

On
fields
harrington
Exhaustive
Nancy
Valladares
Rifts

On Exhaustive Rifts is a conversation and a text collaboratively authored by fields harrington and Nancy Valladares. It was commissioned by the MIT List Visual Arts Center on the occasion of the exhibition *List Projects 27: fields harrington and Nancy Valladares*. Design by Other Means. ST Univers Selectric by Source Type.

fields harrington

It might be helpful just to talk about why we got here, maybe about the invitation from Selby first. I think it was Rami George who introduced me to your work. Maybe it was 2021 because I was thinking about breath, lung capacity, fatigue, and the history of this spirometer. Rami and I were in group crit and I shared a video essay that I was working on about the history of the spirometer and COVID. They mentioned your work and your film *The Density of Breath* and saw some overlaps between our work. And then a year later I got the opportunity to invite you to give a talk about your work for the Arts Platform course Practicing the Environment that Alhena Katsof organized.

Nancy Valladares

It was such a great conversation and I'm really grateful we get to continue to be in dialogue. Since this collaboration started, I've been thinking about the commonalities in our practice as generative words, from exhaustion, thermodynamics, and temporality to technologies of registration or capture. This dialogical format has been very illuminating and has allowed me to reach a different depth of thinking and making. Maybe we could begin by touching on the question of *Why exhaustion?* and how *exhaustion* is an operative term in the exhibition?

This conversation took place on May 18, 2023, in New York and has been edited for clarity and length.

capital *S* without sounding like a science denier or conspiratorial. My work in the past was lacking specificity in how this particular critique was being shaped. When I was introduced to the book *The Human Motor: Energy, Fatigue, and the Origins of Modernity* by Anson Rabinbach, as well as Lundy Braun's book *Breathing Race into the Machine: The Surprising Career of the Spirometer from Plantation to Genetics*, it helped me define my argument. These two books gave me the tools to think specifically about how the study of fatigue and the production of scientific precision instruments in the eighteenth and nineteenth centuries enabled the calculation of bodily arithmetic with statistical analysis and measurement of the physiological functions of the body. To give an example, in the 1840s, the life insurance physician John Hutchinson began to present his research and his new invention of the spirometer. While working as a physician at the Britannia Life office, he developed the spirometer, a technical instrument for the assessment of life insurance candidates, which measures the volume of air inspired and expired by the lungs. His interest in the mechanics of respiration, medical statistics, and profitable assessment for insurance policies directed his research towards the "vital capacity" of the lungs.¹ Hutchinson gave language to vitality that promoted the mechanical functioning of respiration as a dynamic life-supporting system of the living body. With spirometric data, Hutchinson sought to transform vital capacities into graphable truths, organized into statistical tables and weaponized as tools of surveillance that calculated the risk profitability of the British working class.

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I started to think about exhaustion when I was trying to find ways to write about how to remain critical of Science with a

In the same decade, around 1847, the physicist and physician Hermann von Helmholtz lectured on the conservation of energy and described the laboring body as a thermodynamic machine that is capable of dispersing and conserving energy. Measuring the energetic value of the body's labor power permitted an economy of the body with the goal of quantifying production.² The calculation of this energetic value facilitated the science of work and the study of fatigue. So, my understanding of the discovery of entropy, the law of energy conservation, and the science of work produce a constellation of science and politics that determines the calculation of the working body's exhaustion and productivity.

Nancy

My entry point to exhaustion starts with the history of agriculture in Honduras, my home country. I was studying the history of Lancetilla Botanical Experimental Station in Tela, Honduras, which was founded in 1926 by United Fruit Company. It was a *plein air* laboratory, where various plant species around the world were introduced to the Americas by botanists like Wilson Popenoe.

These experiments were testing the potential of Honduran biomes to sustain the expansion of the American empire and its growing appetite for the exotic and the tropical—so Honduran soil became this body for exploitation. Wilson Popenoe helped import plantation technologies that had been used in the US for hundreds of years. They were transposed and amplified at Lancetilla, which at the time was the largest botanical experiment in this hemisphere.

1

Lundy Braun, "'Inventing' the Spirometer: Working-Class Bodies in Victorian England," in *Breathing Race into the Machine: The Surprising Career of the Spirometer from Plantation to Genetics* (Minneapolis: University of Minnesota Press, 2014), 1–26.

