**THE PENCIL OF NATURE:
TRACING INTERTIDAL MEDIA
THROUGH THE DEVELOPMENT
OF EARLY PHOTOGRAPHY**

JOE RILEY

THE PENCIL OF NATURE: TRACING INTERTIDAL MEDIA THROUGH THE DEVELOPMENT OF EARLY PHOTOGRAPHY

JOE RILEY

Figure 1.

William Crotch, Showing the Diorama building from the south at an early stage before the Nash facade was constructed along the frontage, 1823, Pencil and wash, The Guildhall Library, London, in R. Derek Wood, "The Diorama in Great Britain in the 1820s," accessed March 20, 2020, http://www.midley.co.uk/diorama/Diorama_Wood_1_1.htm.

In 1824 the Regent's Park Diorama exhibition house in London, England debuted *Two Views*, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest. A proto-cinematic theatre devised by Louis Jacques Mandé Daguerre and Charles Bouton, the Diorama's twin-peaked roof and exterior facade was hastily constructed with timber and glass in a matter of four months. Depicted mid-construction in an 1823 sketch by William Crotch (Figure 1), the building takes shape in a haze of graphite marks and watery wash. The continuity between these drawing media, the Diorama's edifice, and the atmospheric conditions of 19th century London are remarkable. Daguerre and Bouton's Diorama is drawn into the dense haze of fog and smoke that saturated the industrial city: a smudge of sooty graphite for a window, runny splashes of water for a roof, timbered facades rendered in charcoal. Each of these media share a material constitution with both the weather and the architecture of the diorama. The seams of environmental circumstance and human technical activity stitched throughout Crotch's sketch would be further underscored by the Diorama's display. Inside Daguerre and Bouton's Diorama, the transaction between images and environments was presented as a cipher for the public to decode. Spectators entered a darkened saloon, where they were seated

in stadium-like arrangement atop a “contrivance” described as “partly optical, partly mechanical,”¹ that rotated back and forth, panning across the vertex of a gently angled corner comprised of two enormous translucent images which were illuminated by colored and flickering lights.² These axes of rotation and the theatrical lighting that animated a spectacle already in movement, contrived to challenge “...the sagacity of the beholders, in distinguishing what is nature from what is the effect of art,” according to the display’s associated pamphlet.³ Recognizing the differences between “nature” and “the effect of art” in an image was a task caught up in many instances of proto-cinematic spectatorship: it offered a prompt to engage with the distinction, on which many mimetic theories of art were founded, between what is real (“nature”) and what is illusion (“art”). Daguerre and Bouton’s choice of subject-matter also complicates the viewer’s adjudicative task: on top (Figure 2) a survey-view of the maritime stronghold of Brest on the Northwest coast of Brittany; and below (Figure 3) the interior of the famous cathedral at Chartres, located in the region of Beauce, a major agricultural region of France, named after the Latinized Celtic term *belsa* that designates a cultivated field.⁴

Figure 2.

Regent’s Park Diorama: “Brest Harbour,” in Horace Wellbeloved, *London Lions for Country Cousins and Friends about Town, Being All the New Buildings, Improvements and Amusements in the British Metropolis*, (London: William Charlton Wright, 1826), 24, illustration 6.

Figure 3.

Regent’s Park Diorama: “The Interior of the Cathedral of Notre Dame at Chartres,” in Horace Wellbeloved, *London Lions for Country Cousins and Friends about Town, Being All the New Buildings, Improvements and Amusements in the British Metropolis*, (London: William Charlton Wright, 1826), 25, illustration 7.

- 1 John Timbs, *Curiosities of London: Rare and Remarkable Objects of Interest in the Metropolis*, (London: John Camden Hotten, 1867), 307.
- 2 Erkki Huhtamo, *Illusions in Motion: Media Archaeology of the Moving Panorama and Related Spectacles*, (Cambridge Massachusetts: The MIT Press, 2013), 145-6.
- 3 *Two Views, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest / Painted by Messrs. Bouton and Daguerre*, (London: G. Schulze, 1824), Getty Research Institute Special Collections, 12.
- 4 James Austin ed., *New Spaces for French and Francophone Cinema*, (New Haven: Yale University Press, 2009), 7–2.

Geographically separated by more than 300 miles, the coastal military harbor at Brest and the inland Gothic-style Cathedral of Chartres are telescoped together through the pretense of the Diorama's juxtaposition. When a spectator was physically rotated from one scene to the other by the mechanized seating platform, the very construct of the dualism between nature and art was challenged by the compression of any linear sense of time and space that might otherwise differentiate the cathedral from the coastal panorama. Founded in a surprising, even shocking, simultaneity, the spatial and temporal negotiation that ensues between the two images also reflects wider modes of discursive exchange and understanding set out between cathedrals and sailing vessels.

