

Radiant Exposure:
The Art and Spectacle of the X-rayed Body in American Visual Culture

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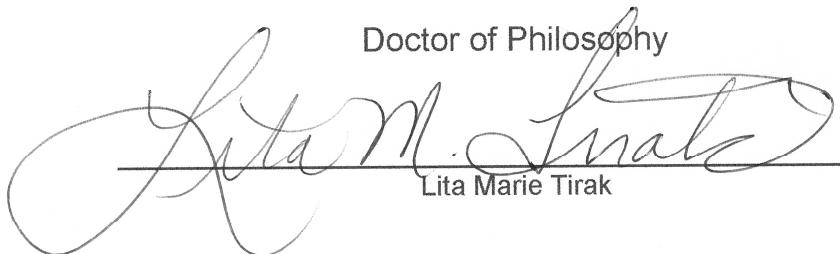
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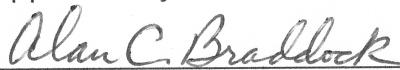
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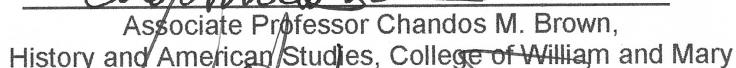
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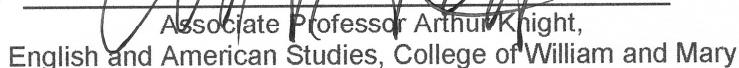
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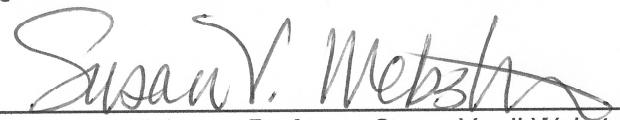
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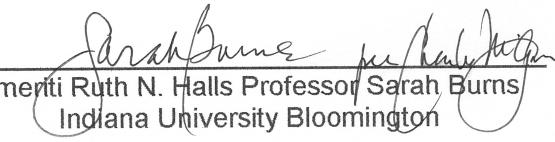
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ABSTRACT

Radiant Exposure analyzes how American painting, photography, cinema, and graphic design creatively visualized X-rays to represent the body under forms of invasive scrutiny. I will historicize a variety of works produced between 1895 and the present, which consist of actual X-ray photographs and artistic simulations of their visual effects. Visual culture scholars and art historians have identified the X-ray as an important development in modern experience, perception, and the visual arts, but they have situated the X-ray's aesthetic bearing in the first thirty years after Wilhelm Röntgen's discovery of the X-ray. I argue that since their invention, X-rays have persisted in the realm of the corporeal spectacle, as a source of aesthetic captivation and a method of social control.

My goals are to generate a new language for articulating the rich significance and specific influence of X-rays in American consciousness, through formal and historical analyses of visual culture that draw from X-rays' technological effects or appropriate them in different ways. More broadly, this project reveals how the subjectivity of American identity has projected onto the anonymous irradiated body in the visual arts, whether idealized or pathologized, made culturally visible or cloaked in invisibility. As Americans have become more transparent under modern surveillance, the X-rayed body in art and visual culture has become entangled with ideas about identity and power.

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INTRODUCTION

IRRADIATING MARILYN

In his biography of Marilyn Monroe, author Maurice Zolotow chronicled her bodily encounter with an unnamed male admirer: "She had gone on a date to the beach, [he] kept pressing his fingers into her flesh so he could feel the bones. He said she had admirable bones. He liked girls with good bones. She stood up and said, 'Well, if you like my bones so much, I'll have an X-ray made and send it to you!'"¹ A great beauty, the image of Marilyn's body was already a phenomenon to masses of observers in the mid-twentieth century. However, her fortunate suitor desired something more. Although Zolotow does not specifically state what her suitor wanted, one might speculate that he longed to sexually penetrate her interior structure.

Her proposed X-ray portrait offered a different view from that of her illustrious façade. In the X-ray portrait, Marilyn's skin, flesh, clothing, make-up, and hair would disappear, while osseous formations and soft tissue from her clandestine regions would appear. The anecdote portrays Marilyn as the primary agent of her own spectacle, as she declares that she can authorize the making of an X-ray portrait of herself strictly for her suitor's eyes. Although Marilyn often revealed parts of her body to sexually tease the voyeuristic observer, her invitation to look inside her body offered a glimpse at seeing the core supporting structure of her cosmetic front. Demystifying her body with an X-ray portrait would be a valuable commodity for her suitor to behold. Her gesture, in turn,

¹ Maurice Zolotow, *Marilyn Monroe*, (New York: Harper & Row, 1990), 70.

changed the subject from sexuality to the X-ray, which had its own sexual bearings.

Marilyn's publicized image maintained her exterior spectacle even after her death. Post-mortem, the reproductions of her image increased exponentially, a phenomenon that inspired Andy Warhol's *Marilyn Diptych* (Fig. 1). Thomas Crow has argued that this work was "as much about the pathos of celebrity identification as about the celebration of the star" and, furthermore, it presented "a stark and unresolved dialectic of presence and absence, of life and death."² With the silkscreen process, Warhol reproduced the surface of her commodified face and ordered each picture in a grid format, a visual aesthetic related to the organization of commercial products for consumption, as in his famous pictures of soup cans, soda bottles, and other commodities. Within the grid, he constructed a perversely superficial Marilyn, based on a still image from the 1953 film *Niagara*. On the left side he inflated her exteriority by printing her faces with flat swaths of color that visually *pop*, often failing to stay within the contours of her face. Warhol recreated her façade without corporeal definition, withholding the structural secrets of her famous smile. He presented her cosmetic front as a boundary of protection, like a tough painted skin that safeguards her inner organism from external pressures and penetrating gazes. On the right side, her colorless face appears and disappears in the grid, a temporality that suggests not only mortality, but also the inner burden of celebrity-- the threat her star would fade. Although the right side does not enable the viewer to see inside the

² Thomas E. Crow, *The Rise of the Sixties: American and European Art in the Era of Dissent*, (London: Laurence King Publishing, 1996), 86.

corporeality of Marilyn like an X-ray would, Warhol revealed that there is nothing underneath the façade of celebrity. The façade itself is vulnerable and pre-disposed to vanishing.

In Figure 2, Warhol holds the *skin* of his silkscreen process, the acetate of Marilyn's cosmetic face. Although the observer can *see-through* this transparency, her interior is not visible. There is no X-ray revelation of her structural physical secrets, just the man behind the art of her image. Warhol did not expose Marilyn's private personal sphere, but rather, even in this transparent state, embraced her layer of exteriority. The same general composition appears in Figure 3, which features a physician holding up an X-ray negative of a ribcage for diagnosis. Contrary to the transparency of Warhol's acetate, the X-ray negative's transparency communicates a different visual effect—not of *seeing through*, but of *seeing inside* the referent. The X-ray negative reveals private information of anatomical health and bone structure. Furthermore, the depicted body on the X-ray negative is the product of penetrative radiation captured visually on a photographic light-sensitive surface, as a critical aid to human vision for surveying the corporeal interior. While Warhol's transparency effectively resists such observation, the radiographic material invites it. Between the two representations of transparent bodies, only one image contains information of the private sphere as a critical component of its exhibition.

In the summer of 2010, Julien's Auctions sold three X-ray negatives featuring images of Marilyn Monroe's chest and pelvis, with her hands on her hips, taken when her physician hospitalized her in 1954 for gynecological

ailments (Fig. 4). The lot sold for \$45,000—a remarkably large sum for medical images of a celebrity, especially when a lot of Elvis Presley's X-ray negatives sold for only \$7,000 just a few years before. After the sale, a range of reactions from disgust to uneasiness emerged online and in print. Dr. Elaine Schattner's op-ed piece in the *Huffington Post* suggested that people should be ashamed to look at other people's insides: "They [the X-ray negatives] contain privileged information—the sort intended for her doctors' eyes only... I wonder if any traces remain of her hidden self, confidential and unexposed. Perhaps the X-rays don't belong in the public domain."³ When she lived, the world judged Marilyn by her façade in movies and magazine covers; however, post-mortem, she was subject to a new kind of scrutiny. Schattner continued, "The [X-ray] films render her vulnerable, again, to more inspection. The loss of privacy is irrevocable, a violation after death."⁴ The medical privacy laws in the 1950s permitted the release and sale of Marilyn's X-ray negatives in 2010. Dismayed by the sale's legality, Schattner argued that Marilyn's X-ray negatives were more than just the interior views of her body; they were indicators of her most private sphere where her non-publicized identity, her *self*, resided.

Marilyn's X-ray pictures were different from anonymous ones because hers contained her identity and the story behind the making of them. Her radiographs went beyond the cosmetic front seen on motion picture film, photographs, and Warhol's art. I would argue that they even went beyond

³ Elaine Schattner, "The X-Rays of Others," *Huffington Post*, June 25, 2010, Accessed on 5/28/2016, http://www.huffingtonpost.com/elaine-schattner/marilyn-monroe-x-rays-auc_b_625014.html.

⁴ Ibid.

macabre fascination of celebrity deaths. The intrigue of her radiographs came from *her* interior anatomical revelation. Although the spectacle of corporeal exposition is present in every radiograph, with Marilyn's identity attached, hers offered a persona far more intimate and meaningful—making this set of radiographs culturally valuable.

Marilyn's radiographs raise many questions about America's attraction to X-rays. How do X-rays render the human body both technically and aesthetically? How can a radiograph be viewed with objective scrutiny and subjective fascination? In what circumstances are X-rays an invasion of privacy or an empowering form of exhibitionism? What is the aesthetic allure of the corporeal radiograph and how has it persisted? How is this aesthetic distinguishable from other modalities of the invisible? Furthermore, how do creative people like artists, graphic designers, and filmmakers interpret or simulate it? How can X-ray pictures of the body become powerful without identities attached, in their anonymity?

THE BODY SPECTACLE: OBJECTIVITY AND SUBJECTIVITY

The example of Marilyn's radiographs demonstrates a widespread and enduring cultural fascination with X-rays in America. In 1895, the German physicist Wilhelm Conrad Röntgen discovered an invisible light, which could record photographs of interior forms. He called this unknown form of radiation "X-ray," setting in motion new technologies for facilitating human vision. In 1896, the photograph of his wife's irradiated hand produced a revelation of her anatomical

interior and established a longstanding trend in gendered image production and power relations. The body, seen with a new X-ray aesthetic, prompted an abundance of creativity in the visual arts around the world.

Röntgen's discovery began with the spectacle of interior anatomical revelation. I call the revelation a *spectacle* because the inside view of the body cannot be seen by the unaided eye. The technical feat opens the body without the scalpel, revealing a glowing, veil-like rendering of anatomical layers. The resulting picture is an illusion created through skillful manipulation of technology, photography, and the radiographer's positioning of the subject. The articulation that I use to describe the X-rayed body spectacle is not *seeing through* the body but rather *seeing inside*. I recognize that X-rays have inspired creative minds differently throughout the past century and a quarter since Röntgen's discovery. Some artists have explored X-rays as *seeing-throughness*. However, I contend that the seeing-throughness is not a spectacle of the body and that this distinction is crucial for visual analysis, especially when making comparisons to actual irradiated anatomy. I maintain a tight emphasis on examples of the body spectacle that enable the observer to see-inside. While the enthusiasm for X-rays was at its height in the first decade after their appearance in 1895, the body's spectacle has continued to inspire scientists, poets, artists, graphic designers, and newspapers for decades.

In this dissertation, I propose that the corporeal revelation afforded by X-rays partakes of a pervasive visual culture of spectacle that increased the scope of modernity's sensory stimuli. The X-ray spectacle is a form of regulation

through which bodies can be isolated from self-knowledge, self-visualization, and each other so that it prevents collective knowledge, empowerment, and action. Moreover, this bodily revelation has worked as a form of disciplinary power that individuals have struggled in order to conform to changing ideals of social normativity, and that the artistically-inclined have challenged with works of resistance. I support this argument with materials from art, film, photography, and graphic design—all expressing the history of American experiences with sensual attractions, fine art and commercial commodities, technological innovation, surveillance, and social visibility.⁵

The core complexity of the X-rayed body is that, on the one hand, it receives the scrutiny of mechanical objectivity in professional practices, but on the other, it maintains a corporeal illusion produced photographically that requires the subjectivity of attention to interpret the visual record. As Lorraine Daston and Peter Galison have stated, “Objectivity is related to subjectivity as wax to seal, as hollow imprint to the bolder and more solid features of subjectivity.”⁶ Of key importance, they argue that the concept of mechanical objectivity has demanded the intent for “self-discipline,” “the honesty and self-restraint required to foreswear judgement, interpretation, and even the testimony of one’s own senses” as well as “the taut concentration required for precise

⁵ The dissertation’s theoretical perspectives about spectacle and disciplinary power are indebted to the works of Guy Debord and Michel Foucault and their ideas about spectacle. Guy Debord, *The Society of the Spectacle*, (New York: Zone Books), 1994. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, (New York: Vintage Books,) 1977. Michel Foucault, *The Birth of the Clinic*, (New York: Routledge), 2012. Jonathan Crary also was influenced by these theorists.

⁶ Lorraine Daston and Peter Galison, “The Image of Objectivity,” *Representations: Seeing Science* 0, no. 40 (Autumn 1992): 82.

observation and measurement.”⁷ These demands of mechanical objectivity incorporate some subjectivity, including the service of the human senses while recognizing that they cannot be interpreted individually, as well as the necessity of the observer’s attention. X-ray pictures in particular grip the attention of the observer when surveying with the intent for objectivity. Professionals and subjects of the pictures have viewed radiographic images on glowing screens, backlit from light tables to computer monitors. They require an intense absorption of the luminous image, a perceptual acuity that can assemble the abstractions of veils of bone and tissue for reading anatomy and pathology.

Bernike Pasveer responded to Daston and Galison’s study on objectivity by clarifying that while some scientists believed that mechanical technologies could substitute for the human senses in a detached, observant mode, radiographs were part of a different movement of technologies that “did not substitute but rather were a new sensory apparatus themselves, and that so produced new objects of inquiry.”⁸ Pasveer further asserts that the X-ray picture itself is less of a *representation* and more a *mediation* of technology, photographic materials, and skillful positioning of anatomy: “an X-ray image is not a simple, true to nature representation of a body’s insides, only a particular perspective on that body.”⁹ The scholarly emphasis placed on the objectivity of

⁷ Ibid, 83.

⁸ Bernike Pasveer, “Representing or Mediating: A History and Philosophy of X-Ray Images in Medicine,” in *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*, ed. Luc Pauwels (Hanover: Dartmouth College Press), 2006, 42.

⁹ Ibid, 43.

the X-ray image ignores the manipulation and perception that compose the interior revelation of the body.

Radiant Exposure builds upon Pasveer's argument about the X-ray's mediation but also draws extensively from art historian Jonathan Crary's arguments on modern subjectivity in *Suspensions of Perception* (1999).¹⁰ The visuality and opticality of the irradiated body are vital components to the spectacle. However, both require human mediation and therefore impose politics on the X-rayed body—what is seen, unseen, amid the broader historical and social implications of that body. I explore this idea with Crary's contention that the spectacle is also a form of disciplinary power. He argues, "spectacular culture is not founded on the necessity of making a subject see, but rather on strategies in which individuals are isolated, separated, and inhabit time as disempowered."¹¹ Seeing X-ray images with the intent for objectivity demands self-discipline on the part of the observer, but the spectacle's subjectivity also has the effect to discipline not only the observer who is gripped by the picture, but also the subject who is isolated for the observer's scrutiny.

In the case of Marilyn's radiographs, a medical team originally produced the pictures for objective analysis. The same radiographs (later sold at auction) continue to objectify her voyeuristically as a commercial spectacle, but they also resonate with the subjectivity that is individually and personally Marilyn. Both types of observation isolated and disempowered Marilyn's body for visual

¹⁰ Jonathan Crary, *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, (Cambridge, Mass.: MIT Press), 1999.

¹¹ Ibid, 3.

consumption. In both instances, her body drew the attention of observers for looking and produced aesthetic pleasure. The main difference was that objective looking scrutinized with the measurement and training to see the normal and pathological, whereas subjective looking did not.

Despite the medical and commercial professions that can position the subject with submissiveness, the power does not stay localized. The X-ray pictures of subjects also discipline observer-professionals by commanding their attention for cerebral absorption and analysis. In *Radiant Exposure*, power shifts between observers and subjects, as demonstrated in the opening anecdote that presents Marilyn with agency. At her direction, she mused about making radiographs of her body to exhibit for her suitor. In different contexts, the subject of the body spectacle can have agency and even an artistic construction to dramatically enhance the subjectivity of the image.

THE VANISHING HISTORY OF X-RAYS

One X-ray picture can look like the next: an elbow is an elbow is an elbow. Radiographs have become visually predictable for the untrained eye. In general, one can envision the picture of an irradiated body-part in the mind and use words to associate it like "negative," "transparency," "see through," "medical," and the sensational "seeing the invisible." Despite one's ability to recognize and visualize a traditional radiograph, the components of the radiograph's scientific composition and aesthetic illusion remain ambiguous, poorly articulated, not based on historical evidence, and largely taken for granted.

Even for the trained eye, radiographs can seem routine and unnecessary to preserve for cultural value. X-ray pictures have had a disposable character in countless practices involving medicine, national security, and commerce. Radiography has long maintained an association with instrumentation—on the one hand, placing emphasis on a present evaluation, on the other, serving as documentation for future evaluations. Depending on the organization and the instrumentation, the pause to hold X-ray images for archiving can last from a few seconds in a computer, to a few decades in file folders, before personnel discard them into digital dust or into the recycling bin for their silver. While this practice seeks to protect subjects' individual privacy and helps to clear out space for new pictures, disposal can create the impression that radiographs have no value beyond their instrumentation. The present study regards them as artifacts of considerable cultural and historical value.

Radiographs have had a long history of decay and destruction. For decades, their material construction made preservation challenging, from fragile fin de siècle glass plates that easily cracked to later cellulose nitrate film stock that was highly flammable. In the 1920s and 1930s, acetate stock stabilized the image and made it safe for filing. This dependability improved into the mid-to-late twentieth century with polyester film stock. However, with the increased use of computer scans and digital radiography in the late twentieth century, tangible X-ray material began to decrease.

In recent years, archives tasked with protecting artifacts of historical value have destroyed their collections relating to X-rays. The American College of

Radiology (ACR), the quintessential repository of X-ray history that served countless scholars in the twentieth century, purged their history collection just before I began research for my study. According to the Director of the Electrotherapy Museum, Jeff Behary, ACR's history collection included "over 100 pre-1910 X-Ray tubes, 4000+ early glass plate radiographs, [the] original furniture of Röntgen, and hand-written scrap books of early pioneers of X-Ray and Tesla technologies. [It was] the largest of its kind in the US and unique to the world."¹² Likewise, the Mütter Museum in Philadelphia had a room of X-ray files for decades, but in 2016 the institution liquidated it. With significant repositories discarding their radiography collections, the history of X-rays is in a state of vanishing.

The destruction of any kind of history is alarming. When a history vanishes, knowledge is lost and human mistakes can be repeated. The history of X-rays includes cycles of sensationalism, unethical experiments, deaths of subjects and technicians, new photographic and digital products, and inventive commodities that the market assures are safe but later quietly eliminates. In the midst of a vanishing history, the spectacle of the X-rayed body has consistently maintained a sense of newness when it appears in popular culture advertisements or marketable items like the shoe fluoroscope or the body scanner. Technological progress and profit mask the fading of this history. When the public lacks access to history, cultural amnesia and vulnerabilities arise. The power shifts towards the images projected from marketers and professionals who profit from ignorance. *Radiant Exposure* examines the spectacle's dynamics of

¹² Personal correspondence with Jeff Behary, 8/19/2015.

attention and distraction to explore how the newness and progress associated with X-rays has persisted for over a century.

RADIANT EXPOSURE

Radiant Exposure revives some but certainly not all of this vanishing history, utilizing many hitherto untapped primary sources from medical, art, and humanities collections along the East Coast, as well as digitized newspapers and illustrations available online. *Radiant Exposure* also builds upon previous studies that have addressed X-rays.

There are a number of seminal texts that provide the foundations of X-ray history, most of which have drawn from the collections at ACR. *Wilhelm Conrad Röntgen and the Early History of the Roentgen Rays* by Otto Glasser (1934), *The Trail of Invisible Light* by E.R.N. Grigg (1965) and *The Rays* by Ruth and Edward Brecher (1969) are among the most highly regarded and referenced texts in X-ray historical scholarship.¹³ Although the authors richly illustrate their work, they offer no cultural analysis beyond a technological history. Indeed, as a whole they assert a monolithically upbeat and uncritical account of X-rays as a sign of progress.