2

Anson Rabinbach, "Transcendental Materialism: The Primacy of Arbeitskraft (Labor Power)," in *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992), 45–69.

They began to develop and refine the agricultural paradigms that we used for decades and were then exported all over the world.³ I was thinking a lot about exhaustion in terms of Honduran labor, which for years and years has been seen as a source of inexhaustible labor for the United States. And then there's non-human exhaustion—after centuries of exploitation and the loss of knowledge of Indigenous land stewardship, these ecosystems have reached a critical point. How many crop cycles do we have left if we continue in this way?

Simultaneously, I'm grappling with the history of the U.S.-owned Rosario and Agua Fria silver mines in Honduras. Silver being one of the precious metals that make film or paper sensitive to light, it's become the lens through which I study extraction. In many ways, it's central to what *PHOTO/SYNTHETIC* is about: how human and mineral exploitation sustain the project of visibility. My entry point to this work was to think about photography's chemical modalities and to think of the flows and networks of photographic production. These are the new forms through which I'm kind of trying to understand the medium and to retrain myself as a photographer and some-one who's interested in lens-based media.

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Frederic Rosengarten Jr., *Wilson Popenoe: Agricultural Explorer, Educator, and Friend of Latin America* (Lawai, Kauai, Hawaii: National Tropical Botanical Garden, 1991), 99–121.

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I'm thinking about the non-exhaustion or non-human exhaustion of Honduran labor that you were talking about. Is there such a thing as an inexhaustible subject? What is non-exhaustive and/or inexhaustible, and where does the documentation of the non-exhaustion of the laboring body get located in history?

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Nancy

One way our conversations helped clarify some of these ideas was to look back to the role of modernity in the creation of the myth of *the inexhaustible*—it was also woven into some of the first financial models and projections of economic growth in Central America. In the early twentieth century, efficiency became the driving force for the production of new technologies of extraction, both in the mine and the plantation, which came at the cost of human and more-than-human life.⁴

I always think of the role that United Fruit Company's propaganda machine played in the creation of Honduran cultural identity as a homogenous agricultural society. A mythos of fertility had to be created by these transnationals in order to sustain the mirage of the infinite potential for exploitation, and thus the Banana Republic was born. With this myth arrived new technologies for sensing, abstracting, managing, and surveilling nature. I don't know if the idea of the inexhaustible subject is compatible with social and environmental justice today. To me, what seems inexhaustible is extractive capitalism's never-ending capacity for violence and the things it's willing to sacrifice in order to achieve profit.

