# Quiet Fires of All Degrees

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## IN THE LINE OF SIGHT

It was seven long hours in the car from Traverse City, Michigan to my grandparents' house in Vermilion, Ohio. Upon being granted freedom, my first action was to burst out of the car and run across the rich soils of the corn and soybean fields all the way back to the railroad tracks. This was the location where the quiet steel lines, extending out of the landscape to infinity, were periodically punctured by the great, terrifying rumblings of passing freight trains. It was for me the center of the universe. As a child, I would wait there, sometimes for hours, in order to experience the arc of sound, the shaking vibrational pattern of weight and mass approaching, exploding, then receding in intensity from my world.

It was here, between the railroad ties, that I first discovered a few handfuls of small purplish-black iron ore pellets. Closely examined, each one revealed itself to be a miniature planet, deeply pitted and speckled, mysterious and darkly shimmering with some sort of unique ineffable energy. What was it? Where did these pellets come from? And where were they going on those trains?

## RUST

I was born in Pontiac Michigan, an extended suburb of the motor city of Detroit, but have few memories of it. My family was one of many in the last quarter century that chose to leave behind the rust belt cities along the Great Lakes, opting instead for a rural region of northern Michigan that has an

economy based on tourism and cherry farming. The Grand Traverse region is known for its blooming and fruiting orchards, set within a landscape of rolling hills and turquoise blue waters. Throughout my childhood and adolescence in Traverse City (the self-proclaimed "Cherry Capital of the World"), it seemed to be everywhere apparent that prosperity came from the ability to grow food and keep the landscape beautiful.

During the snowy winters, roads were treated with a layer of salt, mined from the crystallized remnants of ancient seawater left beneath the city of Detroit. Road-salt acts to prevent accidents but also accelerates the rusting of automobiles and infrastructure here and elsewhere around the region.

My family's choice to migrate northward to a less-populated area became a motion I repeated when I left home to study at a university.

## CIRCULATION

There are two coal-burning power plants in Marquette, a large town located in Michigan's remote Upper Peninsula. One plant burns Appalachian coal on the south harbor of Lake Superior to provide power for the city of Marquette. The other plant burns Wyoming/Montana coal beside the Dead River, on the north harbor, to provide power for the iron mines. Winters are long in Marquette, with heavy snow covering the ground for six months of each year. In this white world, each power plant stands out with its stark mountains of coal, glittering black in the snow.

Bicycling became my primary means of transportation while I was attending college in Marquette. Each day, my legs formed circles, turning gears, propelling me between my apartment, in a majestic but crumbling brownstone, and the university campus. This revolving path brought me into daily contact with a landscape enlivened, almost engulfed, by the dynamic steam exhalations of the twin power plants. Experience had shown that cold days in the single digits, or better yet temperatures below zero, made for the best cycling experience. Not only was tire traction improved, but also the deeply contrasting temperature extremes enhanced the double drama. The little story of my breath-plume exiting, ferociously mixing and dispersing into the bitterly cold air, while being gloriously overshadowed by the grand drama of the power plants, exuding life force and exhaling their own coal-fired breath above the town.

## THE RANGE

Marquette County is home to one of the southernmost portions of the Canadian Shield. This extensive geologic mass of ancient, heavily eroded mountains spans a distance from the Arctic in the north on down to surround much of Lake Superior on the U.S./Canadian border. The oldest exposed rock on the North American continent is found within the Canadian Shield.

Ore mounds
Palmer, Michigan

*Photo by Lorem Ipsum*

Just as the mountains have been heavily eroded by time, the current living landscape here has been worn by successive waves of resource extraction in the Great Lakes region that began with the arrival of Europeans: fur trapping and export, the logging of old growth forests, the mass harvesting of native fish stocks, and the discovery and extraction of ore deposits. Today, thanks to a short growing season and nutrient-poor soil, there is no significant agriculture in Michigan's Upper Peninsula. It is the rock itself that continues to yield wealth.

Though I lived beside the Marquette harbor for five years and watched the trains and freighters move coal in and iron ore pellets out, the mines themselves, located eighteen miles inland in Palmer, remained an abstraction. In May 2009, I returned to the Upper Peninsula of Michigan to view the blast pit, the tailings piles, and to take a tour of the processing plants. The original high-purity ore deposits are gone now, forcing the mines to blast, crush, and finely grind a much larger quantity of low-grade rock in order to concentrate the iron back into a useable form. The resulting iron dust is finished for shipping by firing it up to 2300 degrees Fahrenheit in a massive, rotating, cylindrical kiln to form pellets the size of large blueberries. It was astonishing to peer into the glowing, circling chamber and see the luminous space that formed the little pebble-planets that I first encountered as a child beside the railroad tracks in Ohio. Each tiny cosmic world is reborn out of rubble here, within the murky air of the plant's interior, a space where all surfaces are stained dark with the rust of iron dust.