Around X-rays' centenary, a new wave of scholarship written by women emerged including Nancy Knight's article "The New Light" (1985), Linda Dalrymple Henderson's essays on the Fourth Dimension (1988, 1989), Lisa

¹³ Otto Glasser, *Wilhelm Conrad Röntgen and the Early History of the Roentgen Rays*, (Springfield, IL: C.C. Thomas, 1934). Emanuel R. N. Grigg, *The Trail of the Invisible Light: From X-Strahlen to Radio(bio)logy* (Springfield, IL: C.C. Thomas, 1965). Ruth Brecher and Edward Brecher, *The Rays: A History of Radiology in the United States and Canada*, (Baltimore: Williams and Wilkins Company, 1959).

Cartwright's *Screening the Body* (1995), and Bettyann Holtzmann Kevles' *Naked to the Bone* (1997). Knight's article explores the beginning of the X-ray's transition from sensation to "medical futurism." Dalrymple Henderson's essays discuss the works of modern artists and their inspiration in the Fourth Dimension, with the X-ray being a critical component for understanding the aesthetic of transparency and mechanical fascinations of the Cubists, Futurists, and Dadaists. Cartwright devotes two chapters to X-rays and the irradiated female body with cultural analysis; however, she limits her study to approximately the first fifty years of X-rays. Holtzmann Kevles offers a broad survey of X-ray visual culture; yet it falls short in terms of in-depth cultural analysis.

Most recently, Richard Swiderski and Matthew Lavine have published cultural histories of X-rays. Swiderski's *X-ray Vision* (2012) examines an impressive array of primary sources in exploring primarily the X-ray gaze and its visualizations in daily life and popular culture, but it lacks sufficiently theoretical underpinnings to articulate a comprehensive account of X-ray vision. Lavine's *The First Atomic Age* (2013) provides a survey of X-rays and radium, presenting both forms of radiation as significant factors in modern American science, and using a wealth of newspaper articles. While he succeeds in creating a narrative of the popular experience of radiation and its technologies, his specialization is not in visual culture or analysis. Out of this literature review, Lavine's book is the only one that specifically focuses on the American experience of X-rays and his text may be the last to have consulted with ACR's collection.

Radiant Exposure is the first interdisciplinary study of X-ray visual culture, engaging issues in the history of art, popular culture, cinema history, medicine, and identity politics. Some scholars have initiated investigations to consider X-rays in relation to their respective disciplines. Art historians Dalrymple Henderson and Michael Leja, as well as cinema historians Tom Gunning and Akira Mizuta Lippit, have identified the X-ray as an important development in modern experience, perception, and the visual arts.¹⁴ Michael Leja has recognized the X-ray as a mode through which to understand the fin de siècle's skeptical style of "looking askance." Tom Gunning has argued that detectives and the urban flâneur in the early twentieth century maintained an X-ray vision that penetrated the surface of the city. Lippit has recently applied psychoanalytical discourse to early X-ray history as a means of exploring the "phenomenology of the surface," but does not include any specific visual examples to interpret. Many of these scholars have made commendable attempts to bridge X-rays with their specializations; however, they often have done so in general and metaphorical terms without a solid understanding of the way X-rays mediate the body and without much emphasis on subjectivity. None of these scholars contextualize X-rays specifically in the cultural geography of America. Furthermore, they have situated the X-ray's aesthetic bearing exclusively in the first thirty years after

¹⁴ Linda Dalrymple Henderson, "X-Rays and the Quest for Invisible Reality in the Art of Kupka, Duchamp, and the Cubists," *Art Journal* 47 (Winter 1988): 323–40. Michael Leja, *Looking Askance : Skepticism and American Art from Eakins to Duchamp*, (Berkeley: University of California Press), 2004. Tom Gunning, "From the Kaleidoscope to the X-Ray: Urban Spectatorship, Poe, Benjamin, and *Traffic in Souls* (1913)," *Wide Angle* 10, no. 4 (October 1997): 25–61. Akira Mizuta Lippit, "From Modes of Avisuality: Psychoanalysis--X-Ray—Cinema," *The Spectralities Reader: Ghosts and Haunting in Contemporary Cultural Theory*, ed. Maria del Pilar Blanco and Esther Peeren, (New York: Bloomsbury Publishing, 2013), 257 – 278. Akira Mizuta Lippit, "Phenomenologies of the Surface: Radiation-Body-Image," *Qui Parle: Special Issue on Lacan* 9, no. 2 (Spring/ Summer 1996): 31-50.

Röntgen's discovery. Alternatively, I show that the aesthetic allure and cultural power of the X-ray has continued into the present.

Radiant Exposure is neither a history of the science of X-rays, nor a history of radiology. It also does not dwell on the representation of the skeleton as a persistent signifier of death or a *memento mori*. Rather, it pursues the history of the American imagination's engagement with the X-rayed body, which will show that the irradiated skeleton has conveyed many different meanings over time. This exploration interrogates diverse visual media such as studio art, graphic art, motion picture film, photography, and fluoroscopy. The "America" in this study largely focuses in the United States, but this geography is sensitive to open borders, through which immigrants and non-natives enter into the stories.

More specifically, I focus on the visual culture of the X-rayed *human body*, and its non-simulated and simulated revelations through the chronology of X-ray imaging. The X-rayed body has an anonymous presence without external signifiers of ethnicity or gender. Therefore, *Radiant Exposure* takes care in grounding its analysis of irradiated bodies with sensitivity to diversity in different socio-historical contexts.

I have organized the content of *Radiant Exposure* around thematic chapters that trace the trajectory of X-rays in American visual culture and consciousness. The multiple, layered narratives emerging in these chapters come together to form a single, complex story about the visual politics of the X-rayed body. In effect, this richly-textured story challenges the mythic narrative of technological progress popularly associated with X-rays, in order to empower the

reader and to understand the medium more critically.

My chapters explore five different themes that are central to American thought and cultural identity through which the revelations of irradiated bodies offer some new critical examination. My first chapter explores X-ray vision as a perceptual construction that fuses technology, image, and embodied observer. It offers an overview of the technology, the photographic images, and their relationship to human perception. I assert that X-rays brought about two significant shifts: a new radiant vision of the body that could save lives or kill, as well as a new visual recording of the body that offered the aesthetic of corporeal vanishing.

My next two chapters explore the X-rayed body through the interpretative lens of gender. The irradiated female spectacle was a coveted commodity among men of science, and also for modern women—such as suffragists, domestic scientists, and later postmodern women artists. While irradiated women were indeed sexualized and commodified, this chapter also demonstrates that women could appropriate the X-ray as a means of empowerment and self-agency. The spectacle of the “X-ray lady” also emerged as a fetish object that, through scientific and museum exhibitions, provided further distraction from reports of radiation dangers during the twentieth century.

The next chapter explores how X-rays exacerbated pervasive anxieties about manhood and self-discipline. One measuring stick for manhood in the modern era depended upon ethnicity and notions of duty associated with racial difference. Throughout the twentieth century, X-rays exposed whether a man

was “fit for duty” by revealing pathologies that prevented him from performing masculine roles and even daily tasks of life. At the same time, they aided in distinguishing between malingeringers and men who no longer could work because of a duty-inflicted injury.

Chapter four examines X-ray screenings at the borders of the United States to detect not pathology, but rather the criminality of smuggling—and later terrorism. I argue that the X-ray initiates a process of exposing social deviants by bringing attention to the materiality of the “foreign body.” The origins of this practice date back to the 1890s and consist of fluoroscopic photography as well as films and political cartoons that exploited the revelation of people suspected of deviant corporeality and behavior in various forms.

Although each chapter features works of art within an examination of broader visual culture, chapter five focuses exclusively on American artists who simulated X-rays in order to resist dominant cultural norms of race, class, and sexuality. When artists appropriate X-ray vision, the corporeal spectacle can reveal cultural blindspots—bringing to consciousness those who are socially invisible. In this chapter, I pay particular attention to works by José Guadalupe Posada, Diego Rivera, Pavel Tchelitchew, Jasper Johns, David Hammons, Jean-Michel Basquiat, and David Wojnarowicz.

This study maintains a tight focus on the visuality of the body with *traditional* X-ray photography, but there are diverse kinds of X-ray imaging (like CT scans, mammography, MRIs, xeroradiography, etc.) as well as subjects (like space, industrial materials, museum artifacts, animals, etc.) that this study does

not cover. Nevertheless, I hope that *Radiant Exposure* spurs new interest and scholarship on X-rays that will expand the scope of our understanding about its visual and historical terrain.

Finally, my inquiry into the irradiated body as a subject of exploration will show the different ways Americans applied subjectivities to the anonymous skeletal presence in radiographs and simulations of radiographs. As Americans have become more transparent under modern surveillance, the X-rayed body in art and visual culture has become a key focal point of contestation about identity and power.

CHAPTER 1

X-RAY VISION AND THE BODY

In 1997, the artist Gary Schneider collaborated with a variety of scientists in the Human Genome Project to create a *Genetic Self-Portrait* made of images invisible to the unaided eye from the nanoscope atomic force microscope, photograms, auto radiograms, fluorescent-light microscope, the fundus camera, and X-rays. The composite self-portrait composed anatomical photographic portions of Schneider's body, such as his hands, irises, chromosomes, retinas, teeth, hair, ears, and sperm. Schneider expressed in his artist statement, "All the images together are my most private parts."¹ Traditional portraiture represents likenesses; the very best captures essences of character and spirit. Harnessing the scientific eye in an artistic exploration, Schneider's self-portrait is a portrait of self-surveillance, transparency, and spectacle that demonstrates his agency as an artist and subject.

The X-ray picture of his teeth in Figure 5 captures the lower half of his skull. Schneider sectioned the life-size picture further with a line separating the left from the right side. Against the black background, luminous bones and tissue appear as layers of clouds, fading in and out of opacity and transparency. The picture reveals his dental caps and fillings, individualizing his skull from any other. Schneider explains, "The X ray of my mouth was the most accessible piece of forensic information that I could include. Enlarged it takes on an ominous cavelike quality... In my cave I am on the inside looking out and you are

¹ The Warehouse Gallery, Syracuse University, "Gary Schneider: Genetic Self-Portrait," The Warehouse Gallery, Syracuse, NY, November 15, 2007, Accessed on 5/28/2016, http://suart.syr.edu/wp-content/uploads/2015/06/Gallery_guide.pdf.

on the outside looking in.”² His statement suggests that what may look like a simple X-ray picture is actually a complex dialogue of gazes that intersect with embodied human vision.

The association of X-ray vision with Superman’s powers or other popular culture imaginings not only testifies to the spectacular popular appeal of the technology but also diminishes the technical history that originated X-ray vision. Indeed, there is a lack of scholarship that discusses the complexities of actual X-ray vision and its aesthetics based upon its photographic origins. Richard Swiderski’s *X-Ray Vision: A Way of Looking* has offered, “The awareness of X-rays fostered X-ray vision. It was a way of assimilating the technology to eyesight and of registering the fears that such an eyesight stirred.”³ This is the groundwork from which to ask, what is *the way*? X-ray vision produces an actual visible product that fuses perception, mediation, and the representation of the body.

This chapter focuses exclusively on what constitutes X-ray vision by conceiving it as a fusion of modern embodied perception, a specific apparatus, and a pictured spectacle. Modern perception provides the framework through which to begin exploring vision in America. In *Techniques of the Observer*, Jonathan Crary has shown that perception is subjective as opposed to objective. After the mid-nineteenth century, scholars understood the observer as a “sensory apparatus,” in which gathering knowledge about the world relied on the physiology of senses and produced perceptual subjectivity. As a result,

² Gary Schneider, *Genetic Self-Portrait*, (Syracuse, New York: Light Work, 1999), np.

³ Richard M. Swiderski, *X-Ray Vision: A Way of Looking*, (Boca Raton, FL: Universal-Publishers, 2012), xii.

observations are mental, corporeal, and social constructions, and frequently are informed through mechanical devices, like the stereoscope, which required the mind to piece together binocular vision, and later, assemble images in a sequence to see motion pictures. Crary refers to the relationship between the observer and image as “embodied” because modern seeing is physiological, even with the aid of mechanical technology, in which the world external to the body is processed internally through sensory receptors and mental functions, all of which have important material aspects.⁴ Building upon Crary’s insights in this chapter, I examine embodied observers such as the technicians who mediate the X-ray apparatus and the subjects whose bodies are rendered through X-rays. Embodied vision enables the illusion of X-ray vision to occur. By neurologically processing the X-ray’s revelation of the body’s interior, the observer assumes complete ownership of that sight, despite the mediating apparatus and photographic chemistry. X-ray vision is desirable because the image it produces does not exist in actuality. Even if a physician opened a body to see its bones, the view inside would look different from an X-ray picture of it.

I argue that X-ray vision positions the embodied observer within a complex relationship between the technological apparatus, which facilitates a kind of seeing beyond the natural human senses, and the X-ray image spectacle, which is the representation of that seeing. Making this imagery necessitates arresting the subject’s movement for the exposure, and seeing this imagery requires the embodied observer’s attention to neurologically absorb the sight. Although the

⁴ Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, (Cambridge: MIT Press, 1992,) 136.

spectacle attracts the observer as an expression of its power, the human mediation adjusts the apparatus to control what is seen and unseen. History has shown that the apparatus is difficult to control in terms of radiation exposure, which consequently endangers the observers—both the technician and subject. Therefore, X-ray vision consists of a power structure that is not localized but rather is in constant tension among the three variables of the observer, technological apparatus, and image-spectacle.

This chapter will provide a historical overview of X-ray technology and its phenomenology of observation, organized chronologically in a series of subsections. The chapter will also argue that, despite various technical changes over time, X-rays from the beginning have tended to produce spectacular effects. I will trace both historical change and recurring visual effects in X-rays, which transform in certain ways but never completely disappear.

At their foundations, X-ray pictures—or radiographs—are photographs because they are made with light-sensitive chemistry. Yet authors frequently ignore or forget the photographic elements of radiographs. As a result, the aesthetics of radiography rarely receive articulation outside of sensationalized metaphors like “seeing-through,” and vague associations with “transparency.” Although X-ray technicians are not traditional photographers, they have harnessed an invisible light that has presented a spectacle of the body—one that could not be seen by the unaided eye. By bringing radiography back to its photographic roots, in this chapter I explore the spectacle of the X-rayed body as

a revelation induced by X-ray light. I consider radiography in the terms that Lyle Rexer has articulated:

The photographer becomes a strange type of artist, at least in the modernist sense—part showman, part magician, part stage manager. The photographer does not ‘create’ but harnesses and directs. The photograph itself is a piece of performance art, and the performer is light—its passing through and encountering things in the world.⁵

I begin this chapter with a brief historical review that explores scientific thought and anatomical gazes in America prior to Röntgen’s findings. Then, I deconstruct the technology of X-ray vision and its raw visual artifacts to understand what these early images looked like and the circumstances of their making. Next I introduce the disciplinary regimes through spectacle, X-rays’ capacity to harm observers, professionalization, and the perceptual optics to explore the aesthetics of X-ray vision and its mediation that controls the attention of observers.

THE DESIRE TO KNOW THE BODY BEFORE X-RAYS

X-rays and modern American science developed out of the scientific revolution, which occurred in Europe between the sixteenth and eighteenth centuries, and focused on the pursuit of knowledge in areas such as physics, mathematics, astronomy, anatomy, and optics.⁶ During this time, the telescope and the microscope enhanced seeing matter as far away as the stars, and as

⁵ Lyle Rexer, *The Edge of Vision: The Rise of Abstraction in Photography*, (New York: Aperture, 2013), 11.

⁶ Margaret C. Jacob’s study periodizes the Scientific Revolution beginning with Copernicus’s *On the Revolution of the Heavenly Orbs* (1543) and eighteenth-century industrialization. Margaret C. Jacob, *The Cultural Meaning of the Scientific Revolution*, (New York: McGraw-Hill, 1988), 3.

close as the detailed anatomy of insects. At the center of the scientific revolution was the desire to know, and scholars accomplished this through observation.

Knowing the body frequently took the shape of fantastical anatomical drawings. Andreas Vesalius and Juan Valverde de Amusco's illustrations of the body's interior communicated the corpse's cooperation as it modeled to the surgeon's liking. The surgeon-anatomist asserted his omniscience through the poses he directed his corpses to exhibit. In his *Historia de la composición del cuerpo humano* (Rome, 1560), Valverde de Amusco's original rendering of a male anatomical figure ostensibly expresses the body's willingness to reveal its secrets by removing its own skin (Fig. 6). Holding his skin like a garment that once confined him, the corpse's interior yields corporeal liberation from his own casing, welcoming the sight of the anatomist. By displaying the corpse as willing and cooperative as an object of surveillance, the anatomist dissembles and conceals his position of power. For the anatomist, Valverde De Amusco's illustration creates a fantasy of power, anticipating the later modern rendering of the irradiated body and its corporeal spectacle that reins in the attention of the observer without feeling the guilt of invasiveness.

Michael Sappol has argued that these harlequinesque displays of flesh and bone gradually came to an end between 1680 and 1800, while two kinds of pictorial realism entered into anatomical discourse—"one aimed to show the reality of dissection...the ugliness of anatomical mutilation" and the other,

foreshadowing X-ray imagery, "aimed to show a higher reality, displaying beautified, cleaned-up idealized bodies and body parts that float in air."⁷

The latter form of realism appeared in the "Anatomical Venuses" of the eighteenth and mid-nineteenth centuries. Italian craftsmen carved reclining beautiful nude women made from wax, each with compartments to remove their organs and to see inside their bodies. Their innards were clean and bloodless. Sculptors eroticized the Venuses with long draped hair, and some even wore strings of pearls to exhibit a passive allure for penetration. Each Venus's composure of obedience continued the fantasy of surveillance on the part of the omniscient anatomist. The anatomists exposed the Venuses' inner corporeal secrets without struggle or the gore of realistic dissection. Joanna Ebenstein writes:

The Anatomical Venus and her dissected sisters were, then, an idealized reflection of this universal notion of the human form; they were also the realization of the noble dream of an end to the need for human dissection, a way to teach anatomy without having to resort to the ethical and logistical troubles implicit in the practice.⁸

The spectacle of the Venuses related to the future irradiated body in that their exhibition isolated the subjects in the midst of exposition. The figurative displays evoked the disciplinary power of spectacle in their disempowerment and isolation as penetrable subjects. Yet they also commanded the attention of the observer with their sexual foray into medical practicality. The powerful tension between the subject of spectacle and the surveying omniscient observer will

⁷ Michael Sappol, *Dream Anatomy*, (Bethesda: Government Printing Office, 2006), 115.

⁸ Joanna Ebenstein and Colin Dickey, eds, *The Morbid Anatomy Anthology*, (Brooklyn, NY: Morbid Anatomy Press, 2014), 74.

continue with X-rays, especially in the spectacle of the irradiated female body in Chapter 2.

When the scientific revolution reached the United States in the eighteenth and nineteenth centuries, through such institutions as the Smithsonian and the American Philosophical Society, the process of looking into the human body for knowledge offered a similar cleaned-up version of the corporeal house.

Produced in the Philadelphia publication *Outlines of Anatomy and Physiology* (1847), Figure 7 presents the human body in layers that the observer could interactively flip to learn the art of dissection without the gore or the penetration of a cadaver. Regarding this image, Sappol has said that “readers could perform a ‘dissection’ just by removing the flaps. *Outlines* was designed as a pedagogical aid... ‘everything [is] represented... so that the young pupil may be taught by the eye, as in studying Geography by a map.’”⁹ The layers of organs gave way to the bone structure underneath. Each dissected view represented a cutaway of the body, a slice that could be removed to see further inside.

Late nineteenth-century visual representations of interior human anatomy included drawings, paintings, and photographs of dissections as well as of surgeries. Traditional photography captured the realism of flesh and bone, but it often contained too much other information to allow interpretation of how the body fit together or the individuality of its condition. Highlights, shadows, muscle fibers, fluids, and blood caused visual interference, obscuring the viewer’s observation of the referent, or the subject in actuality. Photography needed to

⁹ Michael Sappol, *A Traffic of Dead Bodies : Anatomy and Embodied Social Identity in Nineteenth-Century America*, (Princeton, N.J.: Princeton University Press, 2002), 200-201.

isolate the subject of investigation for clarity and to accomplish this it would impose a powerful disciplinary gaze.

In *Birth of the Clinic*, Michel Foucault proposes that the direction of the modern clinical gaze initially begins at the surface, and then, with further questioning and physical examination, achieves three-dimensional depth.¹⁰ The patient cooperates with the physician, revealing some of the body's condition while concealing it under its corporeal surface. The parts that the patient discloses receive attention even as the barriers that cover the body—along with extra redundant information—interrupt the examination. In other words, Foucault identifies the gaze as a reciprocal struggle between the doctor and patient. The end result, Foucault claims, is a “two-dimensional...portrait” of data, “that which makes, at the outset, a rational well-founded body of medical knowledge, and that towards which it must constantly proceed through that which conceals it.”¹¹ The medical gaze that Foucault describes is embodied as well as sculptural, with a methodology that requires the assembly of layers of information while encountering some resistance, to build a “portrait” comprising full anatomical depth. The gaze described by Foucault suggests a power structure in which the physician governs the observation, but it leaves room for the subject to have some agency.