Writing on the technical and cultural overlaps of maritime and terrestrial architecture, Bernhard Siegert suggests that, "galleons are basically capsized churches. Naval architecture is modified church architecture."⁵ Siegert's view traces modes of structural congruence between flying buttresses, vaulted ceilings, and the symmetrical ribbed construction of large European sailing vessels; noting that the four-centered arch commonly used in church entryways was a model for timber ship frames.⁶ To press this analogy further, consider how a steeple protruding from the roof of a "capsized church" is anatomically akin to a keel and rudder projecting below a ship's waterline. These architectural correspondences are mediated by human social-technical spheres as well as nonhuman biological, chemical, and geological processes. The shipbuilder takes timber from forests and fashions wood into a vessel that harnesses wind and currents; the cathedral's building blocks are quarried from limestone deposits formed over millennia through the aggregation of sediments, shells, and organic fragments. To the assertion that "galleons are basically capsized churches" we could add: ...and churches are basically re-sedimentations of ancient seafloors. This kind of analogical treatment of objects unfolds the multiplicity of their material composition, similar, perhaps, to the manner in which a prism refracts visible light as a spectrum of color. My prismatic approach builds on Siegert's application of cultural technique which is, among other issues, "concerned with decentering the distinction between human and nonhuman by insisting on the radical technicity of this distinction."⁷ Embracing, in equal measure, the technical interactivity of the human and nonhuman is a necessary step toward understanding the role that visual medias play in the requisite division of those spheres. In order to explore this approach, I will focus specifically on the emergence of photographic media in the early and mid-19th century.

The imbrication of nonhuman processes with human social and technical activity is an often-overlooked feature in the development of chemical photographic techniques from the 1830s-50s. During this time, photographic images are a key locus for the task of mediation, which theorist Sean Cubitt characterizes as "the primal connectivity shared by human and nonhuman worlds."⁸ Following Cubitt's lead, and in recognition of the growing body of scholarship concerning anthropocentrism and multi-species analysis, my use of the terms "human" and "nonhuman" is intended to trouble the prevalence and binary assumptions associated with dualisms (such as nature-culture). I hold these terms, together, in the social and technical spheres that mediate human activity, as well as the (leaky) aspects of photographic images that — by their very "nature" — reveal the interdependence and co-production of human and nonhuman regimes.

If there are "primal connections"⁹ between atmosphere, geography, and human visual representation inscribed in the Regent's Park Diorama, I want to discuss how this materially-predicated, relational connectivity comes into sharper focus by scrutinizing the role that macroalgae (seaweed) and the chemical element iodine played in the subsequent invention of the Daguerreotype. We know from Erkki Huhtamo's work on the media archaeology of Dioramas, that these vision machines are indispensable waypoints for the study of 19th century media techniques and culture. The double effect of viewing interior and exterior scenes from moving diorama platforms initiated a "burst of discursive activity,"¹⁰ and a mode of spectatorship

5 Bernhard Siegert, *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, trans. Geoffrey Winthrop-Young, (New York: Fordham University Press, 2015), 155.

6 Ibid.

7 Siegert, *Cultural Techniques*, 7.

8 Sean Cubitt, *Finite Media: Environmental Implications of Digital Technologies*, (Durham: Duke University Press Books, 2017), 4.

9 Sean Cubitt, *Finite Media*, 4.

10 Erkki Huhtamo. *Illusions in Motion*, 149.

that “became a standard for assessing reality.”¹¹ The relative success of the Dioramas also propelled the development of Daguerre’s eponymous invention the Daguerreotype, widely considered to be the first form of fixed chemical photography. Daguerreotypes helped to advance photography as the new “standard for assessing reality,” and, I argue, also functioned as a medium through which nonhuman modes of life and action became deeply embedded in human-generated manifestations of visual culture. My approach to the nonhuman declension of the Daguerreotype begins from the visual traversal of land and sea summoned by its technical antecedent, the Regents Park Diorama. Exiting the Diorama, I waded into the intertidal zones of Northwestern France, where dense tangles of seaweed were a critical resource for human sustenance, medicine, and mid-19th century photography.

The coastlines of Brittany and Normandy have, for millennia, been shaped by dramatic tides that expose and re-cover, twice daily, broad coastal zones of silt, rock, shellfish, and seaweed. In this day and age, local sea-level rises and falls fifteen meters or more, continuing a tidal rhythm that has long animated human activity, dating back at least to the prehistoric construction of intertidal-zone traps designed to gather fish, shellfish, seaweed, and salt.¹² Ancient inhabitants of the area constructed low-slung walls of timber and stone in the intertidal zone. Called *corejou* in the Breton language, these traps were typically a v-shaped design consisting of two walls converging at a corner and pointing toward the sea.¹³ The angular aspect of the *corejou* allowed the tidal waters to drain while capturing, like a sieve, littoral flora and fauna for human use or consumption. This catch was exploited for sustenance as well as for the production and fertilization of arable land.

Human inhabitants of the west coast of France have, since antiquity, utilized mixtures of burnt shells and seaweed as manure for inland agricultural cultivation. Nutrient-rich and disease-free, seaweed, harvested from the shoreline or trapped in the *corejou*, in particular was used to amend rocky and sandy soil to support sizeable human populations.¹⁴ We now know that coastal soils tend to be deficient in phosphates and potassium, vital nutrients for encouraging plant photosynthesis. Brown kelps (*Laminaria*), a prevalent genus of seaweeds in the western coastal areas of France, bioaccumulate phosphates and potassium from seawater in significant concentrations.¹⁵ Much as the architecture of a ship may have relied on the model of the church (or vice versa), the agricultural practices of coastal areas in 19th century France were, in a similar fashion, shaped by the biological and geophysical characteristics of intertidal zones.

