

Invisible Histories - Mercury and Silver Mining in the Spanish World

It's a bit less than 5 hours by train from Cadiz to Madrid. There are thirteen trains per day, most days of the year, and you're on board and you're thinking about work. Or the weekend. Or the trip you've just finished. Or the vacation time you're about to begin. And ~400 km from Cadiz - at a crossing where you might not even see the sign - you'll pass within 60 km of the Almaden mine. And the name might sound familiar or it might not - we all stare idly out the same window and notice different things - but the train has just passed within 60 km of the single largest mercury deposit in the world. A deposit that - until mining ceased in 2004 - was in continuous operation for ~2000 years and in that time yielded approximately 1/3 of the world's total mercury ore.

This one location.

How do you understand the history of something that is no longer there?

You begin with an invisible hole - that is, you begin with a hole so full of mineral wealth that you don't see it as a hole. You see it simply as a resource. For 150 years the Spanish mined mercury, loaded it onto ships, sailed it to the New World and used it to extract and concentrate the silver that they would bring back to Spain to drive the world's economy. During this 150 year period (roughly 1550 - 1700) it is estimated that ~65,000 metric tons of mercury were mined from Almaden and shipped to Mexico for this purpose. And you end with a statement of history like this: while the majority of the silver mined during the Spanish silver era is still in circulation in one discrete form or another, the majority of the mercury applied to the extraction of silver volatilized to the atmosphere. That mercury is anywhere and everywhere and passing through every food web - terrestrial and marine - on the planet. It is quantifiable but it is untraceable.

And this is a long time ago now, but we are sailors and we have a sense of the size of things and of the pace of things: ~150 years × multiple round-trip transAtlantic voyages per year × as many as 50 ships per voyage - from Spain to Mexico; from Mexico back to Spain - mining and transport for more mining and transport - for an activity that likely represented the longest continuous maritime transport endeavor in history. And what evidence is there now that this activity even existed? The mines are closed - in Mexico in the 1970s for silver, and in Spain, in 2004 with the final closure of Almaden. What evidence is there now for the scale of this extraction and transport? And relatedly, what do we make of the history of an industry and a process that had a significant impact on the people who did the work - who extracted the minerals and sailed the ships and loaded and ran the mule trains and the mining camps - but who are not included in any detail in the history of the Spanish world? How do we understand how this invisible history physically shapes a place? Or a community's sense of itself? And with respect to this particular history - of geology, of maritime transport, of Imperialism, of the scale of endeavors - where does mining, and the associated ecological and health impacts that frequently accompany it - fit into an understanding of the human, cultural, industrial, and economic resources of an area?

I am very interested in the long-term environmental and societal consequences of the Spanish silver era (1556 – 1710). Specifically, and with respect to this Fellowship, I am interested in documenting present conditions in Almaden (Spain) and Zacatecas (Mexico). My interest is to combine photographic documentation with a literature-based assessment of contemporary environmental and cultural conditions to explore what life looks like now through the lens of the mining history in each location.

As a street photographer, I shoot a Mamiya c220 - a medium format film camera. I am self-taught and have discovered that I have a passion for street shooting with old cameras because they are conversation starters, and conversation leads to relaxation which leads to interesting environmental portraiture. Street shooting is in many ways as simple as *take a walk, strike up a conversation, take some pictures, keep talking, keep strolling, keep your*

eyes open for whatever unfolds around you. It is the art of being present. My goal with this project is, in many ways, to see what has unfolded in the past 300 years in the communities around Almaden and Zacatecas. This goal is photographic and conversational and aims to explore the following questions: Do we know the details of the history that has happened in the places we live and work? When that history is industrial - mining, shipbuilding, steel works, as examples - how is the legacy of that history preserved? Is it in museums? In statues and public works? In the names of schools and their mascots? Is it preserved nowhere because it all happened too long ago to still resonate in an age where culture thinks more about digital information than physical process?

As a scientist and engineer, I am also very interested in environmental legacy. Metals will always remain as metals and the arc of industry is a continuous one towards improved performance and enforced restrictions. So, what physical evidence is there now of a historic process having occurred? Who has studied this process? What have they written? How have they sampled (if at all)? Now that the mines are closed in both of these locations, what evidence is there in the literature of the aftermath of mining and transport? This aspect of the project is detective work, and will include a literature review of environmental and industrial health studies focused on these two locations in specific, as well as on mercury and silver mining in general. There are two stories here I want to tell: the cultural history of the mining and transport endeavor that was the Spanish Treasure Fleet and the overall human health story of mercury and silver mining.

As a writer, I see the project detailed in this Fellowship application as a component of a larger passion project I am currently working on (*Ask Alice*) which is a cultural history of how mercury has been used. This larger project started as an outgrowth of my work as a consulting engineer focusing on remedial design for aquatic sites impacted by industrial mercury discharge. As a component of remedial design, it is important to understand the details of how mercury was used and in which chemical forms it had been discharged into the environment. The title of this project - *Ask Alice* - is a nod to Alice in Wonderland, as feeling

of hats was one historic industrial process in which mercury was applied, and is one of the specific historic contributors (along with a DDT production facility) in one particular site we assessed. The chapter of the project that this proposal addresses is titled: *Hg⁰/HgS - The Miners*. The thumbnail sketch for the complete project is on my photography website here: http://thinkpunkgirl.com/?page_id=3945 (www.thinkpunkgirl.com /TheMercury/Ask Alice).