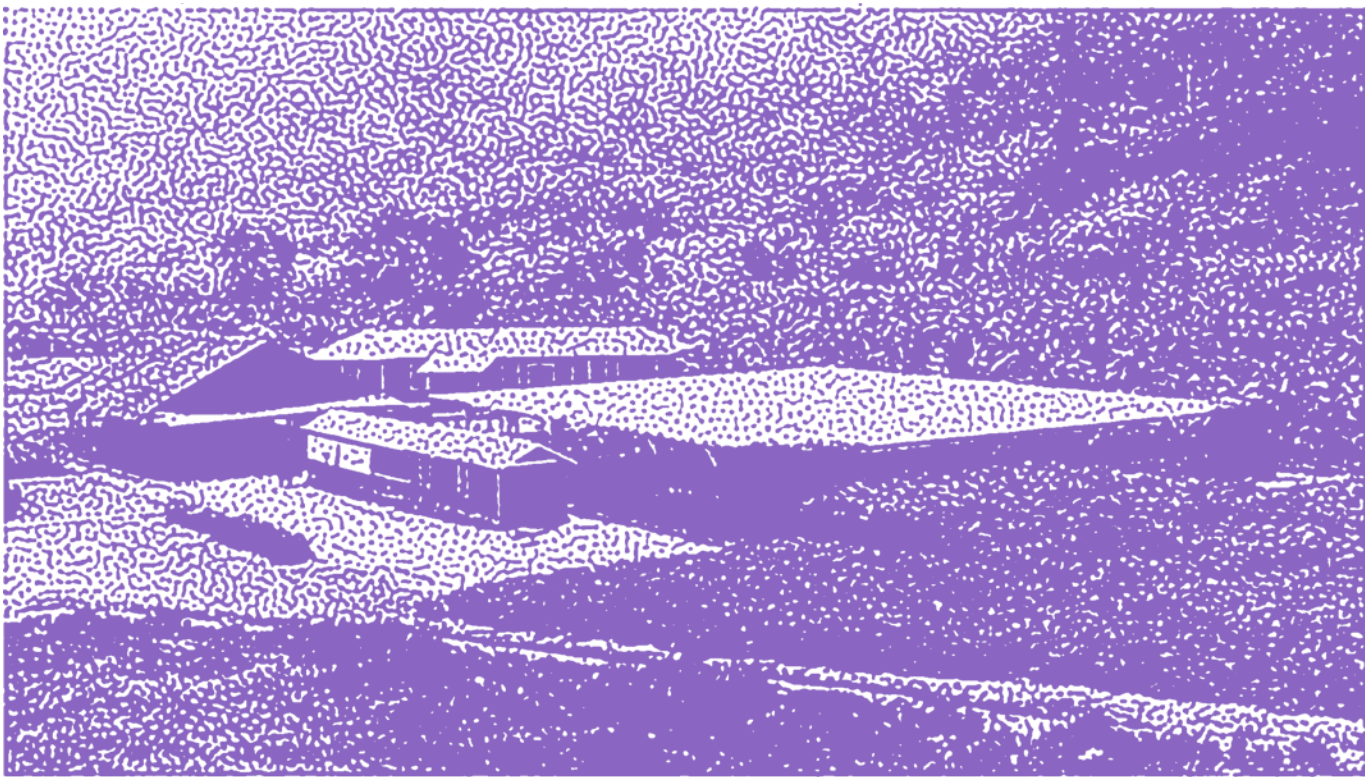
Here's where I think your research into the efficiency and thermodynamics of labor are in really interesting interplay, because not only is it the abstractions of nature that supported the project of the empire, but also through the ideological *mechanization* of the human body. Could you talk a little

bit about how that appears in your work in relation to exhaustion?

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Sophie Sapp Moore, Monique Allewaert, Pablo F. Gómez, and Gregg Mitman, "Plantation Legacies," *Edge Effects*, January 22, 2019, <https://edgeeffects.net/plantation-legacies-plantationocene/>.

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I personally think that the inexhaustible subject is enmeshed with the history of photography when thinking about how image recording through lens-based media participates in the activity of capturing the laboring body in the name of ethnographic and scientific research. And here I'm thinking about both human and non-human subjects as laboring bodies.

More directly, I'm thinking about the motives of Étienne-Jules Marey's chronophotographic gun and the French anthropologist Félix Regnault and his films of Black West Africans enacting directed gestures and movement for the camera. With the application of Étienne-Jules Marey's chronophotographic gun, the investigations into the laws of the body in motion foreshadowed the science

Image Description

Lancetilla Botanical Gardens. Founded in 1926 by Wilson Popenoe with support from United Fruit Company and Tela Railroad Company. It's most known for its introduction to *Elaeis Guineensis*, or African Palm, to the Americas, in addition to tropical fruit and medicinal plants from all over the world.

of the economy of the body and its rationalized movement. Their examinations of the mechanics of the body built the foundation for the science of work and bred the laboratory research of fatigue and could be deemed as inexhaustible. The goal of chronophotography was to discover the decomposition of an action on a micrological level and to observe the optimum expenditure of energy of the body's labor. Some of the early studies into physical labor conducted in Marey's laboratory were concerned with optimal work performance with specific tools.

Marey was invested in a scientific explanation for the conservation of energy in the body to determine the efficient use of its labor power. During his experiments with chronophotography, he conducted research on military recruits and became frustrated by the body's inability to sustain a consistent cadence without experiencing fatigue.⁵ He discovered that muscles "cannot surpass a certain maximum: the point arrives when resistances vanquish every possible effort." These vanquishing resistances of the human motor provided insight into the body's relationship with entropy. The inefficient aspect of human labor power was foregrounded in the documentation and inscription of the body's movement on film.

