that I moved my whole life closer to them. The glacier is in the air we breathe, the water we drink, in the wine and cheese from these valleys, in our bodies, in our bones.

The Icelandic language provides a way to inhabit an experience the English language does not. Say a: j: kla and you mean : to become glacier: , j: kull being the word for glacier. This verb construction follows the behavior of Icelandic seasonal verbs such as a: vora : : to become spring: : and a: vetra : : to become winter: : . A language that signals metamorphic transition at its core, a changing state of aggregation, always on its way to somewhere else. The poet Angela Rawlings thinks about this glacier-verb neologism and how it traces transition: : in the case of current usage, it implies a flux in mass, leaning heavily towards transitional disappearance. The creation of this action word also allows for an empathetic embodiment of glacier experience.: We need language to feel things. Having words for experiences is fundamental to our perception of the world. Put differently: without a: j: kla no a: j: kla.

And yet. We will never know what it feels like to be a glacier, really. Cannot inhabit this experience the same way we cannot inhabit another human's experience. Still, myths and stories are full of mysterious metamorphoses. Just think of the old directive to walk in someone else's shoes for a day. Our imagination is a tool, one could argue, that is vital not only to understanding the other, embracing differences, but quite frankly for survival. Maybe one way to begin something of a conversation is to get close, start flirting a little. But with glaciers, things get complicated awfully quickly. Ice and humans need very different things to be alive and thriving. Our language is full of idioms referring to freezing and coldness as dangerous. Kafka spent his lifetime trying to write books that worked as an : ax for the frozen sea within us: . We may freeze in terror or shock, or give someone the cold shoulder, by freezing them with a look. What is lethal for humans is vital for the glacier's survival. So in order to get in touch a protective layer is required. The artist Kate Hartman invented a glacier hugging suit, a kind of insulating interface to slip into in order to touch the glacier. Lying on the ice, arms spread like a snow angel, we can experience the glacier without freezing, without making it melt away under our warm touch and carbon breaths. Maybe the glacier hugging suit can also become a metaphor. Something we put on that allows us to contemplate differently the effects we have in the world, how it is we are both in and of it.

The sun is warming up the southside of the moraine, a word

originating in the Provençal term for snout. Every few minutes, rocks tumble downhill, loose like drunken tongues. Julian takes pictures, click click goes his shutter. Hear what is still here. I switch on my field recorder. It's high noon but the moraine is quite far from the hustle and bustle of the ski resort. A kind of impossible silence surrounds us that is never truly silent because we are in nature, not in an anechoic chamber. Closing our eyes, we listen to our own inhaled and exhaled, some gurgling further down in the belly. Landscape becoming soundscape. A breath of wind around the ears, almost undetectable but on the skin. What's more, we can hear the presence of mountains formed 200 million years ago, old glaciers with ice frozen for centuries. It is an impossible sound, like the koan of the sound of one hand clapping. Julian and I talk in a low hush in our human language that seems so incomprehensible for what we are experiencing. : Speech a melted thing,: the English poet Helen Mort decides in : The Glacier Speaks: : elusive, fleeting, always running downhill. On the way, we have discussed our use of technology to experience the immediacy of mountains and glaciers. Julian uses his camera, his megapixels and the finest lenses: I tape with my field recorder and the comparably ancient technique of writing. Both of us : and in extension you holding this book : use various perceptive media through which : nature' is constructed, not unlike Kate Hartman's glacier hugging suit. Anthropocene experiences of nature these days are mediated almost always by technology. How, after all, did we get here, all the way up the mountain: The wild is gone, and given the concept's troubled history maybe this is a good thing. Far too long the claim to protect wilderness has been used to justify genocide, drive Indigenous peoples off their land. Since the Industrial Revolution but truly up until today's greenwashing campaigns, protecting a small patch of wild, a forest with rare butterflies here, a bay with the last whales of their kind there, is often an attempt to ease the conscience of those who contribute the most to pollution, destruction, and extinction.