We might advance the comparison between maritime and church architecture a bit further, for the characteristic v-shapes of *corejou* dotting the coastline resemble the gently angled diptych of Daguerre and Bouton’s Diorama that places together a coastline and an inland agricultural district (though the limits of such analogization are clearly apparent). It is worthwhile, however, to remark on another example of technical intervention in the intertidal zone that figures prominently on the right side of Daguerre and Bouton’s Harbour of Brest. Visitors to the Regent’s Park Diorama could see “...the masting machine, and a little further on...a creek called the masting creek.”¹⁶ The “masting creek” was an artificial waterway that could be opened and closed in order to capture water at high tide and therefore float ships at a constant level. This invention enabled naval ships to be docked for the removal, repair, and re-installation of their towering timber masts. The “masting creek” uses much the same principles as the ancient *corejou* traps: harnessing tidal action in order to capture, or fix, the movements of water and marine life in the service of a social and technical endeavor.

11 Ibid, 150.

12 Loïc Langouët and Marie-Yvane Daire, “Ancient Maritime Fish-Traps of Brittany (France): A Reappraisal of the Relationship Between Human and Coastal Environment During the Holocene,” *Journal of Maritime Archaeology* 4, no. 2 (2009): 132, www.jstor.org/stable/23747344.

13 Marie-Yvane Daire, and Loïc Langouët, “Dater Les Anciennes Pêcheries Par Les Niveaux Marins Approche Méthodologique et Perspectives Géoarchéologiques: Le Bas Léon, Nord Finistère, Bretagne,” *Norois*, no. 220 (November 30, 2011): 72.

14 Erika B. Guttman, Ian A. Simpson, and Donald A. Davidson, “Manuring Practices in Antiquity: A Review of the Evidence,” In *Fertile Ground: Papers in Honour of Susan Limbrey*, edited by Smith D. N., Brickley M. B., and Smith W., 68-76, (Oxford; Havertown, PA: Oxbow Books, 2005), 71.

15 Erwan Ar Gall, Frithjof C. Küpper, and Bernard Kloareg, “A Survey of Iodine Content in *Laminaria Digitata*,” *Botanica Marina* 47, no. 1 (January 26, 2004). <https://doi.org/10.1515/BOT.2004.004>, 30.

16 Regent’s Park Diorama Pamphlet, *Two Views, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest / Painted by Messrs. Bouton and Daguerre*. (London, 1824), 4.

Humans living in coastal regions have long acknowledged the ebb and flow of tides as a phenomenon of great consequence. Seaweed, a biological marker of tidal action, has been similarly understood as a companion to human life. In addition to its employment as manure for enriching soil and improving aggregate stability,¹⁷ ancient medical literature recommends burnt seaweeds and sea sponges for the treatment of endemic goiter, a thyroid disease caused by iodine deficiency in the body.¹⁸ In 17th century Brittany and Normandy, a cottage industry developed around the harvest and burning of the region's abundant seaweeds for the production of soda ash; a material widely used in the creation of soap, dye, gunpowder, fertilizer, and for numerous other chemical and industrial processes.¹⁹ By the end of that century, kelp ash was increasingly spread as fertilizer in efforts to augment agricultural production to meet the needs of growing metropolitan centers.²⁰ Around the same time, glassmakers began introducing kelp ash to their process as a way to lower the melting temperature of silica. This additive catalyzed a dramatic increase in productivity levels of glass manufacture, which helped to drive the region's burgeoning industrial turn.²¹ In the early 19th century, the demand for kelp ash decreased suddenly due to the importation of soda derived from salt pans and guano fertilizers from colonial territories.²² Before long, however, the industry was revived in Brittany and Normandy after an accidental discovery of a chemical element concentrated in the kelp ash.

Elemental iodine was isolated in 1811 when burnt kelp entered the niter beds of Bernard Courtois, a French gunpowder manufacturer. While leaching the ash in order to reduce the compound to saltpeter, Courtois added a copious amount of sulfuric acid and found himself engulfed in a cloud of violet fumes.²³ He alerted chemists Charles Bernard Desormes and Nicolas Clément to the curious violet vapor and crystals. Their subsequent report came to the attention of France's leading chemist at the time, Jacques Gay-Lussac, who identified the substance as a chemical element and assigned to it a name after the Greek term for its intense violet color: iode.²⁴

Around 1820 Jean-François Coindet introduced iodine into the European pharmacopeia as an effective treatment for goiter and scrofula.²⁵ Its use is an early example of a specific, or an elementally pure chemical available for the treatment of a wide range of ailments. Throughout the 19th century, medical applications for iodine increased exponentially and the substance became a panacea. By 1890, physicians recommended iodine for the treatment of thirty or more common medical conditions, ranging from gout to cancer to gonorrhea.²⁶ Its curative promise was also referred to in popular French literature of the time. Writing of "the cure of Sister Julienne," in an 1894 novel depicting a spiritual pilgrimage to Lourdes in southwestern France, Émile Zola notes of the medical treatment for the eponymous character that "the doctors had vainly tried every remedy, iodine, blistering, and cauterizing."²⁷

Within a few years of the debut of the Diorama in London, Daguerre experimented with the use of iodine to photosensitize heliographic plates.²⁸ These experiments would prove to be a critical turn for the fledgling photographic process. Introducing iodine vapors to silvered plates created a light-sensitive silver-halide