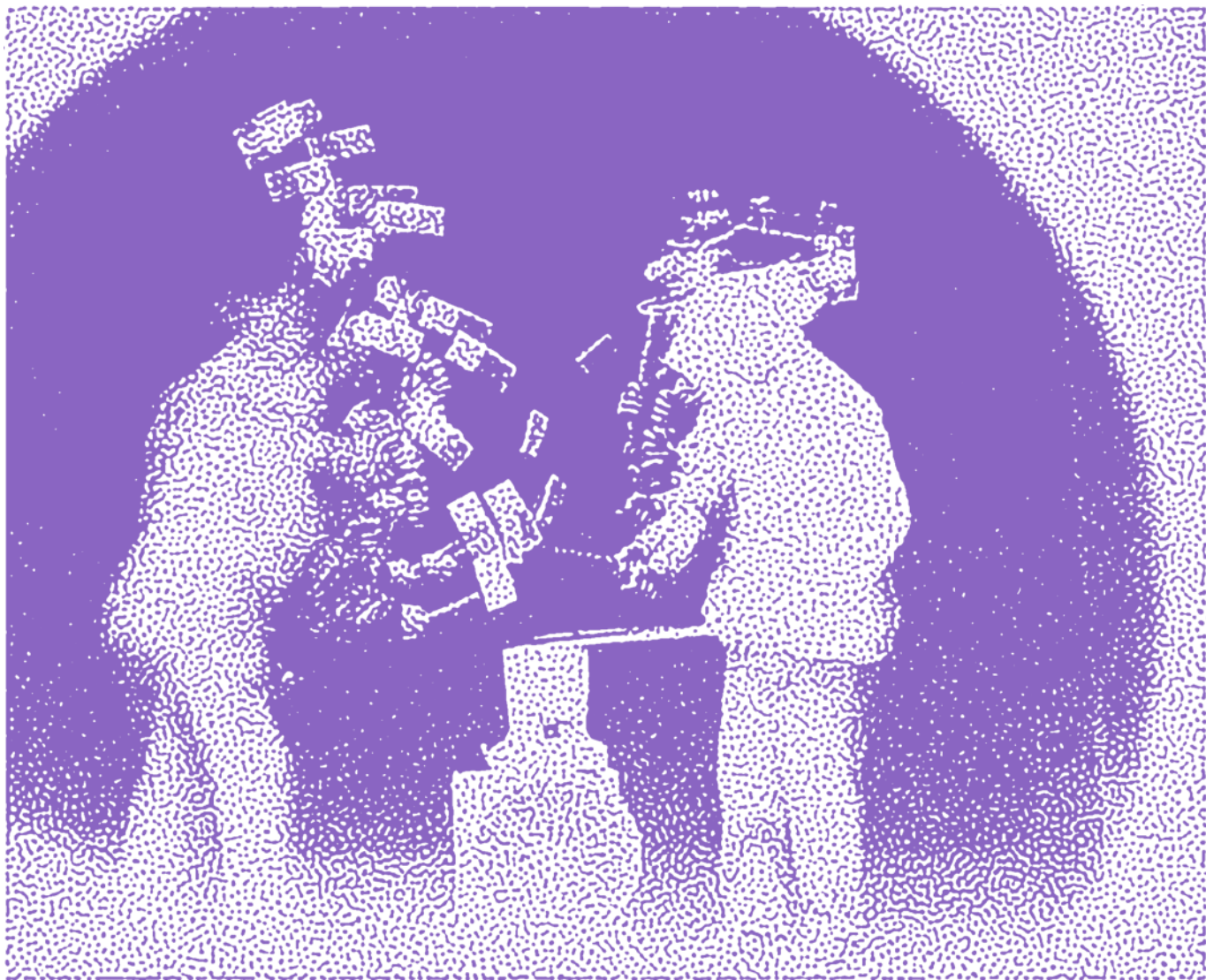
The use value of chronophotography for Félix Regnault was its ability to quantitatively study bodily movement and apply the research to the movement of French soldiers during World War I. After Regnault documented the gait of West African people and French soldiers in the 1870s, Marey presented Regnault's research

to the Academie des sciences in 1895. The focus of Regnault's examinations of Black West Africans and French soldiers was to demonstrate his theory that the French military march could be improved if they adopted the gait of West Africans. The labor of the ethnographic body of the Black West African is coded and inscribed in Regnault's films.⁶ Studying the gestures, gait, and locomotion of West African Black bodies employs them for the recruitment of the French army and ameliorates the productive body of the imperialist European world.