But admittedly, Julian and I feel conflicted about the amount of tourism around us, we have no good solution for how to navigate this. How to include it in our aesthetic experience. It is tempting to simply write all the noise out of the story. Adjust the camera frame appropriately and pretend we are the only human animals up here. But I don't believe this mannerism to be productive. Nostalgia for some idealized past that never really existed in the first place, it clouds our vision. To see what's really here is another form of becoming. To become glacier in 2023, then, means a co-becoming with everyone and everything around us: folk music blasting across the restaurant terrace back at the cable car station, clinking aperol spritz glasses, the flocks of chamois as well as the flocks of skiers racing downhill. All this and the glacier up the valley retreating farther and farther every year. Even though Julian's images keep the hubbub out of the frame : a justifiable aesthetic decision : it is present. We are all here.

There is a way one can feel into a kind of glacial becoming, a: j: kla, that needs no protective membrane, no screens or camera frames. In the cosmology of Pacific Sami poet Vivian Faith Prescott, freezing happens by means of the imagination and the power of story. In her poem : How to Tell a Story Atop the Last Glacier at the End of the World: , she paints the following picture: : Imagine we are here on that last glacier, painting the darkness : ...: pressing our feet into a suncup, water pooling beneath all our warm palms.: In the enchanting scenery of the poem, freezing serves as a transgression, a means to cross over into a liminal realm, to become one with the glacier. It is an embodied experience, enchanted and almost - but not quite - amorous. In the last stanza of Prescott's poem, the gathered people on the glacier, after having tossed into the crevasse their offerings and prayers, start to feel the power of the story in their bodies: : It flutters our scarves about our necks and lifts our skirts of blue-green light. And just like that we begin to freeze.: Just like that. For human bodies, warmth

is an essential and defining condition, for the glacier: frozenness. Whose survival is more important: In Prescott's poem, by the power of the imagination, we all turn into older, colder elements, a: j: kla.

The opposite of this is the narrative of a disenchanting world. Entzauberung, according to Max Weber, is the prime feature of modernity. But to speak of the world as lacking any potential for sublimity, as philosopher Jane Bennett observes, has powerful rhetorical effects that contribute to the condition that is being described. The depiction of mountains, glaciers, and the whole natural world as mute and serving only human agency : inflects the self as a creature of loss: , keeps us from acknowledging the marvelous vibrancy of bodies, human and nonhuman, natural and artificial. I don't want to be a creature of loss. Not more than is inevitable in times of staggering extinction, that is. In this text, I have invited stories and thought experiments that allow for a little bit of transformative space: dwelling in the soundscapes of Findel glacier: allowing for moments of becoming present: contemplating the differing needs of glaciers and humans: and listening to stories of frozen people.

Enchantment doesn't mean to believe in ghosts, in magic. Simply this: that there are more ways to be alive than humans know of, than our language can comprehend. You might have guessed by now that it is not essential to know whether glaciers or mountains can be considered alive on a strictly scientific level. The answer would be negative. Though what you can learn from David Touchette's and Ianina Altshuler's essays in this book is that the surface of a glacier is quite alive, even in a biological sense. Aliveness is a human word whose scientific definition is always in flux, transitioning.

To be enchanted, according to Bennett, : is to be struck and shaken by the extraordinary that lives amid the familiar and the everyday.: To me, that sounds like a very hands-on-down-to-earth kind of magic. When was the last time you experienced being struck, shaken: Enchantment, it seems, is best approached as an activity. Like training a muscle we can practice being enchanted. And so I let my field recorder tape the impossible silence of this day on the moraine. And just like that, and just a little, we begin to freeze.