Total Project Budget - \$6,100

Travel - \$2200

Spain: Roundtrip airfare + land travel (train): Portland - Almaden - Portland - \$1300

Mexico: Roundtrip airfare + land travel (bus) Portland - Zacatecas - Portland - \$900

Lodging and Food - \$2800

Assume ~\$125/day for lodging + food in Europe = \$1750 (14 days)

Assume \$75/day for lodging + food in Mexico = \$1050 (14 days)

Research and Presentation - \$1100

Research (Inter-Library Loan; University of Massachusetts Amherst) - \$300

Photography (film/film processing/darkroom time) - \$500

Presentation (gallery shows, on-line presentation, text and documentation) - \$300

It is expected that the photo-documentary part of this project will take 1 month (2 weeks each in Spain and Mexico). Film processing and printing will likely entail 2 - 3 months. Library literature searches and background writing will likely entail another 4 - 6 months. The goal for this project would be to complete all travel and research during the first half of 2017, with writing and darkroom room comprising the second half of 2017. Goals for the second half of 2017, as well as 2018, would include gallery shows of photographic work, manuscript preparation on literature reviews, and the seeking of opportunities to present the project in a cultural studies context. This contextual aspect of this project feels particularly relevant in the ongoing political discussion of how we acknowledge those aspects of history that were not “*written by the winners*”. Writing and development of Ask Alice is on-going.

Personal Statement

Henri Cartier - Bresson, the French street photographer, spoke often of what he called 'the decisive moment', that moment that, for him, meant he'd been able to capture on film an instant in which a series of intersecting life arcs converged to tell a fixed story of place. I picked up a camera 5 years ago for reasons that I still don't fully understand and gravitated immediately toward film and medium format and that long slow process - of shooting, developing and printing - that doesn't tell you whether you have an image until weeks after you've taken the shot. Nobody shoots like this anymore for all kinds of reasons - it's massively inconvenient, the gear is heavy, and you're a long way into that process before you have any idea whether you've done it right (although we all know that the more you practice the more quickly you know if you're where you think you are and the more confident you become in that kind of sure alignment where you see where those lines are going to cross even before they start converging). Street shooting is a steady-on-your-feet sort of dance - the kind of unbelievably easy in the summer when it's warm and clear and you don't feel anything of the metal in your hand - that lets you feel the work of it in the winter. Shooting when it's cold is a sometimes continuous shifting of one hand on the camera and one in your pocket - and making the shot a balance in that moment between the discomfort and a holding yourself in stillness so that the fog of your breath doesn't cloud the lens.

W-98. February 1988. The Westward and the lights came on. We left the dock in Miami under sail. I was at the helm for no reason other than luck and Miami being Miami and the Gulf Stream being the Gulf Stream, 20 minutes later I was sick. I stayed that way wretchedly - curled into a ball and barfing - for three days. It was awful. It was glorious. Somewhere in there I picked up a sextant. It was solid - a physical tracing of geometry that reached back through time. And what did I learn from the hook that was that instrument? That I love the intricate and the complicated and the analog. That I love the slow pace of lived experience.

I had the benefit - the accidental head start - of an unusual childhood. My father is a geotechnical engineer. He and my mother packed us all up, me still in diapers and the ink on Dad's degree still wet, and moved us to Labrador. And then to Colombia. By the time we moved back to the States my brothers and I had a sense of the size of the world. I've been beyond lucky to see so much of it since then. Science has been what I've always done - geology as an undergrad, then environmental chemistry and then environmental engineering in graduate school. The place where these arcs converge is in geochemistry: where are metals found and how do we mine them and how do we use them and how do we understand the infinitely interesting and complicated and tricky ways that metals move through the environment.

I was out of school for 10 years between my undergraduate degree and graduate school. In that time, I worked on boats, moved to Maine and then did what we all do up here: anything that was available for work. I worked at a plant nursery, a bakery, a greeting card company, I did a few trips with SEA, first as engineer with Pete Kalajian as Captain, then trips as Assistant Scientist for the pleasure of sailing with Rich Malatesta. Those trips led to a M.S. program which led to meeting my future dissertation advisor which led to an opportunity: a recently closed chlorine production facility in coastal Maine that had been using mercury in the manufacture of bleach and had been discharging that mercury into the Penobscot River for the duration of their operation. That opportunity and that event led to a question: What are the ecological implications of discharging mercury into an estuary? The pursuit of the answer took 5 years and led to a degree and then to a job that raised that issue in my mind from the scale of Maine to the scale of the world.

And in parallel, that degree led through life. Following graduate school, I worked as a consultant for 5 years. During those 5 years I also - pill by pill - walked through the aftermath of cancer. The details aren't important here, but the lived experience is. 5 years in consulting. 5 years on Tamoxifen. I finished both in 2011. About consulting I can say this: I

am beyond grateful that I was given the opportunity to turn that big crank for 5 years. I loved the science, the math, and being a part of a team that was all about designing large solutions; I didn't like the long work days at a desk, billing my time at 15 minutes increments and being asked to think strategically about every conversation I had with every person who might someday be a future company client. About cancer I can say this: don't defer your dreams.

I left that career. I finished with the pills. I picked up a camera. I'm working these days in public health and although am bouncing along somewhere much closer to the bottom financially than I was while consulting, I love it. I love working directly with people. I'm thinking about how to turn the science into stories. I'm still serving as a volunteer mentor for the University of Maine student chapter of Engineers Without Borders. I'm still fascinated with mercury. I still like turning the big crank. The experience that would be this Fellowship is a special convergence of arcs - health, science, engineering, and photography - and a new chance to fix a position. Receiving the Elsaesser Fellowship would be a significant personal decisive moment for all the creative opportunities that can come next.