-
- 17 Erika B. Guttman, Ian A. Simpson, and Donald A. Davidson, "Manuring Practices in Antiquity: A Review of the Evidence," In *Fertile Ground: Papers in Honour of Susan Limbrey*, edited by M. Brickley and D. Smith, (Oxford: Oxbow Books, 201), <https://doi.org/10.2307/j.ctvh1djmm>, 71.
 - 18 Ron Fuge, "Iodine Deficiency: An Ancient Problem in a Modern World," *Ambio* 36, No. 1 (2007): 70, <https://www.jstor.org/stable/4315787>.
 - 19 V. J. Chapman, and D. J. Chapman, *Seaweeds and Their Uses*, (London: Chapman & Hall, 1980), 18.
 - 20 Hugh Clout, "Land-Use Change in Finistère during the Eighteenth and Nineteenth Centuries," *Études Rurales*, no. 73 (1979): 70
 - 21 Pierre Arzel, "L'exploitation Des Algues En Bretagne," *Études Rurales*, no. 133/134 (1994): 115.
 - 22 V. J. Chapman, and D. J. Chapman, *Seaweeds and Their Uses*, 18.
 - 23 James Burke, "A Light Little Number," *Scientific American* 280, No. 2 (1999): 107, <https://www.jstor.org/stable/26058069>.
 - 24 Mark Michalovic, "The Race for Iodine," *ChemMatters*, (2006): 19.
 - 25 Scrofula (*Tuberculous lymphadenitis*), also known as "The King's Evil," is a medical condition in which the bacteria that causes tuberculosis infects organs and tissue outside the lungs. Symptoms typically take the form of inflamed and irritated lymph nodes in the neck.
 - 26 Mark Michalovic, "The Race for Iodine," 19.
 - 27 Émile Zola, *Lourdes*, (Grosset & Dunlap, 1897), 103.
 - 28 M.A. Root, "HISTORY OF THE HELIOGRAPHIC ART IN EUROPE AND AMERICA. (Continued)," *Scientific American* 6, no. 8 (1862): 119.

coating that reacted to a timed image exposure with a wide range of tonal values.²⁹ The orchestration of mid and dark tonal accents provoked by iodine significantly improved the legibility of the photographic image. In 1839, Daguerre announced to the world: “Enfin le DAGUERREOTYPE n’est pas un instrument qui sert à dessiner la nature, mais un procédé chimique et physique qui lui donne la facilité de se reproduire d’elle-même” (The DAGUERREOTYPE is not an instrument to be used to draw nature, but a chemical and physical process which gives her the ability to reproduce herself).³⁰ Photographic images were later termed the “Pencil of Nature” by Henry Fox Talbot,³¹ an early adopter of the Daguerreotype process and later inventor of the calotype technique, which employed photographic paper saturated with potassium iodide, another compound derived from the salts of kelp ash.

The photographic process was viewed by its pioneers — like writing, drawing, and printing techniques before it — as a technology of inscription. Through the technical interaction of light and chemistry, photography promised that images of nature were to be authored, apparently, by their own subject. Early adopters of photography would extend Daguerre’s proclamation that his invention would transfer the task of visual representation over to “nature...herself” by insisting that the Daguerreotype process generated images untouched by human hands.³² In 1840, Alfred François Donné, a French bacteriologist and early practitioner of microphotography,³³ produced a series of Daguerreotype portraits of microorganisms in collaboration with Léon Foucault. Donné wrote, “...cet objet vient se peindre de lui-même, se fixer sur la planche sans le secours de l’art, sans que la main de l’homme y mette rien du sien, par le seul effet de la lumière, et toujours identique clans ses moindres détails, à l’image perçue par l’observateur dans le microscope” (...this object comes to paint itself, to fix itself on the slide without the aid of art, without the hand of man putting anything of its own into it, by the sole effect of light, and always identical in its smallest details, in the image perceived by the observer in the microscope...).³⁴ For Donné, and other scientists in the nascent field of microbiology, photography appeared to remove “the hand of man” from the epistemic project of studying and taxonomizing the objects under their microscopes. Much as bacteria were rendered visible solely through the magnification of visual light filtered through an optical device, a photographic record of micro-organisms envisioned a technical uniformity between their scientific observation and visual representation. Capturing the “smallest details” of microorganisms without “the aid of art,”³⁵ promised to erase any inconsistencies associated with human observational drawing.

The turn toward photography as a preferred technique for scientific research methodology punctuates what Lorraine Daston and Peter Gallison term “mechanical objectivity,” the drive to “repress the willful intervention of the artist-author, and to put in its stead a set of procedures that would, as it were, move nature to the page through a strict protocol, if not automatically.”³⁶ The imperative of mechanical objectivity—to install technical procedures that automate visual representation by displacing the role of the artist or author—was a constant refrain in early responses to the Daguerreotype. In 1839 a commentator declared: “All nature shall paint herself — fields, rivers, trees, houses, plains, mountains, cities, shall all paint themselves at a bidding, and at a few moment’s notice. Towns will no longer have any representatives but themselves. Invention says it.”³⁷ As Daguerreotypes were lauded as self-reflexive manifestations of nature and the human environment, the medium of photography was accorded significant authority. Paradoxically, the widespread acclaim also laid bare an underlying contradiction of the Daguerreotype’s mechanical objectivity by way of its consistent emphasis on human “bidding” in the production of photographic images. Contrary to

²⁹ Daniel Grushkin, “The Case of the Disappearing Daguerreotypes,” *Scientific American*, 307, no. 6, (2012): 70.