Glaciers as an Ecosystem  
David Touchette, Ianina Altshuler

White, blue, gray, black: the colour palette of glacial environments suggests that they are devoid of life. Coupled with the sparsity of liquid water, limited availability of nutrients, and high ultraviolet radiation on the glacier surface, untrained eyes may easily assume that glaciers are sterile. However, microbial life is able to inhabit glaciers. Microorganisms are known as Earth's most successful forms of life, being able to colonise and thrive in the most extreme environments, such as permafrost, inside rocks, salt plains, hot springs, deep sea hydrothermal vents, and glaciers. To cope with such inhospitable environments, microorganisms have evolved and adapted a multitude of strategies and mechanisms. It is the case of microbes inhabiting Glaciers: they found their own ways to get liquid water, energy and some nutrients, the three essential elements for life.

Microorganisms are inhabiting a wide range of glacial environments, with viable microbes found under glaciers, embedded within the ice, and as algal blooms on surfaces. However, one of the hotspots of microbial life within glacial environments are cryoconite holes. These pools of liquid water are created when dark matter, such as dust, soil or microbial particles, land on the glacier surface. These dark patches are able to attract the sun's radiation and absorb the energy, this results in the melting of the surrounding ice and formation of liquid pools. With the newly available liquid water, microbial members capable of photosynthesis, like cyanobacteria, start to utilise solar energy for growth. This results in the production of organic molecules that can then be used as a food source to support the growth of other microorganisms present in the cryoconites that can't synthesise their own food from sunlight. This microbial activity and growth further increase the dark matter within the cryoconites, which trigger a positive feedback loop of ice melt, resulting in a more favorable environment of microbial life. As cryoconites are widespread and sometimes cover substantial

percentages of Glaciers, they are responsible for the decrease in albedo of glacial surfaces and promote glacier melt. While this is a natural process, it is exacerbated by increased contribution of dark matter to glaciers from anthropogenic sources. On the other hand, cryoconites play an important role in providing essential nutrients to downstream ecosystems.

Seasonally, when temperatures increase and trigger glacier melting, cryoconite holes are flushed through networks of supraglacial streams, these connect to form a glacier-fed river. Glacier-fed rivers are one example of habitats formed from annual cycle of melting glaciers. Like glaciers themselves, these rivers are harsh habitats for life, but are not limited by liquid water availability. Alpine river habitats, while harsh like glacial environments, tend to be somewhat unstable. Life in these rivers needs to also cope with major diurnal and seasonal fluctuations. Therefore, a different adaptation strategy prevails in these rivers: microbial biofilms. Biofilms are characterised by aggregates of microbes within a slimy matrix which promotes cellular adhesion and allows for protection against the environmental fluctuations and pressures.

This matrix is composed of complex substances like polysaccharides : sugars: , proteins, lipids, and nucleic acids : eg. DNA: . You may be more familiar with biofilms as the slime covering of the rivers' beds and rocks. This complex matrix creates a network of interconnections between its diverse inhabitants by immobilising the microbes, promoting water retention and extracellular enzymatic reactions responsible of solutes absorption. The matrix also creates a gradient with photosynthetic algae and cyanobacteria colonising the light abundant upper layer of the biofilm, while other bacteria are supported by these photosynthesizers and are distributed throughout the matrix. The mutual relationship between the photosynthetic microbes which provide organic nutrient and the non-photosynthetic bacteria which provide carbon dioxide, create a sustainable carbon cycle within the biofilm. Thus, biofilms are a very successful life form, and they dominate in glacier-fed rivers, as they can utilise the nutrients made bioavailable by the cryoconites, cooperate with each other to enhance microbial metabolism and absorb solutes, including some toxic for humans. It is not surprising that they can colonise and establish themselves on new substrates as fast as within five days: Due to their efficiency, complexity and abundance, river biofilms play a key role in the filtration and cleaning of our water sources. Even if at the first glance glaciers seem static, they are highly dynamic, as the microbial communities they support. These communities have adapted to face the natural seasonal fluctuations of glaciers and by doing so, they provide clean drinkable water for a large proportion of humanity.

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