Does the chemical process of exhaustion in photography relate to the historical evolution of photography that deals with the monitoring and surveillance of bodies in your research and practice?

Anson Rabinbach, "Time and Motion: Etienne-Jules Marey and the Mechanics of the Body," in *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992), 84–119.

Fatimah Tobing Rony, "The Writing of Race in Film: Félix-Louis Regnault and the Ideology of the Ethnographic Film Archive," in *The Third Eye: Race, Cinema, and Ethnographic Spectacle* (Durham, NC: Duke University Press, 1996), 44–73.



Nancy

Yeah, absolutely. Photography was so quickly adopted as a tool for the empire and to extend that oculus towards realms that weren't possible before. In the eye of the camera, who gets to be human, and who becomes a machine? I turn towards the work of Sylvia Wynter, who is deeply invested in untangling our understanding of this construction. Photography's historical frictions with objectivity are what allowed it to become a tool for narrativizing the evidence of humanity or lack thereof.

Image Description

Étienne-Jules Marey and Charles Fremont, untitled chronophotograph, 1894. Gelatin silver print from glass negative, 6 1/2 × 8 3/8 in. (16.5 × 21.3 cm). Purchase, The Horace W. Goldsmith Foundation Gift, through Joyce and Robert Menschel and Rogers Fund, 1987.

Early practitioners of the image, like Marey, facilitated the creation of a lexicon of the body as a machine whose geometries could be studied across time and space, regulating caloric intake versus the output of energy. Caloric expenditures and sustenance in the plantation played a huge role in the shaping of global ecosystems. Take the infamous breadfruit voyages, for example, which brought an entire new food landscape into the Caribbean in search for calorie-dense food for Black and Indigenous people who were enslaved in plantations across the continent.⁷

The human body being subject to increasingly more complex and granular oculi aligns completely with the history of photography. It was used to reinforce hierarchies that were already in existence, and it does so to this day. For me this is where the traditional historiographies of photography lack a certain nuance about the preconditions necessary for the emergence of this technology. What happens if we unravel these timelines to include the underlying desires of photography? What if, instead of a timeline, it looks like a membrane through which we can study the rippling effects of this technology?

If photography operates more like an engine through which we inscribe and propel anthropogenic change, then what other forces are acting upon it? Perhaps the search for fixity, the flattening of nature, the cessation of decay, the endless pursuit of sunlight (energy, biodiversity), the creation of taxonomic systems, and the need to zoom closer ad infinitum could be the variables to an increasingly more complex formula.

I've returned to this quote by Roland Barthes recently: "Whatever it grants to vision and whatever its manner, a photograph is always invisible: it is not it that we see." Perhaps this invisibility asks of us to sink deeper beneath the surface of the image even further and to consider that strata of invisibility that sustain the project of visibility. But this question of invisibility in concealment is something I also think of in terms of your work. In *Steam Economies* and *Energy in Hidden Form*, both pieces, from my understanding, deal with what is secret and what's visible and not. You use the privacy screen as a recurring theme that is concealing the image of Rillieux and the remnants of the staged experiment. I wondered how the invisible plays a role in your work, as opposed to the visibilities that photography seeks to create?

Richard A. Howard, "Captain Bligh and the Breadfruit," *Scientific American* 188, no. 3 (1953): 88–95, <http://www.jstor.org/stable/24944162>.