The ore processing plant itself is part of a complex, set within a vast manufactured landscape. In the foreground stand several volcano-like conical mounds of glistening deep-purplish-black ore pellets, fed and connected by a network of rail lines. Surrounding the ore piles, heaped higher still, are the great mountain ranges of tailings.

## LAYERS

Our own planet's core is iron and nickel, deep in the grip of gravitational force. There it remains, dense and hot, beneath the relatively weightless and fluffy layers of crustal rock that we can experience directly at the Earth's exterior.

Metallic iron is virtually unknown on the surface of our planet other than a tiny concentration of cosmic debris in the form of iron-nickel meteorites. This small allotment was the source first used by our species a few thousand years ago to create objects. For all our extensive desires since, it has been necessary to create iron by processing ancient deposits of rust.

Early in Earth's history and prior to any known life, metallic iron was abundant on the surface of the planet, even behaving in water like salt, dissolved at high concentrations within the oceans. Primitive cyanobacteria brilliantly began to use sunlight to create and store energy, releasing pure oxygen gas in the process. This newly created oxygen was pulled first toward a chemical

union with iron, before the excess was free to go on to gather and form a major component of the atmosphere. The event, on this spheroid rock of Earth, was a gradual mass rusting of the iron dissolved in ocean waters. Laid down in layers, iron oxide ocean sediments and silica are found globally in some of the oldest geologic samples, known collectively as Banded Iron Formation.

It is Banded Iron Formation rock that can be seen, touched and processed in the Marquette Iron Range in Michigan and the much larger Mesabi Iron Range in Northern Minnesota.

## ANCIENT SUNLIGHT

I parked the car one afternoon where the rail lines to the Marquette ore docks intersected the two lane asphalt of Country Road 550. On foot, I followed the tracks down towards the humming and reverberations created by the exchange of materials at the Lake Superior shoreline. Unable to get any closer to the actual juncture of earth, coal, water, and iron at the ore docks (where the trains released their weighty cargo high above the floating freighters), I stopped beside some idle boxcars. While looking up-close at the rusting side of one railroad car in the streaming sunlight, it seemed that the light itself had no bottom, both disappearing into the dark surface and swelling out, in all directions, in an iridescent velvet of rainbow particles. In that space, the glimmering splinters swallowed me up, or I swallowed them up, in a moment of pure rapture.

At first, ore production was energetically underwritten by the power stored in the old growth forests. Logs could be rendered into charcoal and burned, releasing the carbon collected within the relatively short span of several human lifetimes. The current means of iron production is highly energy intensive. Today we rely on coal, a precious concentration of ancient sunlight energy that was brilliantly collected by plants during the Carboniferous period, long before the emergence of human life. Luminous power from the sun, gathered and compacted over an almost inconceivable expanse of time, releases a sacred density of energy through the burning of coal.

On my trip North to the Marquette Michigan iron mine, I also routed my travels to visit several coal mines in Appalachia. This was a pilgrimage to locate and actually touch the source of a given material where it is gathered in the flesh and body of the Earth. Coal seams, naturally exposed on a fault line near the Kentucky/Virginia border, revealed their mysterious beauty. The breathtaking blackness, gleaming in some areas, velvety in others, was embellished with a yellow crust of sulfur and sandwiched between layers of dull grey slate imprinted with the occasional dark patterns of ancient ferns and leaves.

Nearby was a horrific landscape of extensive chaos, debris and destruction resulting from a mountaintop removal mining operation. This practice blasts away the rock to directly scrape off the coal seams, literally removing

the mountains themselves. The majority of earth matter and the life forms residing in the vital surface layer are rendered into waste product by the process. Mountaintop removal mining destroys all of the former wealth inherent in the forest and river ecology. The replacement is a terrain of barren rock that begins to oxidize and leak materials in toxic quantities into the surrounding watersheds. The practice is not rare. On a recent flight over the Appalachian Mountains, it was easy to confirm with my own eyes, the patchwork of destruction spreading out across the countryside, just far enough away from the view of passing motorists.