³⁰ Louis Jacques Mandé Daguerre, “Daguerreotype, 1839,” in *Daguerreotype Archive*, Gary W. Ewer, accessed October 16, 2019, http://www.daguerreotypearchive.org/texts/M8380001_DAGUERRE_BROADSIDE_FR_1838.pdf

³¹ William Henry Fox Talbot, “The Pencil of Nature,” accessed August 16, 2010, <http://www.gutenberg.org/files/33447/33447-h/33447-h.html>.

³² Louis Jacques Mandé Daguerre, “Daguerreotype, 1839.”

³³ In addition to his pioneering work in microphotography, Donné was also an innovator in etching Daguerreotype plates for reproduction by way of intaglio printing processes.

³⁴ Alfred Donné, *Cours de microscopie complémentaire des études médicales: anatomie microscopique et physiologie des fluides de l’économie*, (Paris; London; Baillière, 1844), <http://archive.org/details/b21470273>.

³⁵ Ibid.

³⁶ Lorraine Daston and Peter Galison, *Objectivity*, (New York: Zone Books, 2010), 121.

³⁷ “The Pencil of Nature: A New Discovery, 1839,” in *Daguerreotype Archive*, Gary W. Ewer, accessed October 16, 2019: 1, http://www.daguerreotypearchive.org/texts/P8390015_PENCIL_CORSAIR_1839-04-13.pdf.

a technically produced separation of human and nonhuman nature, the auto-portraiture of “fields, rivers, trees...plains, mountains” is interlaced with those of “houses...cities...towns.” These descriptive clusters suggest that in addition to the “natural” aspects of nature, nature’s own pencil is understood in terms of the social and physical architecture of human habitation. Nature does not differentiate between “herself” and human society, but “paints” them in the same frame. Mechanical objectivity notwithstanding, the simultaneity of environment and architecture summoned up by the pencil of nature has retained the historical potential to draw together, rather than divide, human and nonhuman realms.

Some early celebrations of the Daguerreotype acknowledge the relation of the medium to its intertidal source material. In 1855 chemist and perfumer Georges William Septimus Piesse,³⁸ encouraged readers of the journal *Scientific American* to “Go, and have your portrait painted ‘as you are.’ Photography tells the whole truth without flattery; and the colors used in the process are only silver and iodine.”³⁹ Piesse’s advice recalls the truth-determination challenge once issued to spectators inside the Diorama, while also placing the photographic portrait at the end of a long chain of connections, the links of which are forged through the molecular activity of iodine. He writes:

Iodine is found in almost every natural substance with which we are acquainted, although in very minute portions. The sea furnishes an almost inexhaustible supply of iodine. All the fish, the shells, the sponges, and weeds of the ocean yield it in passing through the chemical sieve. Whatever be the food of sea-weeds, it is certain that iodine forms a portion of their daily banquet; and to these beautiful plants we turn when iodine is to be manufactured for commercial purposes. The weeds cast up by the boiling surf upon the desolate shores of the sea islands would at first sight appear among the most useless things in the world, but they are not; their mission is fulfilled; they have drawn the iodine from the briny wave, and are ready to yield it up for the benefit and happiness of man.⁴⁰

While Piesse’s praise of iodine is saturated with an anthropocentric, extraction-oriented sensibility that treats resources as “inexhaustible” and dedicated primarily to the “benefit and happiness of man,” we should note that his lyrical tribute to the element is bracketed by hydrological processes. What Piesse calls the “whole truth” told by photography is suffused through with “every natural substance with which we are acquainted,” and the bioaccumulation of iodine in the “weeds of the ocean” is both a “perfect cure” and perfectly accurate interface for human representation.

The poetical — sometimes rhapsodic — treatment of Daguerreotypes in popular and scientific publications was consistent with emergent literary movements of the mid-nineteenth century, including American transcendentalism, which emphasized, in the words of its central figure, Ralph Waldo Emerson: “an original relation to the universe.”⁴¹ Sean Ross Meehan shows that Emerson used a self-reflexive approach toward writing and nature to reflect, “photography’s metonymic character...its ability to reveal — which is to say its ability to conceal the doings of the medium.”⁴² Meehan further argues that Emerson’s work foreshadows Norman Bryson’s reading of the fundamentally material deixis of photography. In language, deixis is deployed in words and phrases that have a fixed semantic meaning but require additional contextual information in order for their denotative meanings to be understood (for example, English pronouns like *me* or *here* that need additional information to be fully understood). Bryson contends that “Western painting is predicated on the disavowal of deictic reference...” whereas photography is dominated by deictic reference because it is “the product of a chemical process occurring in the same spatial and temporal vicinity as the event it records.”⁴³ Through its technicity and materiality, photography points toward the context of its own occurrence. The metonymic aspects of photography — that pencil of nature that draws itself — is conjured, by the co-mediations of a technical apparatus, non-human molecular action, and human modes of visual

38 In addition to his contributions to the field of chemistry, Piesse is known also for conceptualizing olfactory notes in perfumery and for theorizing the perceptual experiences of *synesthesia* and *sound*.