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Thank you for that question. In the work *Steam Economies*, I wanted to address the history of the sugar technologist, chemical engineer, and inventor Norbert Rillieux. During his time at school in Paris, Rillieux wanted to improve the sugar refining process that he was aware of back home in Louisiana. Prior to Rillieux's invention, sugar processing was limited to the Sugar Train, Jamaica Train, or Spanish Train method. In these systems, teams of enslaved workers ladled boiling sugarcane juice from one open kettle to another. In these particular methods, the workers were burned and the product was lost due to spillage. Rillieux's invention of the multiple-effect evaporator under a vacuum in the 1830s remedied the

inefficient methods of the Sugar Train.⁸ In his research, he determined that the application of latent heat in the form of steam would efficiently produce granulated sugar from sugarcane juice at a lower cost with reduced labor. For Rillieux the sugarcane plantation was his laboratory and the praxis of harnessing the energy of vapors found in steam (latent heat) was his chosen scientific method. At its root, the word *latent* means "to lie hidden." Latent heat can be understood as energy in hidden form that is supplied or extracted to change the state of a substance without changing its temperature. Perhaps this is the initial unrealized curiosity I had with concealment. There is a multifaceted complexity to what is being hidden in the story of Rillieux. There is little known about his Black biological mother; however, there is plenty of information on his white father, who was also a chemical engineer. Later in life, he moved back to France to continue his research in sugar beet processing and decoding hieroglyphics. Anti-Blackness in the antebellum South might have played a part in his decision to move back to France. Rillieux was uncited, excluded, and robbed of his intellectual and creative labor. So, I wonder if he carried ambivalence as he lived with complexity navigating the antebellum South.

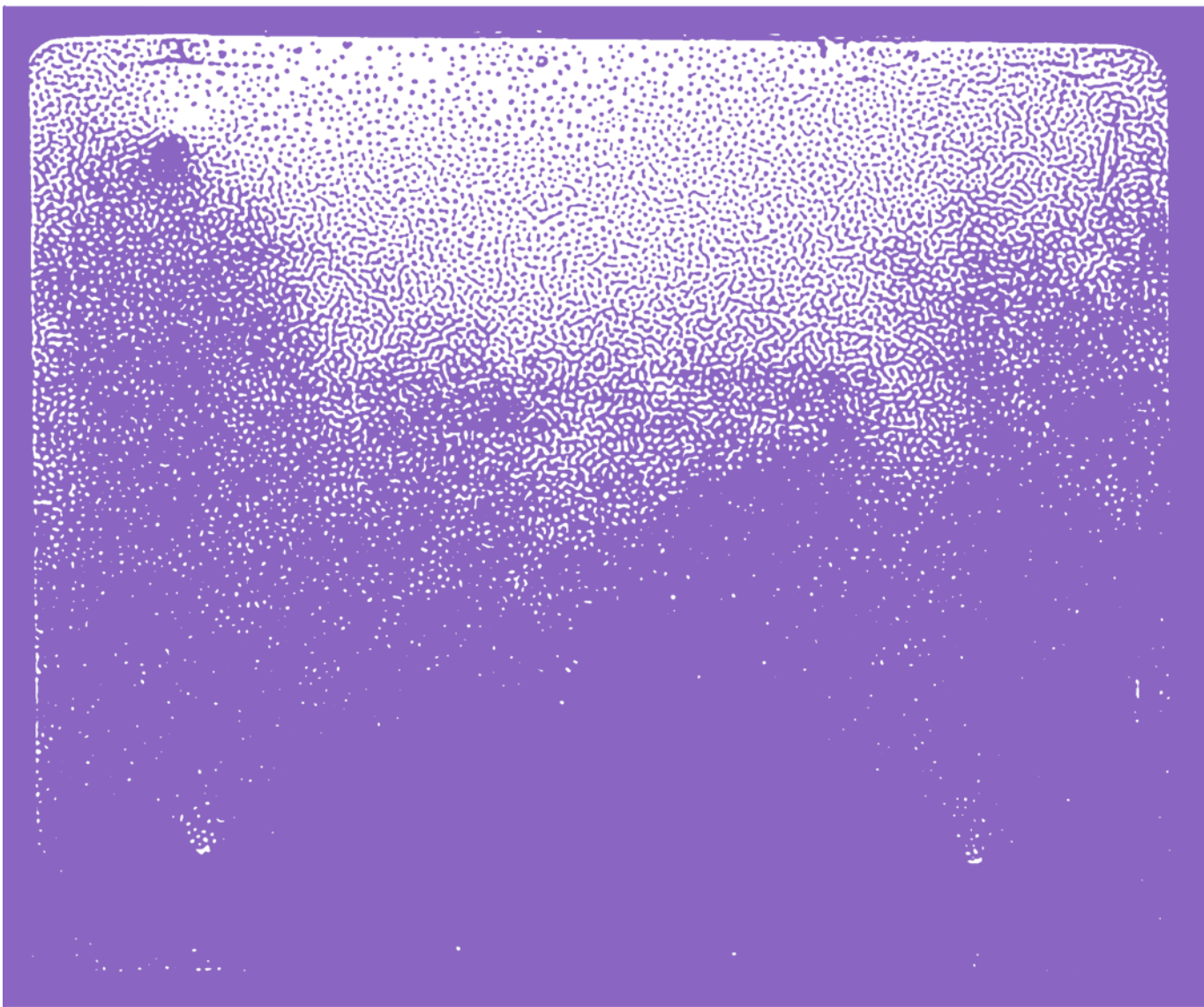
In *Steam Economies*, I'm attempting to work with the complexity and ambivalence of Rillieux's history through the formal properties of the work. This is where the use of the privacy filter arrives in my work. The privacy filter is technically used for computer monitors to prevent "visual hacking." The filter is made of