The reciprocal tension between physician and subject prefigured X-ray vision at the end of the nineteenth century. However, by isolating portions of the subject, the struggle to mediate what the body revealed and concealed continued

¹⁰ Michel Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, (New York, NY: Routledge, 2012), 9.

¹¹ Ibid, 8.

into the era of X-rays. X-rays became a mediating force through which to build a complete portrait of the subject because the interior was accessible in addition to the exterior that the unaided eye could scrutinize.

In other important ways, X-ray vision of the irradiated body diverged from historical precedents in acquiring anatomical knowledge. The production of X-rays, their photographic capture, and their interpretation required a combination of sciences, including photography, mechanics, electricity, chemistry, and physiology. Additionally, in contrast to pre-modern anatomical viewing, which lacked an intervening machine, X-ray vision involved a technological apparatus to mediate observation. The desire to know the interior structure of the body required the pulse of the electricity and the glow of gases inside of glass tubes. The X-ray's mediation sanitized the image by eliminating the burdens of blood and gore physicians experienced when cutting into a patient or corpse, and created a more luminous portrait than what the clinical gaze could render. The open surface of the body revealed an ethereal, monochromatic inner world of structure that compressed anatomical layers into a two-dimensional portrait.

The technological mediation of X-rays, as I will show, is central to the aesthetics and disciplinary power of the apparatus—which sets it apart from the other kinds of seeing inside the body. An understanding of how X-ray technology worked at the turn of the century will be necessary to determine how it visualized the body in a most rudimentary state (without the additional aids of computers and digital imaging). This mediation was critical in order for X-ray vision to

perceptually stimulate the viewer by drawing attention to different kinds of anatomical information.

THE TECHNOLOGICAL MEDIATION OF X-RAYS

In the 1890s, the basic tools to generate X-rays included a high vacuum tube—such as a Crookes tube—connected to an electric generator capable of producing a high-frequency current, an apparatus that took the form of either a Holtz static electric machine or a Ruhmkorff induction coil.¹² Once the technician powered up the tube to a high frequency with a spark over two inches, a green luminous gas enveloped the interior circumference of the glass, indicating X-ray production.¹³ This light was not actual radiation, but merely a symptom that the frequency and vacuum were at the ideal levels for X-ray generation. The larger the spark, the more intense the X-rays could penetrate and become useful. Within the first few months of 1896, technicians recognized the importance of focusing the rays in order to direct them to the target and get a sharper picture. Originally manufactured in London, focusing tubes appeared in the United States within the first six months of X-ray production. Figure 8 demonstrates the look of

¹² William James Morton and Edwin W. Hammer, *The X-Ray; Or, Photography of the Invisible and Its Value in Surgery*, (New York, NY: American Technical Book Co., 1896). Nineteenth-century technicians would measure the frequency by checking the length of the spark passing through the discharging rods of the electric generator capable of producing around one-hundred volts. The spark needed to measure between two and five inches to X-ray a good range of small materials. However, to produce a picture of the chest, hips, or thighs, a spark length between eight and ten inches would be necessary (Morton and Hammer 83-85). A high vacuum occurs when “only about a millionth part of the air originally in the tube remains, while in a low vacuum about one-thousandth part may remain” (Morton and Hammer, 60). To test the vacuum, technicians would power up the tube and take note of the colorations. A bluish or purple glow would demonstrate a low vacuum whereas a green glow would demonstrate a high vacuum (Morton and Hammer, 12).

¹³ To get an idea of the high frequency, the motion of gases within the tube reach “some trillions of vibrations a second and a wave-length as short, sometimes, as $\frac{1}{2}$ cm.” Sinclair Tousey, *Medical Electricity and Rontgen Rays*, (Philadelphia: W.B. Saunders, 1921), 668.

a properly focused X-ray tube, in which the electrically charged gases create a “distinct hemisphere.”¹⁴ Contrary to a regular electric bulb, no green light escapes from the glass; and alternatively, invisible radiation is emitted and directed along this hemisphere.

Due to this invisibility, many technicians operating the high frequency tubes unintentionally produced X-rays long before Wilhelm Conrad Röntgen’s discovery in 1895. E.R.N. Grigg reports how scientists such as Nikola Tesla, Paul Lenard, and William Crookes witnessed the photographic plates near the electrical apparatus fogging up after performing experiments with cathode rays (the rays transmitted from the negative wire in the bulb).¹⁵ Lenard even reported that cathode rays could penetrate opaque substances and could create photographic imagery. However they thought that this phenomenon was just a consequence of the cathode and had no inkling that another kind of ray was the cause.

The novelty of Röntgen’s discovery resonated with photographic history—following the lineage of William Henry Fox Talbot’s *Pencil of Nature* and his light writing. Röntgen’s experiments depended upon observations and innate curiosity as he found and controlled the source of this new light. One of his experiments involved shielding the electrified tube with black cardboard, and in the darkness of his room he noticed the fluorescing of a piece of paper coated with barium

¹⁴ Demonstration of the focused tube, picture, and explanation contributed by Jeff Behary, while serving as Director of the Electrotherapy Museum. 3/3/2013.

¹⁵ Emanuel R. N. Grigg, *The Trail of the Invisible Light: From X-Strahlen to Radio(bio)logy* (Springfield, IL: C.C. Thomas, 1965), 11-13, 167. Also Emil Grubbe, an X-ray martyr, revealed that he too studied “the effect of electricity passing through a platinum vacuum tube” in the summer of 1895, which he later realized produced X-rays due to the burns he received. “The Agony Goes On,” *Newsweek*, August 3, 1959, Clippings, Thomas Edison National Historic Park.

platino-cyanide.¹⁶ He understood that no light from the tube could have caused it, and then subsequently he tested the penetration of the radiation with photographic plates, through a box of various materials that were opaque to the human eye. Following Talbot's contact-printed botanicals and lace, Röntgen contact printed his wife's hand on a photographic plate showing her interior skeleton. So his discovery of X-rays was three-fold: the evacuated tube electrified at a high frequency discharged an undocumented ray; Röntgen distinguished this ray from the cathode because it could not be deflected with a magnet; the new ray could reveal photographic results of interior structures. The latter aspect remains the most significant part of his legacy. To Röntgen's credit, the press emphasized the usefulness of his discovery by suggesting a variety of applications.¹⁷ The earliest applications included X-raying museum artifacts, interior portraiture, and as an aid for the physician or surgeon.

He called them "X-rays," with the "X" signifying a previously unknown form of ray.¹⁸ Due to the high-frequency operation of X-rays, they had the ability to penetrate a variety of thick materials, making the lower-frequency cathode rays obsolete in this respect. Despite their differences, when X-rays entered popular consciousness, journalists frequently referred to X-ray imagery as "cathodographs," as well as "skiagraphs" meaning "shadowgraphs." The repeated suffix of "graph" emphasized the importance of the X-ray's *light writing*,

¹⁶ Röntgen made X-rays with "a current of 6 amperes and a spark 5 inches long, with a plain Ruhmkorff coil 12 inches long and 5 ½ inches in diameter." "Röntgen's X-Ray Photography." *Anthony's Photographic Journal* 27, no. 4 (April 1896): 105.

¹⁷ See Chapter V. "January-March 1896" in Otto Glasser, *Dr. W.C. Röntgen*, (Springfield, IL: Charles C. Thomas Publisher, 1945).

¹⁸ See Chapter IV. "December 28, 1895: W. C. Röntgen: On a New Kind of Rays" in Otto Glasser, *Dr. W. C. Röntgen*, (Springfield, Ill.: Clarence C. Thomas, 1945).

as well as the precedent of the photograph, as it inscribed the interiors of material things.

Casting and securing the shadow was the next task. The stream of invisible light released from the X-ray tube penetrated many forms of matter to different degrees. Where there was resistance (also the most absorption) in the stream's path, there was a shadow. Dr. William James Morton, who wrote the first X-ray manual distributed in America: *The X-ray: or, Photography of the Invisible and Its Value in Surgery* (1896), demonstrated this point through a type of Crooke's tube known as the Maltese cross (Fig. 9).¹⁹ Situated at the middle-to-large end of the pear-shaped glass bulb was a Maltese cross cut-out of aluminum. This type of tube was "in almost all college laboratories at the time Prof. Roentgen first announced his wonderful discovery, and most of the early experiments with X rays were made with the aid of these tubes."²⁰ These tubes demonstrated how the aluminum cross intercepts the radiant stream and projects a shadow of itself on the concave wall of the bulb, casting a dark silhouette amidst the green fluorescence. So when Röntgen photographically exposed an object or a hand onto a glass plate, X-rays projected a shadow of the less penetrable matter. Due to this projection, the final exposed image appeared

¹⁹ Medical history has frequently neglected to mention Dr. William James Morton, who worked in Manhattan during the turn of the century. Thomas Edison referred inquiring minds to Morton, calling him the "best x-ray expert in this country." Thomas Edison, "Response from Thomas Alva Edison to Jos Lippincott Vance," June 22, 1896, Document File Series D9631, The Thomas Edison Papers, Rutgers University. After Marie Curie's experiments, Morton turned his attention to radium. The reason why he has not received much attention in secondary scholarship is because he got involved in a false mining operation with Nathaniel Hawthorne's son. Morton had his medical license revoked for a period of time and then reinstated, but his reputation was forever tarnished. He spent the last years of his life trying to impress that his father, William T.G. Morton, was the initial founder of ether—and succeeded in convincing the Smithsonian Institution to accept his father's papers into their archive.

²⁰ William James Morton and Edwin W. Hammer, *The X-Ray; Or, Photography of the Invisible and Its Value in Surgery*, (New York: NY American Technical Book Co., 1896), 62-63.

slightly magnified as the X-rays passed through the object, treating the material's resistance like an intermediary transparency before passing through onto the plate or film inside a light-tight plate-holder.

To clarify any misconception, Röntgen and his contemporaries did not see dark shadows of their hands' bones on their photographic negatives. The photographic surface recorded X-rays similar to a negative made with ordinary light. The exposed plate holds a latent image: where the image surface received the most rays and least amount of resistance, the silver-gelatin hardened and darkened. Alternatively, where the image surface received less penetration and more resistance, the subject appeared more transparent. By the end of darkroom development, the first pictures did not look like shadows at all. When raising the negative to a light source, the bones illuminated through a background of dark hardened emulsion. Morton remarked, "The only way to truly appreciate the revelations of an X-ray picture of the interior of the body is to study the negative itself; next in importance, but often most disappointing, is the print from this negative..."²¹ For Morton, as well as his scientific contemporaries, the X-ray photograph was more than an objective rendering. It was a *revelation*—indicating something quite miraculous with spiritual undertones.²²

If the owner of an X-ray picture preferred the look of the negative and wanted to preserve the beauty of its "revelations," then he or she made a negative image on paper from an inter-positive. The paper negative lost the

²¹ Ibid, 136.

²² R. F. Mould *Mould's Medical Anecdotes: Omnibus Edition*, (Philadelphia: Institute of Physics Publishing, 1996), 44-45. Linda Dalrymple Henderson, "X-Rays and the Quest for Invisible Reality in the Art of Kupka, Duchamp, and the Cubists," *Art Journal* 47 (Winter 1988): 326.

transparent material and the glow of illumination through the irradiated subject, but retained the look of its luminosity. However, making paper prints for publication or private distribution often took on a positive form in the first decades of X-ray production. The X-ray positive image is an inverse of the negative, in which the subject has shadow-like bones framed around a generally white background. Publishers preferred X-ray positives over paper negatives because they depleted less ink; making an interpositive and subsequent paper negative required more photographic paper and processing time in the darkroom. So for practical purposes then, most of the first X-ray images circulating were positives and indeed pictures of boney shadows.

In addition to the X-ray positive in a still picture, the shadow also appeared in fluoroscopy. Made famous by Thomas Edison in May 1896, the standing fluoroscope screen and the hand-held fluoroscope cast a shadow of the body's interior. The screen in both apparatuses had a coating of crystals—Edison recommended tungstate of calcium—that would fluoresce in the presence of X-rays.²³ By placing the body's limbs up against the screen, the skeleton was a deep green color, amidst the glowing yellowish-green screen (Fig. 9). The effect looked like a colorized photographic positive, with the bone a deeper shade than the outlying space. The fluoroscope had to be viewed in complete darkness because the glow from the screen was dim. If the body was close enough to the screen, the shadow would appear life-size and "clearly defined," whereas if it increased in distance from the screen the shadow would also increase in size

²³ Ibid, 69-70.

and “lost its distinctness.”²⁴ Fluoroscopic imaging offered real-time interaction, in which the subject could wiggle their fingers to affirm their identity.

So in both X-ray photography and fluoroscopy, the authority of the image depends upon concealing some matter and revealing other areas that are the points for inspection. A set of illustrations from March 1896 shows Edison adjusting how the X-rayed body appears on his fluoroscope screen at different distances from the Crooke’s tube (Fig. 11).²⁵ As the body’s distance from the tube increases and is closer to the screen, the more details of its interior workings appear. As the body’s distance from the tube decreases and is farther from the screen, the fewer the details and it appears like a shadow.

THE X-RAY SPECTACLE OF THE BODY

The technical feats of X-ray mediation recall the phantasmagoria, a historical light projection-device for theatrical displays that asserted powerful control over both the image and the attention of the participant.²⁶ Laurent Mannoni’s research on the phantasmagoria as a proto-cinematic apparatus tells us that it developed from the eighteenth-century magic lantern shows.²⁷ Frequently the image illusions for these phantasmagorias were demons, phantoms, or skeletons on slides that a showman would project from behind a

²⁴Ibid, 71.

²⁵ William J. Morton, “X-Ray Scrapbook,” New York, NY, 1896. William J. Morton Papers, 1871-1916, New York Academy of Medicine.

²⁶ Swiderski discusses the phantasmagoria in relation to X-rays, but only in terms of the representation of the moving skeleton and the comparison to fluoroscopy. He does not further explore the mediation similarities or the disciplinary power of the phantasmagoria, which I argue comprise the aesthetics of X-ray vision. Richard M. Swiderski, *X-Ray Vision: A Way of Looking*, (Boca Raton, FL: Universal-Publishers, 2012), 21-27.

²⁷Laurent Mannoni, “The Phantasmagoria,” *Film History* 8, no. 4 (1996): 390–415.

screen to shield his visibility. By moving the magic lantern projector closer to the screen, the subject appeared and materialized out from the darkness—creating the illusion that it came toward the audience. And by contrast, moving the projector away from the screen caused the subject to dissolve and dim into obscurity. This section addresses an explicit and phenomenological connection between X-ray aesthetics and the phantasmagoria as both spectacle and disciplinary power.

The phantasmagoria's spectacle depended upon an environment where technicians manipulated the attention of the participants. Tom Gunning has argued: "As an illusion, it [the phantasmagoria] worked directly on its spectators, limiting their viewpoint, controlling their perception by either withholding some sensual information or by overstimulating the senses (the combination of limiting sight, with darkness, while the ears were assaulted with eerie or unfamiliar sounds.)"²⁸ By regulating perception and limiting the visibility of the workings of production, the phantasmagoria was a disciplinary device, holding the attention of the observer and immobilizing him or her. The spectacle equally required embodied vision, so that the illusion could be processed cerebrally and the observer could be engrossed in the imagery. Jonathan Crary has described the "phantasmagoric" as "designat[ing] the systematic concealing and mystification of the processes of production."²⁹ Staging, technical manipulation, concealing and

²⁸ Tom Gunning, "Illusions of the Past and Future: The Phantasmagoria and its Specters," 2004. Accessed on 9/15/2014, <http://www.mediaarthistory.org/refresh/Programmatic%20key%20texts/pdfs/Gunning.pdf> p4.

²⁹ Jonathan Crary, *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, (Cambridge, Mass.: MIT Press, 1999), 251.

revealing optical effects that control attention, are part of the phantasmagoric spectacle.

The contemporaneous phantasmagoria that emerged just before Röntgen's discovery was known as the Cabaret du Néant (The Tavern of Non-Existence of Nothingness)—also referred to as the Café du Mort (Café of Death). The Cabaret opened in 1892 as a macabre-themed tavern in Paris's Montmartre on the Boulevard de Clichy.³⁰ When announcements of Röntgen's X-ray process emerged in the popular press, the Casino Chambers in New York City opened their version of the Cabaret du Néant on January 18, 1896. The attraction consisted of a series of chambers, each displaying the morbid delights of human decomposition. Waiters, dressed as undertakers, invited visitors to consume bubbly libations, sitting on coffins under an osseous-chandelier. The spectacle of the Cabaret depended upon the concealment of the technology. Behind the Cabaret's black curtains, technicians altered the lighting effects on the genre paintings that hung on the walls—transforming the scenes of daily life into gothic landscapes and humans into ghastly skeletons. Viewers witnessed the demise of the diegetic life inside the painting and the surfacing glow of bones. Walking into the second chamber, a Charon-figure invited a participant to stand inside of a coffin, which leaned against the wall, and cloaked him or her in a shroud. With the aid of hidden mirrors, Argand burners, and panes of glass, the body of the guest dissolved into its skeleton in front of the spectators (Fig. 12). The Charon-figure then ordered the body to materialize to its natural state. This second

³⁰ An earlier version opened in Belgium. Heather Williams, *Mallarme's Ideas In Language*, (Oxford ; New York: Peter Lang Pub. Inc, 2004), 36.

chamber became the centerpiece of New York's Cabaret, with *Scientific American* calling the skeleton's appearance an "x-ray illusion."³¹

While none of the illusions in the Cabaret employed X-ray technology, the opening of this attraction coincided with the excitement of Röntgen's discovery, and the Casino Chambers later capitalized on this association. Beginning on February 18, 1896, the Cabaret provided an actual X-ray demonstration for its paid attendees.³² There were at least two demonstrations that featured the cathode bulb fluorescing and an ensuing shadowy skeletal image. The Cabaret and its daily performances made the Casino Chambers one of the first centers for New Yorkers to experience X-rays not just as education but as a macabre amusement. As participants of the spectacle, visitors expected that they could leisurely enter and exit unscathed, and they could receive a souvenir of cardstock imprinted with a skull and cross-bones. The Cabaret attraction set up the cultural paradigm for the ways in which future artists, filmmakers, writers, and scientists were inspired by X-rays and that X-rays entered the American imagination through a conflation with the phantasmagoria's spectacle.

X-rays emerged on the American scene with the Cabaret and offered a new kind of seeing. Michael Leja has characterized this vision during the fin de siècle as "looking askance," which "was two things at once: a way of looking and

³¹ "The Cabaret Du Neant," *Scientific American* 74 (March 7, 1896): 152.

³² "Theatrical Gossip," *New York Times* (February 18, 1896): 16. There are numerous publications as far back as *Current Medical Digest*, (January 1953): 93 that claim the Casino Chambers offered the first public X-ray demonstration in the United States with the date of January 18, 1896. There were no X-rays produced at the Casino Chambers in January of that year, and asserting that the February demonstrations were the first presented in public is likely hyperbolic. Many technicians wanted to have the first X-ray producing demonstration. There is no way to measure who was the first, especially since for years prior to 1895 technicians accidentally produced X-rays with their machines.

way of thinking about looking.”³³ Looking askance addressed the limits and potential fallibility of surface oriented human vision. The urban public viewed the world around them with skepticism and tried to discern what was real or fabricated. Living in this era of looking askance was more pleasurable and magical than threatening or confusing as technologies fostered the wonderment about what the senses could not detect. Eadweard Muybridge’s photographic motion studies, Étienne-Jules Marey and Charles Fremont’s chronophotographs, and William Harnett’s trompe l’oeil paintings challenged what the unaided eye interpreted. Just days after Röntgen’s publication on X-rays in December 1895, the Lumière brothers projected the illusion of movement through their newly developed cinematograph. The birth of radiography was another extraordinary contribution to this kind of visual interrogation because X-rays drew attention to the limits of human sight.

Although there was a direct connection to X-rays and the phantasmagoria in 1896, the optical effects of the skeletal ghost corresponded to the irradiated body’s appearance on the image surface. For example, the aforementioned illustration of Thomas Edison’s fluoroscopic screen demonstrated that by moving the anatomical subject to and from the X-ray tube, details of the interior would appear and disappear. This same effect occurred with the image surfaces of glass plates and later film. The radiographic body was (and still is) phantom-like because it materializes within a liminal space—a space between the visible and the invisible, the physical and the mental. These effects, which included an

³³ Michael Leja, *Looking Askance: Skepticism and American Art from Eakins to Duchamp*, (Berkeley: University of California Press, 2007), 12.

important element of aesthetic fascination, set X-ray vision apart from anatomical and clinical gazes.