39 Septimus Piesse, “Iodine,” *Scientific American* 10, No. 30 (1855), 235, <https://www.jstor.org/stable/26141474>.

40 Septimus Piesse, “Iodine,” *Scientific American* 10, No. 30 (1855), 235.

41 Ralph Waldo Emerson, *Nature*, Accessed August 25, 2020, <http://archive.org/details/nature29433gut>.

42 Sean Ross Meehan, *Mediating American Autobiography: Photography in Emerson, Thoreau, Douglass, and Whitman*, (Columbia: University of Missouri Press, 2008), 52.

43 Norman Bryson, *Vision and Painting: The Logic of the Gaze*, (New Haven: Yale University Press, 1997), 89.

representation and meaning-making. While these dense connections may be concealed with varying degrees of success by the manifestations of presence apparently delivered by the photographic image, they are unveiled, and perhaps countermanded, through the material history of the medium's technical development.

It was not long after the Daguerreotype process was widely introduced that the lens of the camera was trained back onto its own watery origins. The capture of things in motion — horses, locomotives, ships, and waves — soon became the measure of a photograph's accuracy and quality due to the technical precision required to produce images of mobile subjects. The motion of a sailing ship, for instance, was considered to be most remarkable due to the infinitely mobile vectors of wind, waves, and vessel all swirling in confused motion. The lengthy exposure times required by early Daguerreotypes prompted photography's technical development toward the increase in speed, or the shortening of exposure time, so that an image could be rendered onto a copper plate surfaced with iodine and silver nitrate. This drive led to a series of technical developments for polishing plates, incorporating additional sensitizing chemicals such as bromine (in addition to iodine), faster-acting mechanical and optical equipment, and the use of ethereal mercury for developing images.⁴⁴ The last in this series of developments — the introduction of ethereal mercury as a final step in the plate preparation process — reduced exposure times to a matter of seconds and provided for the clear capture of objects-in-motion.

In 1851 brothers Cyrus and Hippolyte Macaire were among the first to use fast-acting chemical catalysts to expose Daguerreotype plates. The Macaires experimented with this new method at the port of Le Havre, where like many French cities on the North Atlantic coast, a sector of local industry was dedicated to the production of iodine from kelp ash. The resultant images circulated with great critical acclaim: "Every one admires at this moment in Le Havre the labours of M. Hippolyte Macaire, who, in the space of a fraction of a second, and by means of such rapid exposure... These drawings unite the sky with its clouds, the ship, all sails in the wind, with its pavilions agitated by the breeze...as if they had been placed before the lens in an instant of immobility."⁴⁵ The extraordinary quality of the "clouds, the ship, all sails in the wind...placed...in an instant of immobility" would later lead photo-historian Weston Naef, who stewarded the Getty Museum's department of photographs from its inception in 1984 until 2008, to question the veracity of the Macaire Daguerreotypes. Naef suggested that the Macaires employed "optical illusion" by positioning their camera, at a great distance, and directly in front of or behind vessels to reduce motion blur.⁴⁶ For these reasons, Naef declared the Macaire's maritime photography to be a "simple deception."⁴⁷ Through a careful historical and technical analysis of the Macaire image *Navire quittant le port du Havre* (Figure 4), which was unknown until its appearance in a 2014 auction,⁴⁸ Daguerreotype historian Michael A. Robinson disputes Naef's account by demonstrating that the Macaires were early adopters of fast-acting ethereal mercury and he concludes: "this warm-toned daguerreotype clearly indicates an exposure of fraction a of a second."⁴⁹

Navire quittant le port du Havre enframes a three-quarter view of a square-rigged ship setting sail in preparation for departure from the harbor. The vessel sails upwind, beating carefully against a strong breeze, as indicated by the severe angle of the yard-arms and the relatively sparse amount of canvas unfurled for propulsion. If too much sail is set, the vessel could be propelled backwards or sideways rather than making incremental progress against the force of a headwind. The direction and force of the wind, which is also indicated by the ship's agitated flags, explains why the vessel has only a single set sail, while the rest remain partially or loosely furled, at the ready for quick deployment once the vessel passes the end of the stone pier and enters a navigable channel. Considered alongside Robinson's analysis, a close-reading of sailing technique and weather conditions confirms that this Macaire Daguerreotype was produced through innovative photographic technique rather than creative physical stagecraft.

44 Michael A. Robinson, "The Techniques and Material Aesthetics of the Daguerreotype," (Leicester: De Montfort University, 2017), 325.

45 Francis Wey, "Des progrès et de l'avenir de la photographie." *La Lumière: journal non politique hebdomadaire: beaux-arts, héliographie, sciences* 1, no. 35 (Octobre 5 1851): 138-9, quoted in Robinson, "The Techniques and Material Aesthetics of the Daguerreotype," 323.

46 Bibliothèque nationale (France), Bernard Marbot, and Weston J. Naef, *After Daguerre: masterworks of French photography (1848-1900) from the Bibliothèque nationale*. (New York: Metropolitan Museum of Art in association with Berger-Levrault, Paris, 1980), 30.

47 Ibid.

48 Serge Plantreaux, "Discovery: Daguerreotype—Louis-Cyrus Macaire," accessed January 2, 2020, <http://britishphotohistory.ning.com/profiles/blogs/cyrus-macaire>.

49 Robinson, 323.

Figure 4.

Cyrus and Hippolyte Macaire, *Navire quittant le port du Havre*, ca. 1851-53, in Michael A. Robinson, "The Techniques and Material Aesthetics of the Daguerreotype," (Leicester: De Montfort University, 2017), 325, figure 92.