a thin polarized plastic that reduces the viewing angle of your screen. I'm thinking of the filter as an anti-surveillance filter and privacy filter. On the one hand, the viewer of the work refuses the work or vice versa depending on their positionality. The position of the work and the position of its audience is a formal gesture that I want to play with.

The work *Energy in Hidden Form* continues my study into Rillieux's history and expands on his relationship with sugar and labor. I have a hard time answering the question of whether or not the slaves who operated the Sugar Train method are liberated through Rillieux's invention of the multiple-effect evaporator. Their labor was relieved from taking on the dangers of sugar refinement, but then we don't know if they performed safer work on the plantation after Rillieux's invention. But is any invention liberating under the grips of capitalism? What are the visible remnants of labor left behind in sugar processing? Is there a surplus value of the remnants of this labor? Is this another example of energy in hidden form? It's impossible for my work to contain, hold, or distill the history of sugar, but I wanted to address the question of liberation through invention.

The outcome of an exothermic combustion reaction, which is done with baking soda and sugar, is concealed behind plexiglass in *Energy in Hidden Form*. In order for the baking soda to decompose and the sugar to oxidize, both ingredients must be exposed to fire. After this scientific demonstration is conducted, what is left behind is an ephemeral black carbon figure.

The aftereffect of the exhaustive measure of oxidizing the sugar grafts an abstracted form of excess.



Nancy

I really like the title of that piece, as the meaning unfolded slowly over time for me as I read the texts we exchanged over the past few months. I was just thinking about Niépce's heliograph *View from the Window at Le Gras*, which is as far as we know the earliest remaining example of an image fixed onto a surface. A little-known thing about the story of that image is that Niépce and his brother were actually trying to invent the first combustion engine. Boaz Levin and Esther

Image Description

View from the Window at Le Gras, the first successful permanent photograph created by Nicéphore Niépce in 1827, captured using a mixture of bitumen, kerosene, and lavender oil.

Ruelfs write about this in the introduction to *Mining Photography*, and how Niépce used bitumen of Judea mixed with lavender and kerosene (byproducts from the early fossil fuel industry) to etch that image into a metal plate: a kind of energy in hidden form.⁹

Levin and Ruelph write about Patrick Maynard's notion of photography as the "engine of visualization," or a force with a potential to combust, catalyze, and metabolize. You could say that the fossil fuel industry, in some ways, enabled the moment of fixity that inaugurated this new technology.¹⁰ So this historical moment for me is really interesting, when fossil capitalism and photography caught aflame under the pressure cooker of modernity, working in synergy to build and sustain the new ideologies of capital. So it's interesting to hear through you the history of Norbert Rillieux, who is also dealing with this idea of combustion and energy around the same time as the Niépce brothers. In *The Human Motor*, Rabinach writes about "the crisis of modernity" and how the very metaphysical grounds upon which all of these ideologies had been formed were being blasted by the new ideas and technologies that were emerging at a frightening speed. Since then, we are haunted by the specters of speed, efficiency, and combustion as we attempt to unravel our present.