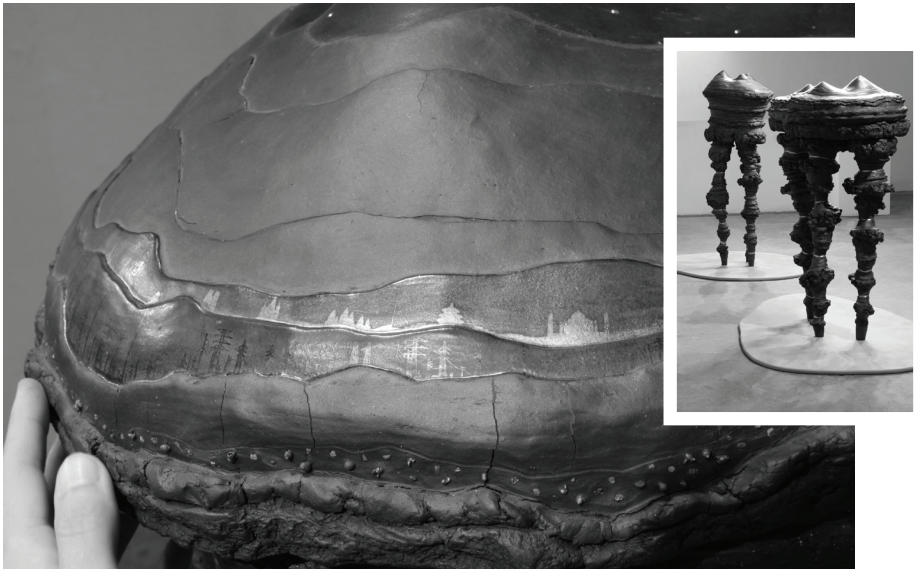
## THE BURNING HEARTS OF STARS

Before the masses of cars swarmed the paved networks of asphalt in the Motor City, before the furnace heat circled and formed the ore pellets, before rich plant matter was trapped in sediments of the Carboniferous to form coal, before Silurian and Devonian seas evaporated to leave thick salt beneath Detroit, even before the ancient Achaean seas sparkled with the earliest life forms of cyanobacteria to grab light and join the dissolved metal with oxygen, *the iron itself began its life in a star*.

The most basic elements in the periodic table, numbering one through three, are hydrogen, helium, and lithium. Following the Great Radiance/Big Bang, this trinity of materials (atoms with one, two, three electrons, respectively) gathered together into clusters, and began, by some means, to burn. The fire of *stellar nucleosynthesis* builds up into layers of creative complexity within the star. Small stars ignite and fuse hydrogen into helium. Larger stars burn hydrogen and helium, fusing more complex atoms into greater mass, number, and depth. Even deeper inside of extremely large stars, carbon (number 6), nitrogen (number 7), oxygen (8), and silicon (14), also begin to burn in layers of nuclear fusion. The process continues to deepen, within this fire of gravity, up to iron at number 26. After this point, a crucial balance of forces is upset and the dynamics within the infernal splendor of the star destabilize. Any further complexity of elemental genesis comes through *supernova nucleosynthesis*: the destructive collapse of the star during the supernova explosion. Elements beyond iron consume more energy than they create.

In the dark, long nights of a bitter Michigan winter, when looking up at a minuscule pinprick of light emitting from a star, it is difficult to imagine that these delicate specks of luminosity are burning with ferocious power and forming, in their very hearts, the dense and heavy metals up to iron. Somehow, in the current balance of forces at work in the universe, iron is special in the sense that it is the last element to form to stability within the inferno of a star. It lies situated on the edge between creative action and destruction.

As there was once a time when the universe could not sustain elements beyond the triad of hydrogen, helium, and lithium . . . is there a future time to come when the number of stable elements will grow greater still?



**Alight and Arise** (full & detail); Black vitreous stoneware, coal slag, glaze, metallic luster; 2010; 64″ in height, 28″ in diameter

## QUIET FIRES OF ALL DEGREES

On the shoreline of creation, iron pulsates, lapping at the edge of the possible. My own pounding heart echoes and emits these patterns of the combined urgency of creation, destruction, combustion, and inspiration. Human culture is no different in this respect. What are we collectively building with the energy of the old growth forests and the coal, with the transformed rust?

There is value in questioning the origin of something, tracing the experience of beauty towards a deeper source. Where did it come from? And where is it going?

In the decade since I left Michigan, my path has wandered through several states to include the climatic extremes of temperate rainforest, desert, and sub-tropical swampland. Yet somehow, the iron mines and rustbelt beckoned a return. Curiosity and intuition about the ore pellets parallels a desire to get perspective on human culture in our time. Where did our Earth-rock come from? And where are we going on this time/train? What does it mean to be embodied here in the present as a breathing creature on the surface of this great, encrusted, slow-cooling ore pellet?

I can sense the healing potential of seeking ground in the rich finitude of place, through intimacy with the specific gifts and limitations of a particular landscape. But the stability gained through precise embodiment of one's position on earth must be paired with a reverence for the shifting and changing motions dancing throughout self, culture, and cosmos. Elemental matter, and indeed all of form is actively innovating, evolving, and expanding outward, pushing beyond what came before.