Beneath the apparent technological triumph of photographing a sailing ship in a stiff breeze, it is also important to note the chemical volatility evident on the surface of *Navire quittant le port du Havre*. Evidencing slow progress of the ship out of the harbor, there is only the faintest indication of a wake behind the vessel, mere traces of bubbles around its stern. These indications of forward motion are practically indistinguishable from numerous spots and flecks created by fugitive chemical reactions on the surface of the image. The aberrations on the image's surface are molecular combinations that register as distinguishing characteristics of the Daguerreotype process. Due to inconsistencies in the photochemical preparation and finishing of Daguerreotypes, some images develop a foggy veneer that conservators call "veiling."⁵⁰

Tiny pores in the silver surface of a plate would, over time, corrode and make an appearance as black specks. Such visual expressions of the technical entropy of the Daguerreotype process make telltale signs of the sailing ship virtually indistinguishable from the long durational changes of the image's chemical substrate. When we look at this early image of a ship, of course, we actually encounter its motions through the effervescent traces of what Piesse called those "weeds of the ocean...passing through the chemical sieve."⁵¹ This image's motion hinges on a fold of chemical elements circulating in the geophysical undulations of seawater, the biological filtration and storage of select elements in seaweed, and the human social and technical practices of exploiting those processes.

In his essay "A Short History of Photography" Walter Benjamin described the close examination of a photograph as "an irresistible...search...for the tiny spark of contingency, of the Here and Now, with which reality has so to speak seared the subject..."⁵² The "irresistible search for contingency" is a longstanding, shared task for viewers — handed down from those early Diorama spectators seeking to distinguish "nature" from "the effect of art"⁵³ — to regard an image through an analytical operation that distills the composition down to its base elements. This mode of visual analysis takes cues from the material processes through which the photograph was produced. Sifting through the materiality of an image resembles the course of those "weeds of the ocean" absorbing and accumulating nutrients suspended in water through photosynthesis, either to contribute again to the sedimentation of the seafloor (through decay of their organic matter and/or consumption by nonhuman organisms) or possibly to be harvested for human use, and eventually "passing through the chemical sieve" and into social and technical modalities.⁵⁴

We know, of course, that the making of a photograph is not determined solely by chemistry or light, and viewing a photograph is not a purely analogical procedure. As Benjamin goes on to reflect, it is the embrace of a "...different nature that speaks to the camera from the one which addresses the eye; different above all in the sense that instead of a space worked through by a human consciousness there appears to be one which is affected unconsciously."⁵⁵

This "different nature" addresses the human eye and the unconscious, anticipating, perhaps, the limitations of the "space" delimited by the architecture of consciousness. To grasp the "contingency," or, "different nature" of a photograph is to recognize the exchange of media between human and nonhuman worlds. Sean Cubitt writes, "the flow of mediation...precedes the separation of the human and the environmental,"⁵⁶ which is to say: whenever we look for the "tiny spark of contingency" we acknowledge the irreducible multiplicity of human image-making in the wake of its environmental interstices. The ebb of consciousness and the flow of media allow us to witness the surface of the sea through the stratum of a Daguerreotype, and in doing so we may discern the movements of tides and littoral creatures in the fugitive mobility of molecules arranged by the pencil of nature.

⁵⁰ Ibid, 152, 153.

⁵¹ Piesse, "Iodine," 235.

⁵² Walter Benjamin, "A Short History of Photography, 1931" in *Screen* 13, No. 1 (1972), 243, doi: <https://doi.org/10.1093/screen/13.1.5>

⁵³ *Two Views, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest*, 12.

⁵⁴ Piesse, 235.

⁵⁵ Walter Benjamin, "A Short History of Photography," 243.

⁵⁶ Sean Cubitt, *Finite Media*, 4.