In still X-ray imaging, the glass plate or film took the place of the screen, producing the same kind of phantasmagorical effect, in which some corporeal layers were revealed while others were concealed. Most of the time, the skin and veins were invisible so that the bone and tissue structures could be visible. However, early physicians injected the body with contrast media, such as dyes or chemicals that appear as opaque on an X-ray positive, to increase the visibility of vessels and organs. In Figure 13, A.G. Fryett decreased the visibility of a fetus's bone formations while highlighting its veins and some of its internal organs with contrast media. For an X-ray of the digestive tract, subjects ingested barium, a type of contrast media, to highlight the intestines for exposure while avoiding detection of the surrounding bones. If neither tissues nor bone were the object of attention, an over-exposure of the skeleton revealed items lodged deep within anatomical density. Morton almost obliterated the skeleton entirely in order to see foreign metallic objects that rested behind bone and tissue (Fig. 14).³⁴

Alternatively, Figure 15 incorporates the rare presence of the hand's epidermal surface, recorded with X-rays by covering the hand first in a barium powder.³⁵ The skin first draws the observer's perception. The X-ray reveals it as diaphanous material, acting like a window to see through with a thin veil of frost

³⁴ William James Morton, "A Röntgen Picture from a Medical Point of View," *The New York Medical Journal*, March 14, 1896, Clipping, William J. Morton, "X-Ray Scrapbook." New York, NY, 1896, William J. Morton Papers, 1871-1916, New York Academy of Medicine.

³⁵ Jeff Behary, Director of the Electrotherapy Museum, suggested that the coating of the hand in barium powder caused the effect. However, the effect could have been created in a different contrast medium in powder form.

on its surface. Yet this view does not facilitate seeing through to the other side. Instead, it enables the observer to see *inside* the structure of the hand. The vision has traversed the surface boundary and entered into an inner topography that contains information of the body's private sphere. Therefore, an appropriate description of the aesthetic of X-ray transparency will address the dioptric quality of seeing through the open surface of the image *and* being able to see inside the structure within the image.

All of these effects resulted from how the radiographer adjusted what was seen and what remained unseen so that the body is neither completely transparent nor uncovered. In this way, the radiographer was a tinkerer of illusion and perception. Furthermore, the disciplinary power of the phantasmagoria was also part of the X-ray experience during the fin de siècle. Subjects frequently experienced X-rays in a darkened room where the apparatus was laid bare but unable to be seen. The viewing of the still image on a negative glass plate required the glow of backlighting to make the corporeal interior observable. For the fluoroscope, a dark room enabled the viewing of the bones on the glowing screen. The technician stationed the tube on the side of the screen away from the subject so that it would be hidden from sight. At X-ray demonstrations, subjects interacted in real time with their moving irradiated hands by reaching under the screen and viewing their interiors from the other side. So without seeing or knowing exactly what produced the green glow of their skeletonized hands, subjects would be immersed and absorbed in the picture. In both cases—the still radiograph and the moving fluoroscope imagery—the irradiated body was

a picture that isolated parts of the anatomy through a technical process of mediation that captured the attention of the observer. With contrast media and composing the body for different levels of exposure, radiographers managed to collect specific corporeal data by means of spectacle.

THE ELECTRICAL SUBLIME AND THE MEDUSA EFFECT

At the time of Röntgen's discovery, the desire to control this powerful new technology attracted the attention of many Americans. The electrical generators of the X-ray apparatuses, both the static electric machine and the electric coil, powered the high-vacuumed tube to produce X-rays. These generators made possible the pictures of the irradiated human interior. Radiographs were not only photographic but also electrically made, which placed them within the terrain of the late nineteenth-century's electrical sublime.

The experience of harnessing the X-ray apparatus resonated with what David Nye and Jürgen Martschukat have termed "the electrical sublime." Electricity was no longer just a natural phenomenon with unruly and unpredictable lightning strikes. It was a subject of spectacle—perceptual and physical sensation. According to Nye and Martschukat, electricity had become part of the American landscape through streetlights, electric fountains, generators at Niagara Falls, street cars, and artificial-spectacular illuminations. The electrical sublime constituted a sense of awe at the progress of civilization through human's ability to harness and dominate the natural force of electricity, and directly affected embodied human perception by drawing attention. As Nye

has argued, "Dramatic lighting made possible the revisualization of landscapes, filling them with new meanings and possibilities. It took the technological sublime in a new direction, displacing attention from particular machines or man-made structures to a set of visual effects."³⁶ Martschukat expands upon Nye by saying the following:

The natural spectacle still had the ability to cause horror and fear, but they could be conquered by means of human inventiveness and transformed into a sublime sensation within the observers. [...]The ability to channel the forces of nature and to transform them into controlled energy was considered the engine of civilization and progress as well as a sign of divine blessing. In particular, electricity was the promise of the age; electric light and dynamos had the aura of the supernatural, and at the same time they signified the boundless genius of man.³⁷

On the subject of X-rays, different inventors marketed a diverse range of electrical generators to showcase the how well each device could be controlled by the operator. One of the most creative of these inventors was Thomas B. Kinraide (1864-1927). Kinraide was a Boston electrician who, in 1896, patented an electric coil, devised as "the first practical portable high-frequency x-ray Machine."³⁸ To advertise the superior control of his coil's spark, he produced aesthetically pleasing designs in trade catalogs and held exhibitions of his work. His method involved navigating a photographic glass plate negative in the path between the two poles of his coil's spark gap, so that the spark itself made the designs. The designs resembled fragile botanical forms that shimmered with

³⁶ David E. Nye, *American Technological Sublime*, (Cambridge, MA: MIT Press, 1996), 145.

³⁷ Jurgen Martschukat, "The Art of Killing by Electricity: The Sublime and the Electric Chair," *The Journal of American History* 89, no. 3 (December 2002): 902, 920.

³⁸ <http://www.electrotherapymuseum.com/KPatents.htm> Accessed on 5/10/2016.

radiant energy, sometimes carefully organized in grids and other times patterned like starbursts.

Although other inventors experimented with electric spark photography, Kinraide's photographs were unique in his demonstration of having superior control of the spark and providing views of different kinds of electrical discharges.³⁹ To make the images in Figures 16-19, Kinraide negatively electrified the surface of the condenser plate and brought it in contact with the positive terminal of the coil, and alternatively, positively electrified the surface of a condenser plate and brought in contact with the negative terminal.⁴⁰ Figure 16 shows Kinraide's mastery of the X-ray electric coil and its spark by his creation of a grid of starbursts, each mathematically spaced to construct a pattern of similarity in form but variety in the fronds emanating from the bursts. According to Anabel Parker's 1902 story about his pictures, the spark discharge in the aforementioned figure captured "the negative ends of electrical entities." Parker specifically observed that the photographs highlighted the "apparatus unique in its delicacy of control."⁴¹

Kinraide identified three different kinds of discharge designs by changing the current of electricity in the coil. Figure 17 demonstrates what Kinraide called "the plumous" structural form from negatively charging the glass plate. The design is a burst of electrical energy with large feathers delicately radiating from the center. The Swett and Lewis Company appropriated the image for their trade

³⁹ The other inventors included: Etienne Leopold Trouvelot, Nikola Tesla, Lord Armstrong.

⁴⁰ Anabel Parker, "Curious Electrical Forms: As Shown in Mr. T. Burton Kinraide's Recent Photographs of Electrical Discharges," *Century Illustrated Magazine* LXIV, no. 3 (July 1902): 376.

⁴¹ Ibid.

catalog as an aesthetically attractive product of the electric coil.⁴² Alternatively, the positive phase of the discharge created a branching and fern-like design that Kinraide called “filiciform” (Fig. 18). Kinraide also discovered a new kind of discharge in which the positive and negative phases united at the base. He called this a “comet structure” (Fig. 19). S.H. Monell, director of the New York School of Special Electro-Therapeutics, appropriated one of Kinraide’s filiciform pictures to advertise one of his announcements. Monell wrote, “without question they (the 50 photographs) furnished the most striking, unique, and magnificent record of electrical discharges ever made.”⁴³

In 1899, Kinraide presented his electric coil and photographs at the Society of the Arts of the Massachusetts Institute of Technology in a magic lantern show format. *American Architect Building News* reviewed the exhibition and asserted that the photographs “were of extraordinary beauty and size, the delicacy of detail being brought out by means of the lantern. It is thought they may be suggestive of forms useful for designers and decorators.”⁴⁴ Kinraide’s aesthetic demonstrations of precise control over the X-ray apparatus exemplified the electrical sublime and extended it into the realm of ornamentation. The harnessing of the unruly electrical force to create spangled, dazzling, and shimmering bursts captured the awe and wonder of human domination over the unknown X-ray.

⁴² Per Jeff Behary of the Electrotherapy Museum: “The Jackson Coil was a therapeutic version of the ‘Kinraide Coil.’” <http://www.electrotherapymuseum.com/KReference.htm>. Accessed on 5/10/2016.

⁴³ E. R. N. Grigg, *Trail of the Invisible Light from X-Strahlen to Radio(bio)logy*, (Springfield, IL: Charles C Thomas Pub Ltd, 1965), 187.

⁴⁴ “Societies: Massachusetts Institute of Technology,” *American Architect and Building News* 64, no. 1220 (May 13, 1899): 55.

While the electrical sublime encouraged the attraction to X-rays and convinced the public that unknown forces could be aesthetically disciplined by human operators, technicians and radiographers did not have complete control of the technology. Even at the most conservative levels of radiation, the body's cells confront the process of physical decomposition. Chicago-born scientist, Dr. Emil Grubbe, was one of the early technicians who unknowingly produced X-rays from his tubes before Röntgen. He received burns from his experiments and, just weeks after Röntgen's published research, showed them to his colleagues at Chicago's Hahnemann Medical College.⁴⁵ Their responses claimed that "anything capable of causing such a reaction in healthy tissue might be used in treating diseased tissue."⁴⁶ Consequently, Grubbe emerged as one of the first scientists to test X-rays in the treatment of cancer.

Contrary to popular belief, the American public had awareness of the dangers of radiation within the first year of X-ray production. In the first six months of 1896, newspapers published reports of skin injuries; however, they were among the many hopeful articles that drew attention to the spectacle of X-ray vision.⁴⁷ After that, reports of danger emerged periodically in waves with the *American Amateur Photographer* making announcements about skin afflictions, and several American newspapers covering the slow gruesome death of a U.S.

⁴⁵ "X-Ray Martyr," *Time*, August 3, 1959, Clipping, Thomas Edison National Historic Park. "The Agony Goes On," August 3, 1959, Clipping, Thomas Edison National Historic Park.

⁴⁶ "X-Ray Martyr," *Time*, August 3, 1959, Clipping, Collection of Thomas Edison National Historic Park.

⁴⁷ R. F. Mould, *Mould's Medical Anecdotes: Omnibus Edition*, (Philadelphia: Institute of Physics Publishing), 1996, 41.

Army Captain who suffered from several hours of radiation exposure.⁴⁸ In November 1896, Professor Elihu Thompson even purposefully exposed his left hand's little finger to a stream of X-rays over several days and found painful blisters and swelling. He warned that the overexposure to X-rays was dangerous. Before the invention of X-rays, no image-making process resulted in such severe injuries to the body—injuries produced through invisible means and causing a protracted demise. The news reports of amputations, blistering, sterility, and lacerations from burns were understandably difficult to believe, even from the perspective of the physicians and technicians.⁴⁹ Some physicians attempted to deny the truth by adopting alternative theories for the dermatological damage, including the idea that “static electricity and individual sensitivity” caused such skin conditions, not X-rays.⁵⁰

I argue that X-ray vision had a contradictory Medusa effect on the body, insofar as it could both kill and save lives in spectacular fashion. While there are many stories of Medusa the Gorgon, some important narrative threads resonate with tales about the early history of X-rays. A mythic creature, part-human and part-monster, Medusa was frequently depicted with snakes representing her hair. Her deadly stare could turn an observer to stone. According to Greek myth, the

⁴⁸ “X-Rays,” *American Amateur Photographer* 8, no. 9 (September 1896): 395. “Danger Lies in the X-Rays,” *New York Press*, November 30, 1896, Clipping, Thomas Edison National Historic Park. “Does Danger Lurk in the X Rays,” *New York Morning Journal*, November 26, 1896, Clipping, Thomas Edison National Historic Park.

⁴⁹ In the aforementioned *New York Press* article, the author mentions how Morton and his contemporaries in New York had known experimenters who had adverse reactions to exposure. However, they dismiss the cause as not being from the tube’s radiation, but rather the experimenter was inexperienced. The report also includes the story of a woman in Kansas who had her foot amputated because of abscesses formed after radiation. The article claims that many physicians did not believe that x-rays could cause such an extreme effect.

⁵⁰ Allen Brodsky, Ronald L. Kathren, and Charles A. Willis, “History of the Medical Uses of Radiation: Regulatory and Voluntary Standards of Protection,” *Health Physics* 69, no. 5 (November 1995): 784.

hero Perseus risked his own petrification in order to decapitate Medusa and use her gaze to kill the Kraken and save the life of Andromeda. Using his shield to view Medusa's reflection, thereby avoiding her direct gaze, Perseus managed to slay her and complete his task.

Scholars have theorized different kinds of Medusa effects in relation to visual culture. In describing Barbara Kruger's photo-collage *Your Gaze Hits the Side of My Face* (1981), Craig Owens identified the Medusa effect as "vision bending back upon itself to produce its own imprint," referring to the male gaze that strikes and immobilizes the female body.⁵¹ W.J.T. Mitchell expands the effect beyond Kruger and gender, suggesting that it is a disciplinary power that images have over observers, causing the observer "paralysis" while their perceptual attention is sustained in the presence of a spectacular image.⁵² More recently, Thomas Albrecht argues that the representation of Medusa in Renaissance paintings is a "ruse...to know or to see the forbidden thing," and "Medusa's head is indicative of [this] truth or thing that can only ever be known or seen figuratively, in the form of images, as any direct seeing of it is not a form of knowing."⁵³ The Medusa effect, he suggests, uses the representation of something forbidden to mitigate the danger of the actual referent. Although the image may offer some defense, danger still "inheres within the representation," especially if that representation is in any way "illusory, deceptive, or unstable."⁵⁴

⁵¹ Craig Owens, "The Spectacular Ruse; or The Medusa Effect," in *Barbara Kruger: We Won't Play Nature to Your Culture*, (London: Institute of Contemporary Arts, 1983), 8.

⁵² W. J. T. Mitchell, "What Do Pictures Really Want?" *October* 77 (Summer 1996): 81.

⁵³ Thomas Albrecht, *The Medusa Effect: Representations of Horror in Psychoanalysis and Victorian Aesthetics*, (Albany: State University of New York Press, 2009), 6-12.

⁵⁴ Ibid,15.

Like Medusa, observers only knew X-rays through the representations they created. So the role of Medusa comprised both the image of “forbidden” knowledge (the interior’s spectacular revelation) denied to natural human vision, and the X-ray vision that caused what Edison believed to be “the killing or paralyzing of certain white blood corpuscles known as phagocytes, whose function is to circulate through the blood and into the tissues, carrying away all foreign substances that disturb the healthful condition of the flesh and blood.”⁵⁵ Cellular paralyses at the bare minimum, or the destruction of an entire body at the maximum, are the expenses for saving or improving life. The raw non-simulated images created with X-rays carried with them the stigma of this Medusa effect. Despite the efforts to harness X-rays, the apparatus itself became a disciplinary mechanism, which led many early technicians and radiographers down the path to martyrdom.

“Medical futurism,” which Nancy Knight has termed to represent the hopes of the X-ray’s “miracle machine,” distracted physicians and technicians from the reports that continued to mount.⁵⁶ According to Knight, X-ray’s significance to medicine offered to “transcend traditional healing powers and promised that solutions to disease and death were as close as the nearest patent office.”⁵⁷ In addition, as Rebecca Herzig has argued, the X-ray’s promises inspired many

⁵⁵ “Edison Describes Effect of X-Rays,” n.d., Clipping, Collection of Thomas Edison National Historic Park.

⁵⁶ Nancy Knight, “The New Light: X-Rays and Medical Futurism,” in *Imaging Tomorrow: History, Technology and the American Future*, edited by J. Corn, (Cambridge, Mass.: MIT Press, 1986), 11.

⁵⁷ Ibid.

technicians to endure like patriotic soldiers willing to sacrifice their bodies for the well-being of future generations.⁵⁸

Expanding upon these scholarly suggestions, I propose another interpretation. While indeed the hopes for healing the body and the allure of the patriotic sacrifice attracted the early martyrs, the desire to harness the electrical sublime of the X-ray apparatus was another important reason for their persistence. In *Godey's Magazine*, Mrs. Laban Smith associated those on the margins of society and the conservatively religious with “primitive people,” contending that they did not “care for the march of the world, for the strides of electricity and the wonder of the ‘x-ray.’”⁵⁹ Fascinations with electrical innovation indicated an advanced civilization, with those harnessing the electricity as masters of that civilization. In addition, Martschukat argued that the electrical sublime also encompassed magical components. Citing Schuyler Wheeler, Martschukat argued that “machines powered by electricity produced ‘results strangely unlike everything previously seen,’ and thus they appeared ‘almost magical.’”⁶⁰ The X-ray apparatus was a machine for technicians to govern: “with it we can make the human body as transparent as glass, see through four inches of steel, tell a frost-bitten orange from a good one and save industry and agriculture thousands of dollars.”⁶¹

⁵⁸ Rebecca Herzig, *Suffering For Science: Reason and Sacrifice in Modern America*, (Piscataway: Rutgers University Press, 2005).

⁵⁹ Mrs. Laban Edward Smith, “In Old Gray Sanctuaries,” *Godey's Magazine* 134, no. 799 (January 1897): 71.

⁶⁰ Jurgen Martschukat, “The Art of Killing by Electricity: The Sublime and the Electric Chair,” *The Journal of American History* 89, no. 3 (December 2002): 916.

⁶¹ Arthur H. Warner, and Kenneth Crist, “X-Ray—Master of Magic,” *Los Angeles Times* (Los Angeles, CA), October 7, 1934, K7.

Meanwhile, independent studies on radiation exposure were penned by significant scientists like Professor Elihu Thomson—one of the founders of the General Electric Company. By the end of 1896, Thomson's research confirmed Grubbe's observations that X-rays had a hostile effect on human tissue.⁶² Despite these studies and news reports, the British Rontgen Society did not appoint a committee to officially investigate the “injurious effects of Roentgen rays” until 1898.⁶³ Thomas Edison’s assistant and chief X-ray technician, Clarence Dally, began experiencing the physical consequences of operating Edison’s fluoroscope tubes as early as 1896. However, he continued his work while his hair fell out, skin dried up, and he received numerous amputations. Around 1901, Edison ended research on his fluoroscope apparatus after he witnessed some disturbance in his own eyesight as well as the extreme deterioration of Dally—but he did not officially announce this until 1903 when he realized that Dally would likely die from his injuries.⁶⁴

Edison’s silence on the physical dangers of X-ray production is significant, especially since the press shaped him as the quintessential American figure representing the hopes of X-rays. Embodying the meaning of American *scientific haste*, Edison and his laboratory’s invention designs dominated many industrial fields including electricity, sound projection, batteries, motion pictures, and

⁶² Elihu Thompson, “Roentgen Rays Act Strongly on the Tissues,” *The Electrical Engineer* 23, no. 447 (November 25, 1896): 534.

⁶³ R. F. Mould, *A Century of X-Rays and Radioactivity in Medicine: With Emphasis on Photographic Records of the Early Years*, (Philadelphia: Institute of Physics, 1993), N.p.

⁶⁴ “Edison Fears Hidden Perils of the X-Rays,” *New York World* (New York, NY), August 3, 1903, 1. Edison also made vague statements in 1896 that X-rays hurt his eyes after working on the tube for several hours. But these statements served more to diffuse the far more alarming reports that came out in the press. “Electrical Field: The Effect of Roentgen Rays upon the Eye,” *Los Angeles Times* (Los Angeles, CA), April 5, 1896, 9.

mining.⁶⁵ Although he had a team working on a variety of different projects, Edison's name indicated a sensationalized mythology of American science. His accomplishments inspired his contemporaries to compete; however, they also generated criticism towards his monopoly on industrial inventions and X-ray experiments. One article complained, "As a member of a large and ambitious class of scientists and experimenters, I wish to enter an emphatic protest against Mr. Edison discovering everything in connection with this new photography... While we are waiting for Crookes tubes to go to work, he is pre-empting the whole realm of science and art and surgery."⁶⁶ Although he was no man of medicine or art, Edison was the driving force that perpetuated the X-ray's association with the miraculous and the mystical, until his announcement following Dally's certain death. Dally died from complications due to radiation exposure in 1904.