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Boaz Levin and Esther Ruelfs, "Photography and Climate Change: The Engine of Reflection, and Its Footprint," in *Mining Photography: The Ecological Footprint of Image Production* (Leipzig, Germany: Spector Books, 2022), 12–25.

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Levin and Ruelphs, "Photography and Climate Change," 12–25.

There may exist a conceivable tracing of a haunted timeline that could be drawn out amidst the eternal return of photography's extractive material history, the untimely geological duration of chemosociality, and modernity's ties to fossil capitalism. How do chemosociality and the environmental afterlife of photochemistry emerge in your research and work?

Nancy

Thank you for asking that question. I'm attributing these terms to the emerging field of chemoethnography and the work of Nicholas Shapiro and Eben Kirksey. I found it a useful catalyst to think about the chemosocial relations of the photographic industry and its long-lasting legacies. We have this idea that the Second Industrial Revolution happened such a long time ago, but even today people live in altered chemical conditions that were created in those historical moments. The towns and cities where photochemical factories were located often have to live with groundwater pollution, heavy metal contamination in the soil, sublimation of chemicals into the atmosphere. If nothing changes, they could remain there until the next ice age.

If you look at the history of Kodak in Rochester, New York, for example, and the continued contamination of the Genesee River and the communities around it, you realize that these companies often see these as a degree of risk they are willing to take, because there are few mechanisms for true

and long-term accountability. This all didn't click right away. The realization that every image has an environmental weight and an afterlife took me on another route as a practitioner. So I'm trying to untangle what it means to look beyond just the surface of the photograph and look deeply into these invisible mechanisms and flows that an industry such as this one has produced.

We had briefly discussed what relationship both of our practices might have to citizen science. I'd never really necessarily thought of it that way, but I do think that these visual experiments or artistic approaches were a search for form, maybe, or for metaphors. I was wondering if you thought your work is somehow in dialogue with citizen science.

fields

If citizen science refers to being actively involved in developing a community of scientists or participating in a scientific community outside of universities or research fellowships, then I would say that I don't see myself as a citizen scientist. My work is not contributing to the scientific community, and it doesn't encompass any form of responsibility in producing knowledge of the physical and material world. I see myself as someone who occasionally watches YouTube videos of citizen scientists explaining scientific principles, tries to read a few scientific articles on how to execute scientific activities, and then attempts to conduct scientific demonstrations. I want to imagine tools or ideas beyond the canonical protocols of scientific methodologies and

practice. What are the possibilities of a new logic of how we know science? How do we append the objective and scientific to our theoretical, mythological, and political lives? Perhaps this is where the question of metaphor comes into my work. I think metaphors have the capacity to be a means for making sense of the complexities of our conditions. Metaphors can be a device for broadcasting ideas that are on the surface abstract, and metaphors work on the edges of scientific knowledge production. However, metaphors' impartiality towards truth is a conflicting moment in my practice. On the one hand, the partial truth that metaphors contain aligns with my desire for an interdisciplinary approach to making art that bridges the gap between sciences and other creative practices. This method allows me to understand things differently without being entirely incorrect. On the other hand, I don't know what to do with the impartiality of truth that metaphor contains. Do you feel that your work and practice engage in a dialogue with citizen science?

Nancy

I would say similarly to you I feel I'm interested in mechanisms that are used to represent or to stage knowledge or objectivity. I'm interested in those languages, but I do not think that this work is in any way a contribution to the scientific field. As an artist, I do think that the search for form sometimes has parallels to experimentation, but they are different epistemes. You mentioned novel forms or new logics, and I think that that is very much true about people who are interested

in this strange intersection of art and technology, or art and science.

It feels like these two fields should be touching, which is why I thought it was so interesting to read about Rillieux's background. Today we would consider him an interdisciplinary researcher, maybe. But it's this thing that keeps haunting us, you know? Historically, an artist and a scientist were often one and the same; that ideological split happened not that long ago in the grand scheme of things. Now we live with that specter of what that union once looked like. It seems to me like there is a need for these crossings to continue to happen.

Image Description (Back Cover)

Illustration from U.S. patent No. 3237, issued to Norbert Rillieux on Aug 26, 1843, showing the vacuum pan.