BIBLIOGRAPHY

- Ackernelch, Erwin H. "Aspects of the History of Therapeutics." *Bulletin of the History of Medicine* 36, No. 5 (1962): 389-419. <https://www.jstor.org/stable/44451164>.
- Arzel, Pierre. "L'exploitation Des Algues En Bretagne." *Études Rurales*, no. 133/134 (1994): 113-26.
- Austin, James, ed. "New Spaces for French and Francophone Cinema." *Yale French Studies* 115. New Haven: Yale Univ. Press, 2009.
- Benjamin, Walter. "A Short History of Photography." in *Screen* 13, No. 1 (1972), 5-26. doi: <https://doi.org/10.1093/screen/13.1.5>.
- Bibliothèque nationale (France), Bernard Marbot, and Weston J. Naef. 1980. *After Daguerre: masterworks of French photography (1848-1900)* from the Bibliothèque nationale. New York: Metropolitan Museum of Art in association with Berger-Levrault, Paris.
- Bouton, Charles-Marie, Daguerre, Louis Jacques Mandé, and Diorama. *Two Views, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest / Painted by Messrs. Bouton and Daguerre*. London: [s.n.], 1824.
- Bryson, Norman. *Vision and Painting: The Logic of the Gaze*. New Haven: Yale University Press, 1997.
- Burke, James. "A Light Little Number." *Scientific American* 280, No. 2 (1999): 106-107. <https://www.jstor.org/stable/26058069>.
- Chapman, V. J., and D. J. Chapman. *Seaweeds and Their Uses*. Dordrecht: Springer Netherlands, 1980. <http://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=3107738>.
- Clout, Hugh. "Land-Use Change in Finistère during the Eighteenth and Nineteenth Centuries." *Études Rurales*, no. 73 (1979): 69-96.
- Cubitt, Sean. *Finite Media: Environmental Implications of Digital Technologies*. Reprint edition. Durham: Duke University Press Books, 2017.
- Daguerre, Louis Jacques Mandé "Daguerreotype, 1939." in *Daguerreotype Archive*, Gary W. Ewer, accessed October 16, 2019, http://www.daguerreotypearchive.org/texts/M8380001_DAGUERRE_BROADSIDE_FR_1838.pdf.
- Daire, Marie-Yvane, and Loïc Langouët. "Dater Les Anciennes Pêcheries Par Les Niveaux Marins Approche Méthodologique et Perspectives Géoarchéologiques: Le Bas Léon, Nord Finistère, Bretagne." *Norôis*, no. 220 (November 30, 2011): 69-93. <https://doi.org/10.4000/norôis.3680>.
- Daston, Lorraine and Peter Galison, *Objectivity*. New York: Zone Books, 2010.
- Plantreaux, Serge. "Discovery: Daguerreotype—Louis-Cyrus Macaire." accessed January 2, 2020, <http://britishphotohistory.ning.com/profiles/blogs/cyrus-macaire>.
- Donné, Alfred. *Cours de microscopie complémentaire des études médicales* [electronic resource]: *anatomie microscopique et physiologie des fluides de l'économie*. Paris; London: Baillière, 1844. <http://archive.org/details/b21470273>.
- Fuge, Ron. "Iodine Deficiency: An Ancient Problem in a Modern World." *Ambio* 36, No. 1 (2007): 70-72. <https://www.jstor.org/stable/4315787>.
- Gall, Erwan Ar, Frithjof C. Küpper, and Bernard Kloareg. "A Survey of Iodine Content in Laminaria Digitata." *Botanica Marina* 47, no. 1 (January 26, 2004). <https://doi.org/10.1515/BOT.2004.004>.
- Grushkin, Daniel. "The Case of the Disappearing Daguerreotypes." *Scientific American* 307, no. 6 (2012): 70-73.
- Guttmann, Erika B., Simpson, Ian A., and Davidson, Donald A. "Manuring Practices in Antiquity: A Review of the Evidence." In *Fertile Ground: Papers in Honour of Susan Limbrey*, edited by Smith D. N., Brickley M. B., and Smith W., 68-76. (2005). www.jstor.org/stable/j.ctvh1djm.12.
- Huhtamo, Erkki. *Illusions in Motion: Media Archaeology of the Moving Panorama and Related Spectacles*. Leonardo Book Series. Cambridge Massachusetts: The MIT Press, 2013.
- Langouët, Loïc and Daire, Marie-Yvane. "Ancient Maritime Fish-Traps of Brittany (France): A Reappraisal of the Relationship Between Human and Coastal Environment During the Holocene." *Journal of Maritime Archaeology* 4, no. 2 (2009). www.jstor.org/stable/23747344.

- Meehan, Sean Ross. *Mediating American Autobiography: Photography in Emerson, Thoreau, Douglass, and Whitman*. Columbia: University of Missouri Press, 2008.
- Michalovic, Mark. "The Race for Iodine." *ChemMatters*, (2006): 18-19.
- Piesse, Septimus. "Iodine." *Scientific American* 10, No. 30 (1855): 235. <https://www.jstor.org/stable/26141474>.
- Robinson, Michael A. "The Techniques and Material Aesthetics of the Daguerreotype." (Leicester: De Montfort University, 2017): 1-435.
- Root, M. A. "HISTORY OF THE HELIOGRAPHIC ART IN EUROPE AND AMERICA. (Continued)." *Scientific American* 6, no. 8 (1862): 119–119.
- Siegert, Bernhard. *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, trans. Geoffrey Winthrop-Young. New York: Fordham University Press, 2015.
- Talbot, William Henry Fox. "The Pencil of Nature." August 16, 2010. <http://www.gutenberg.org/files/33447/33447-h/33447-h.html>.
- "The Pencil of Nature: A New Discovery, 1839." in *Daguerreotype Archive*, Gary W. Ewer, accessed October 16, 2019: http://www.daguerreotypearchive.org/texts/P8390015_PENCIL_CORSAIR_1839-04-13.pdf.
- Timbs, John. *Curiosities of London: Rare and Remarkable Objects of Interest in the Metropolis*. London: John Camden Hotten, 1867.
- Two Views, 70 Feet by 50, of the Cathedral of Chartres and the Harbour of Brest / Painted by Messrs. Bouton and Daguerre*. London: G. Schulze, 1824. Getty Research Institute Special Collections.
- Wey, Francis. "Comment le soleil est devenu peintre. Histoire du Daguerreotype et de la photographie." *Musée des familles* XX (June 1853, July p. 257-265, 1853): 289-300.
- Wellbeloved, Horace. *London Lions for Country Cousins and Friends about Town, Being All the New Buildings, Improvements and Amusements in the British Metropolis*. London: William Charlton Wright, 1826.
- Wood, Derek R. "The Diorama in Great Britain in the 1820s." Accessed November 11, 2020. http://www.midley.co.uk/diorama/Diorama_Wood_1_1.htm.
- Zola, Émile. *Lourdes*. Grosset & Dunlap, 1897.