PROFESSIONALIZATION

In the beginning, anyone who had access to a vacuum tube, a high-frequency electrical generator, and photographic studio equipment could make X-rays and produce images. Some experimenters, like William James Morton,

⁶⁵ According to Arthur Fuchs, Edison had many professional fields competing for his attention: "The manufacture of cement grew out of his [Edison's] iron-ore concentrating venture; improvements in the Edison alkaline battery were being rapidly made; and, in 1907, the universal electric motor was developed. Further work on the phonograph improved the reproduction of vocal and instrumental music." Arthur W. Fuchs, "Edison and Roentgenology," *The American Journal of Roentgenology and Radium Therapy* LVII, no. 2 (February 1947): 156.

⁶⁶ "Hold On, Mr. Edison," *Commercial Advertiser*, February 13, 1896, Clipping, Thomas Edison National Historic Park.

even claimed to use a regular incandescent lamp to generate X-rays.⁶⁷ X-ray making, processing, and reading the pictures for information each required different sets of skills. A professional skilled at electricity worked the apparatus, a photographer exposed and developed the negatives, and a physician read the anatomical image. Photographers learned how to make X-rays for lucrative business and to aid physicians who had no photographic equipment. They originally wanted to capitalize on the public's interest in X-rays and take the market away from the medical profession.⁶⁸ Photographers opened "Roentgen studios" that advertised "X-ray sittings."⁶⁹ As more horror stories appeared in the press about radiation burns, the photography field removed much of their interest in actual radiography.

Alternatively, some physicians learned how to make photographs and outfitted their medical practices so that they would not have to send their plates to a photographer for processing. The high interest in X-rays precipitated cross-disciplinary professional exchanges and training. With the practice of radiography lacking standards and organization, the professionalization of X-ray making was essential for a safer process and training. The professionalization of X-ray work bifurcated into the fields of radiology (interpreting the X-ray pictures) and radiography (the photographic work of the X-ray technicians). As radiological societies and technological improvements in the equipment increased, the public

⁶⁷ "New Routes for X Rays: More Ways than One of Exciting the Mystical Dark Vibration," *San Francisco Examiner* (San Francisco, CA), March 3, 1896, Clipping, William J. Morton, "X-Ray Scrapbook." New York, NY, 1896. William J. Morton Papers, 1871-1916. New York Academy of Medicine.

⁶⁸ "The New Light: Our Own Investigations," *The Photogram* 3, no. 27 (March 1896): 73. E.A. Robins, "The New Light: Apparatus for Rontgen Work," *The Photogram* 3, no. 27 (March 1896): 73. "Rontgen Work for Profit," *The British Journal of Photography*, (July 10, 1896): 434-35.

⁶⁹ Douglas Collins, *The Story of Kodak*, (New York, NY: Harry N. Abrams , Inc., 1990), 299.

perception of X-rays was less enigmatic as Americans believed that X-rays were under stricter control.

A number of factors encouraged the professionalization of X-ray generation. First, the early experimenters who suffered from radiation exposure were instrumental advocates for safety measures, standards, and specialization. In 1896, Emil Grubbe promoted lead protection by devising a thin foil made of 95 percent lead and 5 percent tin to shield healthy parts of the human body from X-ray exposure.⁷⁰ After suffering from burns, William Herbert Rollins recommended “wearing radiopaque glasses, enclosing the x-ray tube in a leaded or non-radiable housing, and irradiating only areas of interest by covering adjacent areas with material.”⁷¹ However, according to E.L. Harris, no one paid attention to Rollins because he seldom attended society meetings.⁷² After a few scientists like Grubbe and Rollins put forth suggestions for protection, S.H. Monell proposed a Committee on Standards of the American Roentgen Ray Society in 1901. Monell argued that standards would “promote uniformity in results and to secure accuracy and give legal value to the evidence of x-rays.”⁷³ As technology changed, these recommendations on enclosing tubes, quantity of radiation, and other equipment would be the first of many Committee rules on safety throughout the twentieth century.

⁷⁰ E. R. N. Grigg, *Trail of the Invisible Light from X-Strahlen to Radio(bio)logy*, (Springfield, IL: Charles C Thomas Pub Ltd, 1965), 839. Mihran Krikor Kassabian, *Röntgen Rays and Electro-Therapeutics: With Chapters on Radium and Phototherapy*, (Philadelphia: J.B. Lippincott Company, 1907), 524. Emil H. Grubbe, “The X-Ray Treatment of Skin Cancer,” *The Medical Brief*, (August 1914): 499.

⁷¹ E. L. Harris, *The Shadowmakers: A History of Radiologic Technology*, (Albuquerque, NM: American Society of Radiologic Technologists, 1995), 9.

⁷² Ibid.

⁷³ S. H. Monell, “Roentgen Society: Committee on Standards,” *American X-Ray Journal* 8, no. 6 (1901): 926.

Professional societies and associations in the United States sprang up as efforts for consistency and regulation increased, each provided a set of their own standards, published journals, and offered archives of important research. Among them were the American Roentgen Ray Society (founded in 1900), the Radiological Society of North America (1915), and the American College of Radiology (founded in 1923). At its inception in 1900, the American Roentgen Ray Society sought to gain approval from the American Medical Association, but was not at first warmly received. Instead of accommodating medical professionals, the Society membership was primarily composed of physicists and electrotherapists.⁷⁴ However, with their persistence and a purging of the non-medical members, by 1905, the Society became “an honor society for the elite, controlled by East Coast physicians.”⁷⁵ X-rays, then, were medicalized in the American imagination ten years after Röntgen’s discovery.

The manufacturing of photographic equipment and apparatuses also propelled professionalization. Eastman Kodak and General Electric led the industrial production of supplies for X-ray work in America. In addition to standard silver gelatin glass plates, Eastman Kodak manufactured silver bromide papers in 1901. However, fine detail was difficult to record on this paper. Furthermore, World War I suspended Belgium’s manufacturing of photographic glass plates. So, in 1914, Kodak manufactured single coated cellulose nitrate film made specifically for radiography. According to Fuchs and Martin, this film had:

⁷⁴ E. L. Harris, *The Shadowmakers: A History of Radiologic Technology* (Albuquerque, N.M.: American Society of Radiologic Technologists, 1995), 11.

⁷⁵ Ibid, 12.

an emulsion of greater sensitivity than that on any roentgen plate theretofore. The urgency of war demanded greater efficiency and speed in the X-ray film because of its use with portable X-ray apparatuses in the field. This need brought to a head the extensive research work then being conducted on double coated film.⁷⁶

During this time, in 1913, William Coolidge developed the Coolidge X-ray tube. The early X-ray tubes were frequently unpredictable in terms of how well they vacuumed the gases. The Coolidge tube modernized the making of radiographs by replacing the platinum in the tube with ductile tungsten and “made it possible for the operator to control the output of x-rays.”⁷⁷ This control of the output made it safer for the technician and the subject. The bulb was smaller and lighter than earlier tubes. The Coolidge tube helped make X-ray machines portable for the Medical Corps during World War I, with models called “the U.S. Army Portable outfit” and the “U.S. Army Bedside Outfit.” The Red Cross standardized it for use in hospitals.⁷⁸

Furthermore, after World War I, the open tube connected to the apparatus phased out into models that required protective coverings. In 1920, Henry Fuller Waite, Jr. patented the oil-immersed model. According to E.R. Grigg, “the x-ray tube was encased together with the transformer in a box filled with oil. This was the first oil-immersed, shock-proof and later (when the box was lined with lead) also the first ‘radiation-proof’ apparatus.”⁷⁹ Thus, with the protective covering

⁷⁶ Frederick C. Martin and Arthur W. Fuchs, “The Historical Evolution of Roentgen-Ray Plates and Films,” *The American Journal of Roentgenology and Radium Therapy* 26, no. 4 (October 1931): 545-546.

⁷⁷ General Electric Company, *The Story of X-Ray* (Milwaukee, WI: General Electric Company, 1963,) 11.

⁷⁸ General Electric Company, *The National in the World War: April 6, 1917-November 11, 1918...* (Cleveland, OH: Gilman Printing Company, 1920), 247-248.

⁷⁹ E. R. N. Grigg, *Trail of the Invisible Light from X-Strahlen to Radio(bio)logy* (Springfield, IL: Charles C Thomas Pub Ltd, 1965), 74-75.

concealing the inner-workings of the technology, the X-ray apparatus had become a phantasmagoria itself. The crackle of the spark, the visibility of the tube's green glow, the physical sensation left the components of spectacle, with only the glowing irradiated body remaining in a darkened room.

As time progressed, and the medicalization of X-rays continued, the subject's access to view or own his or her X-ray pictures decreased. Many medical offices decided to not release X-ray negatives and prints to the patients. Dr. Alan Hart explained:

For years the medical profession looked upon the roentgenologist as a sort of super-photographer who was not entitled to the same standing as other specialists. [...] Not until World War 1 did X-ray work come to be regarded as a specialty really worth a man's while to master. [...] Physicians are coming to look upon the roentgenologist as a medical consultant who is entitled to all available knowledge of the case before he examines the patient, and not as a mere photographer who makes pictures of various parts of the body on order.⁸⁰

Professionalization of X-ray work constrained subjects' rights to see, so that the X-ray vision itself became a privileged object for the educated person of science.

All of these factors contributed to a new disciplinary action on the part of the irradiated body spectacle. X-ray pictures were no longer for just anyone. Sometimes subjects could not see their own radiographic images and, more often than not, they saw irradiated anatomies belonging to other people in popular magazines, advertisements, art, comic books, and movies.

Consequently, when X-ray pictures of the body appeared in visual media, the spectacle became less about a novelty of interaction, and more about seeing

⁸⁰ Alan Hart, *These Mysterious Rays, a Non-Technical Discussion of the Uses of X Rays and Radium, Chiefly in Medicine* (New York: Harper, 1943), 191-192.

something that was increasingly forbidden. However, the desire for interaction produced the commodity of the X-ray Specs, an amusement toy glasses that refracted light around materials to create a prismatic effect. At the same time, X-ray Specs did not enable the viewer to see-inside their bodies, and could not provide the illusion of the body spectacle. Ultimately, most of the time, physicians experienced actual X-ray vision more than the subjects-patients.

The image-spectacle for medical interpretation has had a complex relationship between representation and referent. According to Luc Pauwels, “visual representations in science may refer to objects that are believed to have some kind of material or physical existence, but equally may refer to purely mental, conceptual, abstract constructs and/or immaterial entities.”⁸¹ There are some referents that can be “directly observable to the human eye,” but others that “only become visible with special representational means and devices.” I propose that the referents in X-ray images have fallen under the latter category. While they did not reflect materials in the visible natural world, they have had value in “the production of a scientific reality”—which entails “solving a problem, filling gaps in our knowledge, or facilitating knowledge building or transfer.”⁸² Furthermore, because of modern embodied vision, the referents in X-ray images have been also, in part, mentally constructed. Even though they may have not existed exactly as they have appeared in the natural world, medical professionals

⁸¹ Luc Pauwels, “A Theoretical Framework for Assessing Visual Representational Practices in Knowledge Building and Science Communications,” in *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication* (Hanover, NH: Dartmouth College Press, 2006), 2-3.

⁸² Luc Pauwels, “Introduction: The Role of Visual Representation in the Production of Scientific Reality,” in *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication* (Hanover, NH: Dartmouth College Press, 2006), viii. Pauwels cites M. Lynch in that “the production of scientific reality” is what visualization is about.

treat them as data containers of spatial and material depth. For example, X-ray images of an individual's anatomical limb have guided the surgeon when inserting surgical pins into the physical limb. An amalgamation occurs, in which the X-ray image and the X-rayed referent have shared the same identity in the observer's mind. The consequence of this bond has projected the illusion that the observer maintains the power to see inside materials, enacting the role of the technology, and constructing the image's surface as open or see-through.

In traditionally-made photographs, the image surface is open like a window for the eye to observe. Reflecting on the life of the photograph, Roland Barthes struggled with the photographic window that lured him into the illusion to see the world beyond it, but at last he came to recognize the image's physical structural support. He writes, "I cannot penetrate, cannot reach into the Photograph. I can only sweep it with my glance, like a smooth surface. The Photograph is flat, platitudinous in the true sense of the word, that is what I must acknowledge."⁸³ Since it is part photographic, the X-ray image's surface also has functioned like a window for the observer to see inside. However, when life and death have been on the line, the referent in the X-ray photograph has held more authority than the referent seen in photographic realism. While surgeons have not been able to reach inside the X-ray image, the perceptual relationship between image and referent enabled them to perform surgeries and make diagnosis in the physical referent. The union of the image and referent, as well

⁸³ Roland Barthes, *Camera Lucida: Reflections on Photography* (New York, NY: Hill and Wang, 2010), 106.

as the conflation of the technology with embodied vision, has constructed the wonders of how medical personnel have perceived X-rays and their spectacle.

John Sloan, an artist of the Ashcan School, depicted the technological attributes and disciplinary professionalization of the radiological field in his 1926 print *The X-Rays* (Fig. 20). The print is a self-portrait of the artist undergoing an examination of his digestive system using a lead-glass fluoroscope.⁸⁴ In this picture, Sloan holds a glass half-full of barium, while the physicians survey his stomach and intestines darken as he digests the contrast media. The fluoroscopic screen provides the only light source for the room, enough to illuminate two framed professional degrees on the wall, their owners examining Sloan's innards, and consequently his face of frustration. Sloan made approximately fifty-five copies of the print, using the sales to pay his medical bills.⁸⁵

Similar to his other paintings and illustrations, Sloan's narrative in his print depicts an everyday event experienced by the working class, in which he uses humor to poke fun at power structures and inequality. Katherine Manthorne has argued, "Sloan saw the artist as an expert, a professional looker if you will, like the x-ray technician or medical doctor who had the right to look where others do

⁸⁴This type of fluoroscope was made with lead-glass to protect the physician's eyes from radiation. Its surface was coated with crystals that fluoresced in the presence of X-rays. The X-ray tube was stationed behind the subject. Using a pedal, the physician could move the screen up or down, left or right to adjust the vantage point into the body. Stephen J. Hage, *Let There Be Light: Physics, Philosophy & The Dimensional Structure of Consciousness* (New York, NY: Algora Publishing, 2013), 287.

⁸⁵ Stefan Schatzki, "John Sloan's 'X-Rays,'" *American Journal of Radiology* 156, (March 1991): 554.

not.”⁸⁶ However, here, in the space of the X-ray room in which his face is more visible than his doctors, Sloan encourages the observer to empathize with the representation of himself, as a patient, under the gaze of medical professionals. He stands immobilized in between the vertical fluoroscopic table and the screen’s window. The window, a frequent spatial device in his paintings and illustrations, in this setting gives him no voyeuristic pleasure. Not only does the room conceal the technology from him, but also the fluoroscope’s window is equally inaccessible to him. However, his compliance as the irradiated subject enables his body to become the image spectacle and container of knowledge for the medical professional to consume. Sloan’s narrative assesses how X-ray vision has become a privileged view—no longer egalitarian in which the participant can see his or herself.

Sloan titled his print *The X-Rays* and yet he may not be referring to *what* is seen on the fluoroscope as much as *how* it is seen. In his print, the two physicians wear red goggles, which had only been on the market for one decade prior.⁸⁷ A proper fluoroscopic examination depended upon the physician’s eyes adapting to the darkness of the room in order to read the fluorescing screen.⁸⁸ Prior to the 1950s, physicians wore red goggles, but not to view the glowing screen. They put on the goggles at least one hour before and after entering the dark room to allow the retinal rods in the eye to adjust slowly to and from the

⁸⁶ Katherine Manthorne, “John Sloan’s Moving-Picture Eye,” *American Art* 18, no. 2 (June 1, 2004): 93.

⁸⁷ Wilhelm Trendelenburg invented the red goggles in 1916.

⁸⁸ Richard H. Daffner and Matthew Hartman, *Clinical Radiology: The Essentials* (Philadelphia: Lippincott Williams & Wilkins, 2013), 2.

darkness.⁸⁹ While Sloan's depiction of the physicians wearing goggles in the dark room is historically inaccurate, the professional goggles render the physicians as outlandish figures, physically and emotionally detached from the subject of their scrutiny—the patient. Furthermore, they work as mediators for the embodied vision, connecting the physiology of the retina to the image-spectacle provided by the X-ray. Overall, the print shows the space of the X-ray spectacle in a disciplinary setting.

Over time, X-rays were increasingly more professionalized through the efforts to push safety standards, the merchandizing of industrial materials, and the professional societies that developed. In the early 1930s, the National Bureau of Standards began publishing handbooks on radiation protection, which made recommendations for rooms containing the apparatus, marking devices with labels, requiring tube enclosures, protection of patient, physician, and personnel, protection from direct radiation and scattered radiation, electrical protection, and the storage of films.⁹⁰ Furthermore, in 1934, physicians established the American Board of Radiology, which oversaw certification and professional development of different radiological specialties. Despite the radiograph's association with the medical realm, it maintained its optical spectacle and disciplinary grip on the privileged few who were able to look at actual non-simulated X-ray pictures.

⁸⁹ During the 1950s, image intensifiers were developed to increase the visibility of the imagery on the fluoroscopic screen, enabling the examinations to take place in dim uv light. Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century* (New Brunswick, N.J.: Rutgers University Press, 1997), 68.

⁹⁰ U.S. Department of Commerce, *X-Ray Protection: Handbook, Bureau of Standards, No. 15*. (Washington, DC: Government Printing Office, 1931).

THE PERFECT RADIOGRAPH

While radiology grew increasingly professional with standards for equipment and safety, the field of radiography also developed with new equipment, photographic materials, and the standards for the image. Between the 1930s and '40s, the base for the radiograph phased out highly-flammable cellulose nitrate film and brought in cellulose acetate—a safety film stock. Radiographers used intensifying screens, placed inside the cassette holder for the film or over the fluoroscope screen to aid in increasing the contrast of the irradiated body. By the 1940s, manufacturers coated X-ray film with emulsion on both sides to increase the contrast of the image and decrease the exposure time on the subject. Radiographers regularly referred to double-sided emulsion as "non-screen film." By 1942, the company Pako devised the first automatic X-ray film processor that processed "120 films an hour, to a total cycle time of approximately 40 minutes per film."⁹¹

Spearheading the improvements for image quality was Ed C. Jerman of Chicago, Illinois, head of the Education Department of General Electric (1918-1934). Contemporary authors refer to him as the "Father of Modern Radiologic Technology."⁹² In his manual *Modern X-Ray Technic* (1928), Jerman recounted the history of radiography, explaining that originally men performed most of the technical X-ray work.⁹³ However, the field began accepting women in the early

⁹¹Kodak Health Sciences, *Radiography: The First Century* (Rochester, NY: Eastman Kodak Company, 1993).

⁹²R. Terrass, "The Life of Ed C. Jerman: A Historical Perspective," *Radiologic Technology* 66, no. 5 (June 1995): 291–98.

⁹³Eddy Clifford Jerman, *Modern X-Ray Technic* (Saint Paul, Minneapolis: Bruce Publishing Company, 1928), 11.

twentieth century to fill needed positions. Women comprised the majority of the field in the 1920s and 30s.⁹⁴ A good number of them were Sisters of Catholic Hospitals who had the right combination of education and training. Additionally, many women who were rejected from medical schools turned to radiography as an alternative career.⁹⁵ Furthermore, he wrote, “for many years there were no schools for the training of technicians... Through lack of control of the energy used, technic was mostly guesswork... ”⁹⁶ Jerman found the absence of standards unacceptable.

The radiographic image, the bearer of the body spectacle, became a subject of formal scrutiny—which Jerman wanted to refine for high quality. He argued that the perfect radiograph would have a “minimum of distortion, the maximum of detail without evidence of movement, sufficient contrast to make the detail plainly visible, and that degree of density which will in no way interfere with the maximum of contrast.”⁹⁷ Distortion, detail, contrast, and density were the terms that radiographers globally recognized as being components of high quality X-ray images. Jerman drew attention to the exposures of the irradiated body and their potential for “twisting,” “turning,” “unusual shapes,” “contour lines of objects,” “improper alignments” “percentages of grain,” and “lightness and darkness.”⁹⁸ Correcting these components enabled the best possible image, producing an enhanced body spectacle.

⁹⁴ Ibid, 12.

⁹⁵ Personal correspondence with Catherine Price. 8/11/2015.

⁹⁶ Eddy Clifford Jerman, *Modern X-Ray Technic*, (Saint Paul, Minneapolis: Bruce Publishing Company, 1928), 11.

⁹⁷ Ibid, 119.

⁹⁸ Ibid, 119-123.

Following this movement for the art of radiography, the most impressive were those made by Jerman's General Electric successor, Harold O. Mahoney also of Chicago. His work integrated well with the X-ray explorations of the time. In the 1930s, radiographers experimented with early forms of tomography (or body-section roentgenography), which attempted to isolate and section single layers of the human body with the X-ray. At the same time, radiographers tried to improve recordings of soft tissue in radiography. Around 1935, Mahoney embarked on a collaborative project between his parent company General Electric and Northwestern University's Anatomy Department. His goal was to provide a visual framework for radiographers to study anatomy for properly positioning the body during exposure. Additionally, Mahoney argued, "radiographic anatomy should emphasize the location of the anatomic parts and their relation to surrounding structure..."⁹⁹ He sectioned by hand the Anatomy Department's frozen embalmed cadavers and X-rayed each slice.

Figure 21 shows one of Mahoney's radiographs, in positive cyanotype form.¹⁰⁰ The picture is unlike any other radiographic spectacle of the human body, including sharp fibrous textures of muscle, ribbon-like impressions of bone, and the shimmering soft tissue in the lungs and upper extremities. Mahoney's sectioning method produced a nearly symmetrical subject with mathematical proportion. Contrary to the phantom-like presence of an ordinary radiograph, this irradiated body has distinct physical boundaries, with occasional softness around the edges to suggest the irradiated body's phantasmagoria. Mahoney's approach

⁹⁹ Harold O. Mahoney, "The Jerman Lecture," *The X-Ray Technician* 19, no. 1 (July 1947): 4.

¹⁰⁰ These cyanotypes were printed by the Army Medical Museum ca. 1940-1950.

brought Jerman's expectations to fruition. The picture of the body contained minute details of fibrous soft and hard tissues, no movement, high contrast to make the interior architecture pop, and a density of physicality. Mahoney had trouble with the component of distortion because the slicing of the body created unique designs and patterns, which, even when the observer viewed the slices in sequence, maintained some abstraction and optical illusions. In this example, the pelvis reads as a pelvis, but it is not a complete pelvis and contains detailed soft tissue that overlaps the bone.

Figure 22 ventures into the other extreme. It lacks the density of the previous image, with the anatomical edges softly dissolving into a pool. The ribs can read as ribs, but in their un-materialized state, they appear as a spider-like form aloft over vital organs. The phantasmagoria of the irradiated body is far more pronounced in this image, with the most exterior part of the male human anatomy dissolving into the most interior portions underneath the ribs. As an academically trained artist, Mahoney's method produced aesthetic designs of the interior that distracted from a purely didactic anatomical diagram, interrupting a scientifically objective view with subjective physiologically-optical projections.¹⁰¹

Mahoney's series of pictures like this were on display as spectacles at medical association meetings and, approximately between 1940 and 1950, were on exhibition at the Army Medical Museum in Washington, DC. So while these images originally were seen by a privileged few with medical training, the

¹⁰¹ Mahoney studied painting, drawing, and sculpting the human figure at the Art Students League of New York and the Art Institute of Chicago. He maintained an artist studio through his entire adult life while working as an X-ray technician for General Electric and training the Sisters of Catholic Hospitals.

museum venue made them publicly accessible for non-trained eyes. For the non-professional, his radiographs' spectacle spoke to the interior landscape of the body—its glittering intestinal terrains, the tributaries that carry blood, and the gothic transept and nave of bony architecture. They contained information unseen before in any anatomical image from the photographic outlines of muscle, to lucid organs, to abstracted impressions of bone. Eventually, the cyanotype prints appeared in the fine art photography market and are now in the most prestigious art collections in the United States, including the National Gallery of Art, the Metropolitan Museum of Art, and the Museum of Fine Arts in Houston.

Mahoney's spectacles of the irradiated body were also unique in the history of X-rays. Ever since Röntgen's discovery, radiographers attempted not only to attain images of bone but also soft tissue. William James Morton claimed in 1896 that he could record soft tissue and bone by adjusting the exposure time and the distance of the corporeal limb from the image surface.¹⁰² However, neither Morton, nor any radiographer after him for many years, could attain soft tissue and bone in the *same* radiographic image. Mahoney's achievement of this difficult feat earned him praise, but his process was impractical to replicate and became lost in time. In hindsight, his radiographs set the roadmap for the future of the field of tomography.¹⁰³ Although he produced his radiographs without

¹⁰² William James Morton, who wrote the first X-ray manual in the United States, published that he could obtain "delicate, ghost-like, yet clearly defined, outlines of skin, muscle, tendon," and veins, arteries, and soft tissue organs when injected with a contrast medium." William James Morton and Edwin W. Hammer, *The X-Ray; Or, Photography of the Invisible and Its Value in Surgery* (New York, NY: American Technical Book Co., 1896), 144, 157-158.

¹⁰³ Tomography involves using X-rays to cross-section the human body and isolate its layers. Usually, the subject lays on a table and the X-ray tube circles the subject effectively slicing the

manipulating the technology by tomographic means, the pictures were superior photographic prototypes for what computed tomography would look like in the late twentieth century.

THE RADIATION SCARE

After the United States dropped atomic bombs on Japan during World War II and entered the Cold War, radiation exposure became a global concern resulting in a reassessment of X-rays as a form of radiation, demanding scrutiny about appropriate dosages and thwarting X-ray's Medusa effect to some extent. In 1946, the American Standards Association recommended a daily dose of no more than 0.1R, with the R being the roentgen unit of radiation exposure measurement. However, as Duffin and Hayter have explained, "these standards were difficult to apply because the dose rate varied with distance from the x-ray source; it was also recognized that tolerances might be higher if only a part, rather than the whole, of the body was exposed."¹⁰⁴

Even though the apparatus became more predictable and portable, and safety standards helped protect technicians and subjects, its Gorgon stare continued to be a threat because radiologists could not agree on what constituted a lethal dosage of radiation. In 1949, *Time Magazine* asked physicists and radiologists "how much radiation would it take to kill a man?"¹⁰⁵ These specialists responded with a wide range of answers, "from twenty-five roentgens (the

body without penetration. Some of the earliest tomographic examples in the first quarter of the twentieth century were exceptionally blurry.

¹⁰⁴ Jacalyn Duffin and Charles R. R. Hayter, "Baring the Sole: The Rise and Fall of the Shoe-Fitting Fluoroscope," *Isis* 91, no. 2 (June 2000): 273.

¹⁰⁵ "How Much Radiation?" *Time Magazine*, July 4, 1949, 47.

standard measure of x-ray dosage) to one-thousand.” Dr. Robert Newell, director of Stanford University’s radio-biological laboratory, found the lack of consensus alarming: “This is like saying you don’t know whether a teaspoon or tumblerful of poison will make a man sick.”¹⁰⁶ By this time, technicians understood the importance of minimizing exposure, but the frequency of exposure and the best way to mediate it remained the unanswered questions.

Scientists devised strange contraptions to harness and control the Gorgon stare so that the destruction of cells would focus on a localized target without affecting healthy living tissue. In 1950, the Massachusetts Institute of Technology constructed the “X-ray barbecue”—a rotating chair positioned in front of the X-ray tube that spun the subject around like meat on a spit.¹⁰⁷ As the subject whirled around, the radiant stream from the X-ray tube entered the body at different positions of the rotation, so that the target in the subject would receive a greater amount of exposure while diminishing exposure in the surrounding areas. Although the contraption did integrate an X-ray film holder for imaging, the practical application for this technique proposed to treat a cancerous tumor.

Yale Joel’s photograph of the X-ray barbecue, published in *Life*, brings to the forefront the fight to control the stream of X-rays inside the quiet, sanitized, highly professional and industrial space of the X-ray room (Fig. 23). The subject spinning around disrupts the symmetrical composition of the photograph, communicating a sense of chaos in the disciplinary space. His camera’s long shutter speed photographically records the blurring of physical matter in motion,

¹⁰⁶ Ibid.

¹⁰⁷ “X-Ray Barbecue,” *Life Magazine*, April 17, 1950, 87-88.

while the most opaque forms surface from the repetition of the overlay. His technique in this case corresponds to the X-ray barbecue's vision itself, in which the most concentrated area of radiation will appear photographically as the most in focus. Through Joel's method, a revelation about X-ray vision and its effect on the body emerges that counters the hopefulness of medical futurism. Despite the technological advances of the twentieth century that projected a progress narrative, science continuously faced new conflicts to avert the deadly radiant stream. The circles that envelop the subject speak to the historical trajectory of X-rays and science's repetitive tensions in mediating exposure.

Life describes the figure in Joel's photograph of this apparatus as "Buddhalike" in position; however, contrary to displaying peaceful meditation, the subject reflects the unseen horror of the X-ray's Gorgon stare. Joel's photographic vision of the science alters the human form into a nightmarish Minotaur that returns the gaze of the observer. The straps confining the subject appear as rings encircling his body that resembles the iconic film still from Fritz Lang's *Metropolis* (1927), in which human and machine are electrically conjoined into a female android, which subsequently emerges as a futuristic threat to civilization. Joel's representation of X-ray vision is of technology out of control: violent, disorienting, and magically transformative. Comprising all these visual elements, his photograph visualizes the Medusa effect and its disciplinary punishment upon the body that requires a nightmarish shield of protection.

In 1952, the National Bureau of Standards updated its *X-ray Protection Design* handbook with acute descriptions of radiation: the useful beam,

secondary and direct radiation: “The useful beam is that part of the radiation from the target that passes through the tube-housing aperture, cone, or diaphragm. Direct radiation is that radiation escaping through the tube housing itself, whereas secondary radiation is radiation that originates in an irradiated material. The latter includes scattered radiation and fluorescent radiation.”¹⁰⁸ It also recommended that “the permissible exposure rate for x-rays is set at 0.30r (300mr) per week, measured in air.”¹⁰⁹ Overall the acuity through which to examine X-ray safety was at a more intense level with sensitivity to different kinds of radiation that emit in a radiography area. Each kind of radiation required protective barriers with designs to “restrict the directions of the useful beam.”¹¹⁰ At this time, the mediation of X-rays focused less on the visual spectacle and more on the concealing and revealing of the apparatus and its Gorgon stare.

Throughout the 1950s, the concerns over radiation continued. In 1957, Johns Hopkins University produced a televised program with experts who answered questions about X-rays with the press called *Is X-ray Harmful?*¹¹¹ Dr. Russell H. Morgan of Johns Hopkins fielded most of the questions, including the press’s concerns about the life spans of subjects who received radiation. He emphasized that radiation did not only come from X-rays, but also from cosmic radiation, radioactive materials in the surface of the earth, as well as in food. While Morgan had few concerns about past dangers from radiation, he identified future dangers. He said:

¹⁰⁸ Harold O. Wyckoff and Lauriston S. Taylor, *National Bureau of Standards Handbook: X-Ray Protection Design*, 50, (Washington, DC: U.S. Department of Commerce, 1952), 2.

¹⁰⁹ Ibid.

¹¹⁰ Ibid., 3

¹¹¹ John Hopkins University File 7, *Is X-Ray Harmful?* Video, Baltimore, MD, 1957.

According to records at our hospital, the amount of X-ray work is increasing at the rate of 2% or 3%, 3% or 4% per year. On the surface this doesn't look like very much. But in addition to the increase in work, the complexity of the work is increasing. Instead of a patient receiving one or two exposures, in a diagnostic study, frequently you go now to four or five or six. And so, a better estimate of the amount of radiation exposure to which one is exposed over the next few years, probably will be one in which the amount of radiation is doubled by 1960 or 1965.¹¹²

Morgan's alarm was not the dosage itself, but the frequency with which subjects receive those dosages. This ultimately directed scorn on X-ray workers who overprescribed radiographs or made them routine.

Indeed, the unknown persisted as to how much radiation could cumulatively damage a human body. Latent damage was far more difficult to measure. Stories of immediate burns or blisters had long been diminished, yet fears persisted about future injuries and illnesses like cancer. So, the radiation scare inflamed the public's consciousness of the X-ray's Medusa effect and asserted a new conundrum: while X-rays could reveal the unseen, the damage that they caused remained unseen. In 1959 Emil Grubbe reported, "I taught more than 7,000 doctors and could never stress enough the dangers inherent in careless handling of X rays. Yet of the 7,000, more than 300 have already died from the effects of radiation."¹¹³ After more than ninety operations on his body—including losing some of his nose and his upper jaw, Grubbe died from his radiation injuries in 1960.

The radiation scare continued into the 1960s with Roger Corman's science fiction film *X: The Man with the X-ray Eyes* (1963). The film told a

¹¹² Ibid.

¹¹³ "X-Ray Martyr," *Time*, August 3, 1959, Clipping, Thomas Edison National Historic Park.

dystopian story of Dr. James Xavier who invented a magical formula that, when dropped into his eyes, allowed him to see inside of things. Xavier originally aimed to improve public health. His eye drops did not offer permanent X-ray vision, so he increasingly used the formula to extend the sight. First he saw the pens hidden inside of pockets, then the nudity underneath clothing. He developed the ability to probe beneath skin to see organs and could aid surgeons. However, with more dosages of the formula, his X-ray vision became difficult to control and had negative cumulative effects. Later, he could see skeletons underneath flesh in a spectrum of dazzling saturated light (Fig. 24). The X-ray simulation of these bodies displayed a drug-induced psychedelic presentation of bones with light refraction. They appeared less human and more alien to him. He had seen too much. Over the course of the film, Xavier loses his mind as the spectacle of his X-ray vision takes over his human perception.

At the conclusion of the film, Xavier finds himself in a chapel and tells the congregation what he sees: “There are great darknesses farther than time itself and beyond the darkness is a light that glows, changes. And in the center of the universe—the eye that sees us all...”¹¹⁴ Xavier refers not to the Christian religion, but rather to what his vision shows him. Xavier then sees blinding colorful light and screams. The pastor calls him a sinner and advises him to “pluck out” the evil. Xavier ultimately gouges out his eyes with his own hands. Ending the film in the chapel offered up a moral that when a scientific man aims to take on the unnatural sight of a god, he must be punished physically. Behind the sequence, the embodied X-ray vision and the disciplinary action of the Medusa effect inform

¹¹⁴ Roger Corman, *Man with the X-Ray Eyes*, American International Pictures, 1963.

the narrative. Xavier became another X-ray martyr and a representation of the public anxiety about X-rays.

PERCEPTUAL OPTICS

The X-ray simulation of the skeletal bodies in *X: The Man with the X-ray Eyes* was congruous with new developments in X-ray imaging and perceptual optics that preoccupied the American imagination in the latter part of the twentieth century. The colorful skeletal bodies in the film resonated with a new method for seeing color radiographs. In 1957, Philco scientists created a special viewer, the EXICON, which changed the radiograph's gray tones into high-contrast color. *Look Magazine* explained:

the human eye cannot detect contrast changes which are less than two per cent. Thus, a radiologist may easily miss evidence of disease, such as early cancer or gallstones, if the gray contrast changes in the X-ray film he is viewing are in the 'invisible two per cent' range.¹¹⁵

The EXICON purported to "expand vision up to 20 times, so that the eye can see the 'invisible two per cent.'"¹¹⁶ In addition, the system proposed that it could decrease radiation exposure time by increasing the contrast in the finished representation. The process included placing the film on a light box, and electronic beam passed over it so that the gray tones allowed different gradations of light to pass through and were then detected by a tube inside the box. The

¹¹⁵ Roland H. Berg, "X-Rays in Color," *Look* (May 14, 1957), 69, Department of Prints and Photographs, Library of Congress.

¹¹⁶ Ibid.

tube changed the light into TV signals that pumped the image with contrast.

Finally, a color converter processed the TV signals onto a TV screen.¹¹⁷

Figure 25 shows the result of a hand radiograph converted into color. The effect flattened the bones and the auratic haze around them into blocks of color. While the images had high contrast, they lacked Ed C. Jerman's advocacy for the detail and density of the irradiated body. The device had a lifespan and was largely a sensationalized product, combining the X-ray spectacle with the American cultural fascination for turning black and white motion pictures on television into color. Color television was still in its infancy in the United States, a novelty, and not yet a widespread product in homes. In this example, the X-rayed body continued as spectacle in the new medium of color television, creating the feeling of newness, progress, and excitement in the popular press.

The EXICON's other significance was that it identified how, even with X-rays, human perception is physiological and unable to see every subject in the range of vision. This prompted a revived interest in the radiographic image and perceptual optics. In the process of condensing and flattening the three-dimensional body to a two-dimensional image, the raw X-ray image recorded parts of the body with abstractions that trained radiologists had to decipher. In the phantasmagoria of the irradiated body, clouds of dense tissue areas produced illusions of pareidolia, so that subjects of the psychological imagination, such as faces or other anthropomorphic forms, appeared for some observers. Canadian Dr. Douglas Eaglesham devoted his scientific study to the subjectivity of radiography, the perceptual and perspectival tricks that challenged a

¹¹⁷ Ibid.

physician's objective mode of seeing. He pioneered the experimental composite photoradiography as early as 1955.¹¹⁸ Composite photoradiography required the combination of a traditional photographic image as well as a radiographic image that superimposed one with the other.

One of his results from 1978 was Figure 26—a spectacle of the interior surrounded by the exterior compositionally reminiscent of M.C. Escher's drawing hands. The background presented the photographic image with the radiographic components in the foreground. The seamless integration of the two also offered shadows projecting from the skeletal hands that write a memo. Composite photoradiography was not a common practice, nor did it offer a practical purpose in medical diagnosis. Rather, magazines such as *Popular Mechanics* appropriated the images purely because of their imaginative renderings, the novelty of seeing the inside imposed with the outside. They propelled the irradiated body spectacle into the realm of the commercial and the sensational.

In 1968, Eaglesham wrote, "the epigram 'Seeing is believing' might well read 'Seeing is deceiving.' The radiologist may be tempted to add 'Some things must be believed to be seen.' To see however is not to understand; there is more to vision than meets the eye."¹¹⁹ He recognized that interpreting radiographs produced distortions of perspective in sizes and shapes; after-images resulting from the bright light screens in the dark rooms; complex positions of depth, and even the impression of movement in still radiographs of subjects. Eaglesham

¹¹⁸ Douglas C. Eaglesham, "Composite Radiography," *Medical Radiography and Photography* 31, no. 1 (1955): 52–57.

¹¹⁹ Douglas C. Eaglesham, "Visual Illusions Affecting Radiographic Interpretations," *Journal of Canadian Association of Radiologists* 19, no. 2 (June 1968): 96.

explained that the observer of a radiograph could “read light areas on a dark background in one appraisal of a picture and on another occasion see it as a pattern of dark areas on a light background with a change in significance,” with a figure/ground change causing a double image or “ambiguous figure.”¹²⁰ On the one hand, the effect could cause an observer to view the soft tissue of an intestine, but on the other, see abstract foreign shapes in the tissue.

In the medical terrain, optical illusions did challenge the attention of radiologists. Ever since the 1940s, radiologists had begun to identify pathologies in the abstractions of radiographic images with “radiologic signs.” Radiologists saw these signs largely due to Eaglesham’s explanation of the aforementioned ambiguous figure so that perceptually the brain composed recognizable objects or pictures to stand for pathologies. In 1984, Dr. Ronald Eisenberg created an atlas spanning decades of radiologic signs. As the twentieth century progressed, more of these radiologic signs increased—so that the majority of his collection came from the 1970s. He argued:

Signs are the spices of medicine. Some are basic and used by the novice and expert alike, whereas others are so subtle and rare that they can be savored only by the diagnostic gourmet. Signs serve as shorthand phrases, a few words that convey a complete picture and often a specific or limited differential diagnosis. They are almost a secret language, identifying the user as a knowledgeable member of a medical specialty.¹²¹

Eisenberg’s collection of signs were an array of imaginative terms, such as the applesauce sign (1971)—“the abnormal obstructing meconium, mixed with

¹²⁰ Douglas C. Eaglesham, “Visual Illusions Affecting Radiographic Interpretations,” *Journal of Canadian Association of Radiologists* 19, no. 2 (June 1968): 100.

¹²¹ Ronald L. Eisenberg, “Preface,” in *Atlas of Signs in Radiology* (Philadelphia, PA: J.B. Lippincott Company), 1984.

gas” or the ram’s horn sign (1975)—“Crohn’s disease” of the large and small bowel.¹²² Each example included both a radiograph of the actual pathology and a picture of its associated sign for comparison. Eisenberg also found art inspired signs in radiology, such as the Starry Night Sign (1975) and the Seurat Spleen Sign (1979). For the Seurat Spleen Sign (Fig. 27), he annotated:

Following publication of an article comparing the arteriographic findings in a ruptured spleen to the painting “Starry Night” by Vincent Van Gogh, another report suggested that the pattern of extravasation of arteriographic contrast is more reminiscent of the works of Georges Seurat than those of Van Gogh, Seurat’s contemporary. Pointillistic paintings, composed of hundreds of tiny dots that merge almost imperceptibly at a distance often look strikingly similar to the multiple punctate areas of contrast seen in patients with a ruptured spleen.¹²³

With Seurat’s *Parade de Cirque* (1888), Eisenberg demonstrated the similarity between the dots in the painting and the dot patterns in a traumatized irradiated spleen.

Eisenberg does not equate the artistry of a Seurat painting to a radiograph of a spleen, but he does make a significant comparison between the two. The images not only have optical similarities, but also suggest what Jonathan Crary has described as a “new understanding of attention as both binding and disintegrative, as incapable of fixation.”¹²⁴ Indeed, the irradiated spleen is a spleen, but the perceptual organization of the human mind attributed it to Seurat’s configuration of dots that comprised a picture. The X-ray vision attentively bound the observer to the spleen, but the dots also disintegrated that

¹²² Ronald L. Eisenberg, *Atlas of Signs in Radiology* (Philadelphia, PA: J.B. Lippincott Company, 1984), 12, 74.

¹²³ Ibid, 89.

¹²⁴ Jonathan Crary, *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, (Cambridge, Mass.: MIT Press, 1999), 160.

fixation into the semblance of a Seurat. Just as the painting required perceptual absorption of the image, so did the irradiated spleen. The radiologic sign that related to the Seurat sensationalized and aestheticized the irradiated body.

The space between the observer and the painting, and the radiologist and the radiograph both require the discipline of what Crary has called the “suspension of perception--” a “sustained attentiveness,” implying “the possibility of a fixation, of holding something in wonder or contemplation, in which the attentive subject is both immobile and ungrounded.”¹²⁵ However, attention, he argues, is inseparable from distraction. Attention and distraction can merge, incite, and invoke disciplinary forces in the social sphere around subjects of perception. The intense concentration required to see the Seurat and the radiograph, immobilizes the observer, disciplines his or her perceptual organization to makes sense of what is seen. Equally, the pictures contain distractions by the pieces that make up their whole. Distraction of the elements informs the attention, a disintegration and re-integration. This concept is at the center of the phantasmagoria’s premise, in which the focal point of concentration also operates as a distraction from the forces that comprise its spectacle.

CONCLUSION

Although the technology has changed, the radiographic pictures have diverged in form, and the professionalization of medicine has disciplined the medical observer and has severed the personal connection between the radiograph and the non-medical observer, the spectacle of the irradiated body

¹²⁵ Ibid, 10.

has persisted. Indeed, the variables that I have just mentioned enable that persistence. The phantasmagoria's principles of controlling knowledge and attention, and concealing the workings of production, continue to create the optical wonder of the irradiated body spectacle. The magic of seeing inside the human body without physical penetration continues to inform that spectacle. As new technological advancements emerged, the irradiated body has continued to appear new and innovative, carrying with it a sense of trust in the human mastery over mysteriously concealed inventions. The professionalization did not extinguish the level of concentration required to see the irradiated body. Instead it intensified scrutiny as the glowing irradiated body captured the attention of the medical observer. Over the course of the twentieth century, the lack of access to one's own X-ray pictures made the desire to see other people's X-ray pictures increase. This lack of access, in addition to the fears of X-ray radiation, prompted new kinds of spectacular X-ray simulations in popular culture, film, and art.

Although the variables for safety have changed and improved, and the public awareness of radiation-caused deaths has decreased, the Medusa effect remains part of the X-ray's exposure and disciplinary action on embodied observers and subjects. Individuals shield healthy parts of their bodies with lead to avoid the Gorgon stare. At the same time, conversations about X-ray safety and the frequency of dosages are still far from over. The rapidly developing technologies make setting the standards and understanding dosage frequency difficult to ascertain. For this reason, the spectacle of the irradiated body continues to have the allure of danger. Alternatively, the imaginative simulations

of the X-rayed body in art, film, and popular culture liberate observers from the Medusa effect as they pose no danger and can therefore be aesthetically revered and entertaining.

In 1896, author Edward W. Byrn wrote these words with X-rays and other electrical inventions in mind for the *Scientific American*:

It is so easy to lose sight of the wonderful, when once familiar with it, that we usually fail to give the full measure or positive appreciation to the great things of this great age. They burst upon our vision at first like flashing meteors; we marvel at them for a little while, and then we accept them as facts, which soon become so commonplace and so fused into common life as to be only noticed by their omission.¹²⁶

Byrn reflects the complexity of how contemporary observers think of X-ray images of bodies. On the one hand, traditional radiographs have become commonplace, familiar, and medicalized. On the other, there are systems in place that bring observers back to the X-rayed body as spectacle—through commodities, art, technological progress, surveillance methods, and artistically-directed scientific inquiries. I put forth many examples in the following chapters that demonstrate how X-rays have maintained their wonder for the embodied observer by enabling him or her to see inside the human body.

¹²⁶ Edward W. Byrn, “The Progress of Invention During the Past Fifty Years,” *Scientific American* LXXV, no. 4 (July 25, 1896): 82.

CHAPTER 2

FOR YOU, SEE INSIDE: WOMEN AND THE COMMODIFICATION OF X-RAYS

Before publishing his discovery, Wilhelm Conrad Röntgen made trial radiographic prints from various materials in November 1895. One evening he asked his wife Anna Bertha Röntgen to contribute her hand. His biographer, Otto Glasser, recounted:

At his instruction, she placed her hand on a cassette loaded with a photographic plate, upon which he directed rays from his tube for fifteen minutes. On the developed plate the bones of the hand appeared light within the darker shadow of the surrounding flesh; two rings on her finger had almost completely stopped the rays and were clearly visible. When he showed the picture to her, she could hardly believe that this bony hand was her own and shuddered at the thought that she was seeing her skeleton. To Mrs. Röntgen, as to many others later, this experience gave a vague premonition of death.¹

There was a magical component to this picture (Fig. 28). The international audience that soon saw this skeletal body fragment would realize that its female subject was physically whole. Yet the radiograph presented a vanished woman whose partial image visually prompted a yearning for the materiality of her body and a desire to reconfigure her wholeness. This effect made the picture of Frau Röntgen, and many subsequent images of irradiated women, fetish objects.

Frau Röntgen's hand became the first radiograph of the human body. Along with his published manuscript "On a New Kind of Ray," Röntgen distributed the picture of his wife's hand with several other prints internationally.² The press,

¹ Otto Glasser, *Dr. W. C. Rontgen*, (Springfield, Ill.: Clarence C. Thomas, 1945), 39.

² According to Roger F. Robison, Röntgen sent the pictures to "F.S. Exner in Vienna, Voller in Hamburg, O. Warburg in Berlin, O. Lummer in Berlin, L. Zehnder in Freiberg, F.W. G. Kohrausch in Gottigen, H.H. Lorentz in Leiden, Lord Kelvin (Wm. Thompson) in Glasgow, Schuster (German

future X-ray related textbooks, and photograph history books reproduced this image far more than the other prints Röntgen circulated. As I argued in Chapter 1, the radiography of the human body spoke to centuries' old pursuits to see inside the body and presented a new vision of human anatomy that had not before been seen. A man's scientific investigations led to X-rays, but a woman's hand was the first spectacle of the X-rayed anatomy—a spectacle that led to the commodification of X-rays through mediations of the female body.

After Röntgen's discovery, visual forms of the irradiated female body popularized X-rays for the American public. Throughout the twentieth century, she appeared in poetry, academic art, photography, advertising, and graphic design. The female spectacle drew the male gaze as an erotic metaphor for penetration but also as the banner for technological progress. However, modern female consumers and artists were also drawn to X-rays as a means to exhibit empowerment through the sensation of receiving X-ray portraiture, fashion, household items, beauty pageants, and feminist art. With the irradiated female body emerging as a fetish, scientists worked to create a full-bodied life size "X-ray Lady," which the magazines, graphic artists, and studio artists later appropriated. By looking at the full trajectory of X-ray history, the irradiated female body commanded attention as a commodified spectacle, not simply as one of optical revelation, but also as an attractive vehicle that softened or exhibited liberation from the disciplinary gaze of the X-ray.

born) in Manchester, and H. Poincare in Paris." Roger F. Robison, *Mining and Selling Radium and Uranium* (Cham: Springer, 2014), 36.

According to Marxist theory, the commodity obscures its historical relations of production. X-ray technology has had a similar effect. While the X-rayed female body promises transparency to the observer, it also masks the technology and its vulnerabilities of production. In this chapter, I expand the meaning of the phantasmagoria from Chapter 1 into a focused look at the phantasmagoria of the irradiated female body as a commodity. Theodor Adorno once argued that the phantasmagoria was:

the point at which aesthetic appearance becomes a function of the character of the commodity. As a commodity it purveys illusions. The absolute reality of the unreal is nothing but the reality of a phenomenon that not only strives unceasingly to spirit away its own origins in human labor, but also, inseparably from this process and in thrall to exchange value, assiduously emphasizes its use value, stressing that this is its authentic reality, that it is ‘no imitation.’³

In the case of X-rays, an observer can see inside the body but, beyond that spectacle, cannot see a gendered system of exchange value that abstracts its production into a commodity fetish. This commodification has resulted from networks that encouraged and profited from the progress of the technology. The urban market consisting of photographers, merchants, newspapers, department stores, amusement parks, and filmmakers worked in tandem with scientists and health workers to construct methods for the American public to accept X-rays into daily life. Scientists did not force X-rays on the public. Rather, they integrated the female spectacle as an attraction to make the technology palatable, and even desirable, for consumption. As a symbol of modern progress, the female spectacle softened the public’s anxieties of the changing technology, and

³ Theodor W. Adorno, *In Search of Wagner* (New York: Verso, 2005), 90.

provided an aesthetic distraction from reports of radiation dangers over the course of the twentieth century.

During the twentieth century, surveillance technologies like radiography and photography developed in tandem with the pleasures of being seen and owning a piece of that sight. While men were more likely to purchase X-ray equipment and be the operators in the early years, middle and upper class white women were the primary consumers of non-medical portraits. They were also the consumers for household products that bore the “X-ray” logo and the creators of family albums that included radiographs. The evidence I present suggests that many American women did not shriek at the sight of the skeleton like Frau Röntgen, nor did they shrink at the thought that their privacy was compromised. They willingly internalized the disciplinary regime associated with the X-ray that I introduced in Chapter 1 as an aesthetic tool for exhibiting liberation, claiming self-agency, and for making art. So my second argument proposes that women were not merely or exclusively passive objects of masculine inquiry but rather were active agents in X-ray image production and the integration of X-rays into American life.

This chapter expands upon the foundational research in Lisa Cartwright's *Screening the Body* (1995). In two chapters, Cartwright recounts the sensationalism associated with the early years of X-rays, and what follows is her investigation of the X-rayed female body and its merits in popular and medical culture. She places an emphasis on the cinefluoroscope and the medical screenings of women until around 1963. Cartwright applies the term “spectacle”

to the irradiated female body, but primarily in reference to its visual splendor and representation. She calls the image of Bertha Röntgen's hand a "stunning spectacle of death in life."⁴ While the macabre mode of interpretation existed during the fin de siècle, as I confirmed in Chapter 1, the fascination with the X-rayed female body over the twentieth century surpassed a fetish for the gothic or death. Furthermore, I focus on the mediation of the body rather than its representation so as to continue the exploration of the corporeal phantasmagoria as a gendered phenomenon, and the picture's relationship with human perception.

In addition to Cartwright, I draw from Bettyann Holtzmann Kevles' *Naked to the Bone*, which offers a broad survey of X-ray history. She writes briefly about women:

Women's bodies were especially singled out as territories suddenly open to exposure. Women raised in an atmosphere of sexual repression shrank from the lustful gaze of X-rays: their husbands and fathers jealously feared that something privy to them would now be visible to strangers. There were also fears that women, tempted by the possibility of seeing past the clothing of other women, would succumb to the temptation to look at themselves.⁵

While initially Europeans had fears that X-rays would threaten female modesty, the American public did not show much concern for privacy in relation to X-rays except in the history of smuggling which I address in Chapter 4.⁶ However, I will

⁴ Lisa Cartwright, *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995), 123.

⁵ Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century* (New Brunswick: Basic Books, 1998), 28.

⁶ See Kevles, 27 for information about a London manufacturer who marketed lead-lined underwear to guard women against "Peeping Toms." I must also emphasize that medical practices were sensitive to the privacy of the patients.

expand upon how women indeed succumbed to the temptation to see inside their own bodies.

Chapter 1 introduced the topic of the irradiated body spectacle as a phantasmagoria—with an optical photographic aesthetic and disciplinary mechanism; this chapter narrows the focus to the female body. I draw from Laura Mulvey’s “phantasmagoria of the female body,” in which the spatial dimensions of surface and the “concealed decay” beneath have a reflexive relationship.⁷ Through what she terms “phantasmatic space,” the female body serves as a metaphorical front to conceal the inner workings of the commodity. Mulvey has stated, “By exploiting the gap between knowledge and belief, inherent in the complexity of value, the commodity erases its origin labour of the working class, at the production line, and turns a phantasmatic, cosmetic, face to the world.”⁸ Phantasmatic space composes the space of the commodified body. The irradiated female body itself is a phantasmagoria composed of layers that the X-ray ventures through and records. The irradiated female body has also served as the front for X-ray progress, and it has masked the uncertainties about the technology for many years. To further understand the commodity and the desire created through the X-ray’s vanishing of corporeal layers, I apply Karen Beckman’s analysis of the spectacle of the “vanishing woman.” In the commodification of X-rays, the revelation of the female body displays female

⁷ Laura Mulvey, “A Phantasmagoria of the Female Body: The Work of Cindy Sherman,” *New Left Review* 188 (1991): 145.

⁸ Ibid, 150.

sexuality and what Hille Koskela terms, an “empowering exhibitionism” and performance of gender.

The following narrative integrates X-rays into the history of women’s roles during modernization. It explores women’s visibility, the artistic interpretations of their materiality, and how their bodies were best to display the benefits of X-ray technology. The “X-ray lady,” a totem that introduced X-rays to the public, has continued to be a welcoming subject until today. Responding to the question of W.J.T. Mitchell, “What do pictures want,” the X-ray lady invites the observer to view the commodified spectacle of her irradiated body, in which she says, “For you, see inside.”

THE GIRL OF TO-DAY AND THE VANITAS

X-rays entered into the public consciousness of the United States during the 1890s when the metropolitan areas were full of female workers and consumers amidst modern attractions, cheap amusements, electric trolleys, and new movie houses. As Kathy Peiss has argued, “consumption is coded as a female pursuit, frivolous and even wasteful, a form of leisure rather than productive work.”⁹ Women, she contends, were not passive consumers, but rather active agents in forming their gender identity through their purchasing power and style.

Charles Allen Gilbert’s painting *All is Vanity* (1892) and the subsequent popular printed reproduction distributed by *LIFE* (1902) conveys the character of

⁹ Kathy Peiss, “American Women and the Making of Modern Consumer Culture --- the Electronic Text.” Accessed May 3, 2016. <http://www.albany.edu/jmmh/vol1no1/peiss-text.html>.

the contemporaneous female consumer. As a disciplinary warning against women's pursuit of leisure as a source of danger and death, it preceded X-rays by just three years (Fig. 29). Gilbert's print presents a flickering illusion between a lady at her dressing table and the skull of female vanity—with the lady's mirror forming the skull, her reflected face and referential head create the eyes, an oil lamp flame illuminates the nose, and her toiletries comprise the grin. In some early versions of the print, a crystal chandelier also appears above the reflected face.¹⁰ The *New York Times* recognized Gilbert's mass-produced print as representing a famous "type of American girl" and consequently Gilbert juried the *Times* photography contest called "The Girl of To-Day."¹¹ What kind of girl would this be? Neglecting her role as the moral center of the home, this woman preoccupies herself with beauty as she prepares to go out.

Gilbert's print drew upon the art historical tradition of *Vanitas*, moralizing pictures about the transience of material goods and earthly desires that typically incorporated a memento mori (reminder of death) in the form of a skull, or, in some cases, cutaway views of the female body as half-woman, half skeleton. *Vanitas* imagery cautioned against the indulgence in this life, often through warnings about women. Such imagery reminded observers that decadence leads to decay and all luxury and pleasure will fade after death. In Gilded Age America, *Vanitas* pictures like Gilbert's criticized the high-life in gendered terms that explicitly associated women with moral depravity and physical mortality.

¹⁰ http://www.sandlotscience.com/Ambiguous/Charles_Allen_Gilbert.htm, Accessed on 9/22/2013

¹¹ Penthm Stanlaws, "'GIRL OF TO-DAY' Jury Famous for American Types," *New York Times* (New York, NY) December 7, 1913, 5.

However, in Gilbert's painting, the skull is neither a prop nor a cutaway. The skull is rather a visual aftereffect through the composition of the scene and the lady's doubling, caused by her own self-surveillance in the reflection. The skull that materialized through the image meets the observer's scrutinizing gaze with a penetrating power that anticipated the X-ray. Broadly, her gaze joins with the observer's through the visual inspection of the picture and her contemplation in the mirror. Both gazes project a desire to know, suggesting detraction from the focus on morality. The mirror holds the ideal image, the luxury on display that the woman wants to consume and become. With the traditional interpretation of the Vanitas in mind, Gilbert's image is as much of a warning to the middle-class (and implicitly male, heterosexual) contemporary viewer as it is to the depicted lady. This "type" of American girl is a seeker of knowledge and challenges the status quo. She is the New Woman. Gilbert's lady looks into her reflection and both her reflection and the skull stare back—an optical flickering of looking inside and out, forward and backward—characteristic of fin de siècle's perspectives that looked into the future while remembering the past, and X-rays' capacity to transpose the outer and the inner-self. Gilbert's type of American girl foreshadowed the early X-ray consumer and the kind of looking that would be commodified before the end of the nineteenth century.

THE MAGIC ACT OF THE VANISHING LADY

"All the world seems to have gone off on two crazes—bicycles and X-rays. With the latter I have myself been badly bitten," wrote Dr. Silvanus Thompson in

1897.¹² The X-ray craze was an eight-year period characterized by amusements and sensationalism—like the Cabaret du Néant, X-ray parties, portraiture, interactive demonstrations, yellow journalism, and movies. All of these amusements drew attention to the constraints of unaided human vision and reveled in the mediated extensions of the senses as well as the questioning of truth and reality. The X-ray craze was most intense in 1896, when X-rays first entered popular consciousness and received extensive press. Historian Matthew Lavine has located the craze primarily in that year by measuring the media saturation of news coverage and related publications.¹³ However, there is enough visual and textual evidence to demonstrate that optimism about the technology persisted until 1903, and women consumers aided the enthusiasm.

Visualizations of X-rays during the craze represented the irradiation of the female body as a magic act. The radiographer performed the role as the magician who could conjure and direct meta-human powers upon the female subject/ magician's assistant.¹⁴ Actual magicians, like Harry Houdini, experimented with X-ray technology. Houdini looked into incorporating the effect into his magic shows and advocated for the use of X-rays upon Spiritualists to detect their fraudulence.¹⁵ Alternatively, radiologists, such as Houdini's associates Jacob Hyman and Leopold Weiss, were drawn to magic as a brief

¹² Thompson 1897, 29. Cited in Bernike Pasveer, "Representing or Mediating: A History and Philosophy of X-Ray Images in Medicine," in *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*, (Hanover: Dartmouth College Press, 2006), 41.

¹³ See Chapter 3 of M. Lavine, *The First Atomic Age: Scientists, Radiations, and the American Public, 1895-1945* (New York, NY: Palgrave Macmillan), 2013.

¹⁴ Solveig Julich discusses the role of the technician as magician in her study on the X-ray craze in Sweden. Solveig Julich, "Media as Modern Magic: Early X-Ray Imaging and the Cinematography in Sweden," *Early Popular Visual Culture* 6, no. 1 (April 2008): 19–34.

¹⁵ Houdini dared Spiritualists to go under X-rays to prove that ectoplasm was an artificial material.

occupation and eventual hobby. Making pictures of the anatomical interior without physical penetration and revealing authenticity bound X-rays to magic.

The relationship between magic and science had been established for centuries, especially in the work of Giambattista della Porta's illustrated volume *Magia Naturalis* (1558), which called upon the "Magician" to know and observe "the causes of wonderful things" in Natural Philosophy.¹⁶ Each developed country had its own celebrated scientists who worked on X-rays, but in America two of them received the magical monikers: Thomas Edison the "The Wizard of Menlo Park" and Elizabeth Fleischmann-Aschheim "San Francisco's Twentieth Century Witch."¹⁷

While male X-ray operators frequently used female assistants to demonstrate the magic of their technology, Elizabeth Fleischmann-Aschheim revised the performance to exhibit her own agency. In 1896, she taught herself how to use the X-ray apparatus after attending a lecture in San Francisco about Röntgen's discovery. She practiced with chloroformed animals and living human patients, and consequently, the U.S. Army employed her to X-ray the wounded soldiers of the Spanish-American War. This job garnered Fleischmann-Aschheim the most respect of any woman in the field, and as a result, the international journal *Archives of the Roentgen Ray* admitted her to serve as the

¹⁶ Giambattista della Porta, *Magiae Naturalis*, (London: T. Young and S. Speed, 1658), 3. Accessed on 10/17/2013. <<http://hdl.loc.gov/loc.rbc/pre1801.23451.1>>

¹⁷ French book that details important scientists and their experiments in other countries. Fleischmann was referred to this title in "San Francisco's Twentieth Century Witch." "San Francisco's Twentieth Century Witch," *The Sunday Call* (San Francisco, CA), February 10, 1901, 8.

first woman radiologist on their Editorial Committee, one of the only members from the United States.¹⁸

Although she was a serious scientist, Fleischmann-Aschheim also partook in the magic of the X-ray performance by becoming both operator and performative subject. During one of Fleischmann-Aschheim's X-ray demonstrations for *The Sunday Call*, she showed the interviewer an uncanny effect known at the time as the Static Electric Head Breeze. To exhibit how much energy was required to produce radiant light, she connected her own body via a metal wand to the static electric machine after the tube had produced X-rays. The wand carried the pent-up electrical charge into and through her body, causing her hair to rise, spark, and "hiss," emitting a sensation of a ghostly cool breeze produced without a physical draft. Her performance for the newspaper reified the invisible charge that had produced X-rays into an embodied spectacle, rearing its own Medusa head with writhing hissing hair. Fleischmann-Aschheim's demonstration with the X-ray tube still attached was unorthodox, and revealed the liberal uses that these early apparatuses inspired. Her playfulness was the disavowal of the apparatus as a disciplinary mechanism that caused harm and inevitably was her demise.¹⁹

Apart from Fleischmann-Aschheim, the cinema reinforced the dynamic between the male radiographer and subject/magician and female assistant. In 1896, the debut year for X-rays, George Méliès released a short film entitled "The Vanishing Lady" (also known as "The Conjuring of a Woman at the House of

¹⁸ Fleischmann-Aschheim's photographs were featured in *Archives of the Roentgen Ray* 3, no.2 (November 1898).

¹⁹ Fleischmann-Aschheim was an X-ray martyr who died from radiation-related injuries in 1905.

Robert Houdin"). In this film, the magician Houdin throws a blanket over his female assistant and she disappears (Fig. 30). At first he cannot successfully return her to her whole form. He removes the blanket and she materializes as a skeleton. However the expectation remains that the female assistant will reappear as a whole body. With one more try, Houdin removes the blanket again and succeeds in returning her to her full physical form. Méliès' films like this one circulated to America through bootlegging operations in the 1890s.²⁰

Méliès' film drew upon the visual aesthetic of the X-rayed body, which, as I have technically demonstrated in Chapter 1, expressed the tension between presence and absence. Radiographs represent remnants of corporeal vanishing. The effect results first from what the observer sees—a partially materialized body as a skeleton—and what the observer believes to be true—namely, that she is still physically whole and will reemerge as such. As Laura Mulvey has stated, "the commodity...is haunted by the gap between knowledge and belief."²¹ By concealing the workings of his illusion, Méliès' trick capitalizes upon the viewer's belief that the lady will reappear unscathed. Due to her lack of absolute materiality, Méliès conceives her as a fetish object.

Karen Beckman has suggested that females' bodies were targets for the "vanishing lady" effect in visual culture because in the same historical moment women threatened to occupy political space, employment, and education and to command the marketplace. They "emerge on the modern scene unstable and

²⁰ David Puttnam, *Movies and Money* (New York, NY: Random House LLC., 2011).

²¹ Laura Mulvey, "A Phantasmagoria of the Female Body: The Work of Cindy Sherman," *New Left Review* 188 (August 1991): 149.

constantly prone to disappearance.”²² On the one hand, the imaginative politics of this “vanishing” metaphorically exemplify the misogynist stifling of educated and working-women. The vanishing effect presents both a violence of visual penetration that is performed on the female body, and a voyeuristic desire based upon her lack of stable presence. But “vanishing women” must reappear to fulfill the trick, which Beckman proposes is a sign of female resilience against the vanishing. The subject of this unstable presence can, in effect, assert agency.

Expanding her argument, I suggest that the creative, commercial, and scientific male majority often rendered the X-rayed subject female in media because they designated the irradiated anatomy as a gendered site for this vanishing, in order to assert their mastery over their own materiality. A 1906 illustration titled “X-rays: Before and After” by Emil Grubbe featured a woman demonstrating “the diagnostic qualities of the X-ray” (Fig. 31).²³ The image provides an interactive optical illusion using a monocle, a book on radiation therapy by one of the first Americans to use X-rays for the treatment of cancer. Created for a presumed male gaze, the illustration offers a view of the female body that oscillates between revealing its inside and outside thereby suggesting that her materiality was vulnerable and fetishized for science.

Male voyeuristic fetishism viewed the female body as a private space that X-rays could invade. For advertising early X-ray products, including the popular X-ray glasses patented by George W. MacDonald in 1906, the typical object of

²² Karen Beckman, *Vanishing Women: Magic, Film, and Feminism* (Durham, NC: Duke University Press Books, 2003), 6.

²³ Emil Grubbe, *X-Ray Treatment: Its Origin, Birth, and Early History*, (Saint Paul, MN: Bruce Publishing Company, 1949), 130.

the gaze was often an unsuspecting female whose voluptuous body became visually available to a heteronormatively gendered male. The irradiated female spectacle invited the observer to look deeply into her clandestine regions, where the absences of her flesh could be questioned and erotically explored. The romantic poem, *Lines on an X-ray: Portrait of a Lady* (1896), illustrated this best:

She is so tall, so slender; and her bones—
Those frail phosphates, those carbonates of lime,—
Are well produced by cathode rays sublime,
By oscillations, amperes, and by ohms.
Her dorsal vertebrae are not concealed
By epidermis, but are well revealed.
Around her ribs, those beauteous twenty-four,
Her flesh a halo makes, misty in line,
Her noseless, eyeless face looks into mine,
And I but whisper, “Sweetheart, Je t’adore.”
Her white and gleaming teeth at me do laugh.
Ah! Lovely, cruel, sweet cathodograph!²⁴

With the X-ray, the woman’s cosmetic façade dissolved away. The male poet visually moved into and through the irradiated female’s corporeal space, thereby exerting an act of power over her. Indeed, this poem conveys the male fantasy of penetration.

The poem also illustrates the composition of the irradiated female body. “Phantasmatic space,” according to Laura Mulvey, originates in the unconscious where sexual difference is perceived and fetishism emerges at the signs of loss or substitution.²⁵ The visible surface of the female body often stands in for a screen onto which socially constructed ideals and fantasies are projected and filtered. However, in the case of radiography, the surface of the body is removed

²⁴ Lawrence K. Russell, “Lines on an X-Ray: Portrait of a Lady,” *Life*, March 12, 1896.

²⁵ Laura Mulvey, “A Phantasmagoria of the Female Body: The Work of Cindy Sherman.” *New Left Review* 188 (August 1991): 145-147.

but the screen remains. The fetish that appears is a fragile apparition of anatomy, incomplete without its flesh, thereby inviting the viewer to visually complete it, causing it to emerge from the screen as a whole body. Phantasmatic space comprises the vanishing lady concept of Beckman and shapes the fetish of an X-rayed woman through its tension between presence and absence.

COMMODIFYING AUTHENTICITY FOR THE AFFLUENT WOMAN

As Frau Röntgen's irradiated hand circulated around the world, it prompted the vogue for X-ray portraiture, or the interior portrait. The interior portrait was a radiograph that had aesthetic and personal value to the subject. Most interior portraits depicted hands because they were the easiest to corporeally expose and to remain stationary for the length of time required. For portrait sitters, the radiographic experience was, in part, a return to the novelty of photographic portraiture: "secure the shadow, ere the substance fades." Unlike the popular snapshot cameras of the 1890s, the exposure for interior hand portraits could take anywhere from thirty seconds to several minutes, and required the sitter's patience and immobility reminiscent of photography's Daguerreian era.

In the first six months of 1896, interior portraits were a novelty for the upper class, elite women in particular. The process of making the portraits provided an exhilarating electrical experience. X-ray demonstrations were sensual events in which the participant felt fear, anxiety, wonder and pleasure, taking place in total darkness with crackling electric sparks inches away from the

body. As I argued earlier, the phantasmatic space of the irradiated female body invited the observer to visually complete the body because the image itself was fragmentary and an aide-mémoire of the surface's loss. So the ending sensation of the X-ray demonstration was one of wholeness, completeness, and survival.

Since X-rays erased surface values of clothing quality, styled hair, and ethnicity, the skeletal representation held the potential revelation of a classless, genderless, universal body. Therefore, the pleasure of the interior portrait involved subjects accessorizing their hands with different kinds of jewelry, like rings and bracelets. Affluent women were drawn to interior portraiture to not only have an authentic experience, but to authenticate their financial status through the display of their luxury commodities.

In early 1896, experiments in Germany by Josef Maria Eder and Eduard Valenta demonstrated the effects of X-rays on a variety of different materials including metals, jewels, biological specimens, and human limbs.²⁶ Their studies and those by other scientists determined which materials, were penetrable and impenetrable by X-rays. Dr. James Ames in the United States found that genuine diamonds, rubies, and sapphires appeared mostly transparent while the "paste" imitations and glass were an opaque black.²⁷ These experiments also produced an aesthetic appreciation for translucency. Theodore Dreiser reminisced: "This new light, before which flesh, wood, aluminum, paper and leather become as glass, sounds quite like some aged Arabian fiction, akin to the natural fountains of colored waters and the trees whose fruit was diamonds and precious

²⁶ Josef Maria Eder and Eduard Valenta, *Versuche über Photographie mittelst der röntgen'schen Strahlen* (Wien: R. Lechner [W. Müller], 1896).

²⁷ "A Marvel of Science: Popular Lecture Describing the Roentgen Rays," *The Sun* 1896, 8.

stones.”²⁸ The lucidity seen in radiographs validated the quality of materials, establishing norms and judgments about the beautiful and valuable. As a result, X-rays drew the attention of the upper class, especially women, with rousing anxiety and optimism that their jewelry would retain its market value, and consequently helped fuel the fads of X-ray portraiture and the X-ray soiree.

Some of the first documented X-ray soirees took place in New England, with Boston’s prominent art collector and socialite Isabella Stewart Gardner as one of the hosts.²⁹ In 1896, Mrs. Gardner lived at her Beacon Street residence with her husband John Lowell Gardner. Bernard Berenson had overseen her art acquisitions for two years prior, and in February 1896 she purchased Rembrandt’s *Self-Portrait*—which she later said was the “cornerstone of her collection and thereafter she planned her own museum.”³⁰ Between March and the end of April, she secured the purchasing of her personal favorite painting: Titian’s *Europa*, and at the same time, Gardner hosted X-ray soirees for her intimate acquaintances with the assistance and equipment belonging to her nephew, John L. Gardner II (Johnny).³¹

Johnny, an amateur photographer Harvard-schooled in Natural History, and his friend Billy Seabury, helped produce fine radiographs of her hand, which

²⁸Theodore Dreiser, “March 1896,” in *Theodore Dreiser’s Ev’ry Month*, ed. Nancy Barrineau (Athens: University of Georgia Press, 1996), 56.

²⁹ “X-Rays for Everybody,” *Boston Evening Transcript*, March 14, 1896, 20.

³⁰ Bernard Berenson and Isabella Stewart Gardner, Mary Berenson, and Rollin Van N. Hadley, *The Letters of Bernard Berenson and Isabella Stewart Gardner, 1887-1924, with Correspondence by Mary Berenson* (Boston: Northeastern University Press, 1987), 48. See note 1 under the entry for January 19, 1896.

³¹ “Grim Fads,” *Times-Picayune New Orleans*, March 18, 1896. This article refers to a previously published report—most likely out of Boston, but which is unknown to the author.

she passed around to her friends—the “Boston 5 o’clock ten.”³² These fashionable elites from the Back Bay area displayed their finest jewelry for their radiograph sittings. Rings and bracelets studded with diamonds, lace at the wrists, restored the markers of their class and gender. However, the display of their baubles put them in a vulnerable situation of social sorting as one woman discovered: “When the picture was taken she wore a handsome solitaire, which appears on the print as a black spot in her ring...the X ray was an infallible test of a genuine diamond and that a real stone would transmit the rays as easily as glass permits the passage of light, while a spurious stone was opaque to them.”³³ The interior portrait could in turn expose inauthenticity and reveal the worthlessness of these luxury commodities, thereby bringing shame to the owner.

Gardner’s interest in X-rays has survived through the newspaper stories, as well as a cabinet card that she once owned, now in the collection of the Isabella Stewart Gardner Museum (Fig. 32). Manufactured in Germany, the front of the cabinet card depicts an upper-class woman wearing a dress with puffed sleeves, long gloves, and her hair stylishly supported with a pin. Illuminating her body is a floating letter “X” that radiates with light. She stands, with her left arm extended, transfixed in its glow. The verso of the cabinet card reveals her

³² “X Ray in Boston Society,” *New York World*, April 5, 1896, 20. Reference to the “Boston 5 o’clock ten” is in “Grim Fads.” For more information about John L. Gardner II (Johnny), see Heather Ross Munro’s thesis: *The history and significance of the Gardner Collection of Photographs at the Kummel Library, Harvard University*. (1988). I have not been able to positively identify Billy Seabury, but I suspect he is the “William Seabury” mentioned in the *New York Herald* May 28, 1896, 6 and the *Boston Journal* 8-29-1907, 7, which identifies him as a member of the Myopia Club. The Myopia Club was a country club with exclusive membership including the patriarchs of the Gardner family.

³³ “X Ray in Boston Society,” *New York World*, April 5, 1896, 20.

irradiated spectacle in simulated form. The light has removed her clothes, with an exaggerated rendering of her skeleton and halo of flesh, emphasizing her wide hips, slender waist, bent knees, and curled hair. The German words under the pictures translate to: “A new light moves the world, as Professor Roentgen discovered, see now your beauty under the X-ray.” The cabinet card presents interior portraiture of women as a commodity and serves as an invitation to experience the X-ray’s revelation of the *beauty* of the inner body.

Contrary to the popular Cabaret du Néant’s macabre focus, Gardner’s attraction to X-rays may not have been born of morbid fascination, but rather a fetish for the phantasmatic space that comprised the irradiated body. Her participation in the X-ray soiree occurred a few years before the opening of her palace on the Fenway; however, there is a similar spatial aesthetic between the interior portrait and the arrangement of her museum artifacts. Patricia Vigderman has argued that the Gardner Museum exudes a Taoist and Zen philosophy where “true beauty could only be discovered by one who mentally completed the incomplete.”³⁴ She suggests that the Gardner Museum conveys the presence of incompleteness, due to the unique and diverse display of objects where observers must attempt to complete the grand narrative that Gardner has authored. If Eastern philosophy influenced Gardner’s spatial arrangement of her palace, then the interior portrait appealed to her because it resembled a fragile relic of beauty inviting her and her guests to restore the memory of its surface.

³⁴ Patricia Vigderman, *The Memory Palace of Isabella Stewart Gardner Museum* (Louisville, KY: Sarabande Books, 2007), 60.

X-ray soirees hosted by the wealthy continued well after the first year of the craze. According to the *New York Sun* in late 1898, “the x-ray party promises to oust the trolley party, at least during the winter, and it certainly is far more amusing.”³⁵ Unlike Gardner’s gatherings, young women’s charity groups in Brooklyn Heights offered these soirees for fundraising. Doctors or operators of equipment would donate their service to the ladies for the “first-look-yourself-and-each-other-through-and-through-show.” The *Sun* reporter addressed a concern that he had heard X-ray exhibitions were dangerous. The doctor who administered the X-ray apparatus for the King’s Daughters members responded, “Properly applied there is absolutely no danger with the X-ray, especially in connection with a static battery. I have never known it to burn a patient... When people begin to take their fun scientifically, or rather find science really amusing as well as interesting and instructive, then we are progressing.”³⁶ Even after Edison’s announcement following Clarence Dally’s death, private X-ray demonstrations in people’s homes continued, though infrequently.³⁷ Stories of such fashionable interactions presented X-rays as commodities to be desired and consumed without concern for radiation.

Interior portraiture depicting bejeweled hands disclosed the indulgence against which the art-historical Vanitas of Gilbert’s illustration had warned. X-ray pictures liberated women from the social constraints that advised against their pursuit of leisure and consumption. With X-rays, the interior portrait sitter could

³⁵ “Brooklyn’s Newest Fad,” *New York Sun*, November 20, 1898. 4.

³⁶ Ibid.

³⁷ “Game Supper Greatly Enjoyed: The Fur, Fin, and Feather Club Gives Its Annual Dinner at Home of Dr. J.D. Robertson,” *Cambridge Chronicle*, December 17, 1904, 7.

take rings and bracelets with her in death; they did not fade away. Such ornamentation fused to the bone on the radiograph.

THE POPULARIZATION OF X-RAYS AND THE NEW WOMAN

While private X-ray soirees sprang up in the northeast, public demonstrations of the new technology occurred at universities and libraries. Months later, X-rays became more commercial for the middle class. In May 1896, the press publicized Thomas Edison's exhibition at the National Electrical Exposition that opened at New York City's Grand Palace with great anticipation. He constructed a dark chamber, draping the entire room in black cloth, for his newest X-ray viewing invention—a large fluoroscope screen. An operator instructed visitors to reach underneath the screen and to press the palms of their hands onto the other side in order to make their internal structures visible. The fluoroscope exhibition strengthened the desire to possess the spectacle that Frau Röntgen received upon observing her own skeleton, thus commodifying X-ray vision for a major public event in a significant metropolitan area. According to a *New York Times* review of the event, "Women carried off all the glory that was to be gained at the exhibition."³⁸

The reviewer observed that more women than men recognized their own bones because most women wore rings and "the margin between the bones of the fingers and the rings was too obvious to admit of skepticism."³⁹ Jewelry held significance to radiograph sitters beyond just the authentication of their material

³⁸ "Fluoroscope a Success," *New York Times*, May 12, 1896, 3.

³⁹ Ibid.

value. Rings, bracelets, and necklaces served as indicators of individual identity amidst the United States' increasingly standardized production of consumer goods. Ornamentation was a way to distinguish one interior portrait from another, a customizable imprint of the X-ray's mechanically-produced vision. In other words, wearing jewelry highlighted the personhood in the irradiated body.

Under the pressure of strong consumer interest, Edison offered to make radiographs for some of his exhibit's most exclusive visitors—including the Infanta Elvira, the Bourbon Spanish Princess. This Princess was one of the first royals around the world who participated in X-ray portraiture: the Duke and Duchess of York followed her in August 1896, and Nicholas II (Emperor of Russia) and Alexandra (Empress of Russia) also had radiographs of their bejeweled hands made in 1898.⁴⁰ The *New York World* pointed to her lack of riches but, nevertheless, the radiograph captured the “bluest blood of the Bourbons.”⁴¹ In the radiograph, the Princess wears a single ring from her royal ancestors to identify her stately lineage.

Observing her anatomy, the reporter notes that the Princess’s hand is “broad and strong, and that the fingers, though well proportioned, are far from tapering.”⁴² The specificity of these characteristics suggests that socially constructed biometrics measuring the class and gender of the hand had already taken hold. The Princess’s anatomy did not quite fit the profile of femininity by Victorian standards. X-rays revealed that “beauty is in the bone and not

⁴⁰ For information on the Duke and Duchess of York, see “How Royal Hands Look Under the Roentgen Rays,” *New York World*, August 2, 1896, 19.

⁴¹ “A Bourbon Princess’s Hand,” *New York World*, May 24, 1896, 31.

⁴² *Ibid.*

altogether of the flesh. There was never anything so taper as a taper finger as it shows in the bone structure.”⁴³ This example shows that X-rays authenticated aristocratic class status as a natural trait at the skeletal level. A nineteenth-century reader may have interpreted the Princess’s physiognomic variance as the result of her lack of excessive wealth. Alternatively, her hand was also emblematic of female strength and an eagerness to participate in the electrical wonder. She was a Princess for the New Woman and her participation in Edison’s display encouraged more middle-class women to be exposed to X-rays.

After this success, the popular press and leading scientists worked in tandem to position the irradiated female body as the front for technological progress. New women interacting with technology were frequent icons for companies such as Eastman Kodak’s “Kodak Girl,” communicating the message that if women can do it, anyone can. Thus, if women visibly interacted with X-ray technology, it would appear less frightening to both men and women. Toning down public anxiety for a new electrical marvel and the sporadic reports of radiation burns involved drawing more attention towards the spectacle of irradiated women constructed by the reputations of well-known technicians.

After Thomas Edison’s successful fluoroscope exhibition, the global population considered him an authority on X-rays. Letters written to him from private citizens and the press increased. In private correspondence, Edison told one prospective client that he was not a specialist on the subject of X-rays. He had many other interests besides X-rays, including his mining operations. Redirecting his admirers and the press, Edison praised electrotherapist Dr.

⁴³ “Her Latest Photograph,” *New York Times*, May 29, 1898, 14.

William James Morton of New York as the “best x-ray expert in this country.”⁴⁴ In June 1896, Edison advised the *New York World* to cover Morton’s achievement: creating a radiograph of a woman’s living beating heart.⁴⁵

Morton’s subject, Kate Swan, was *The World*’s frequent contributor who wrote about her sensational adventures. Given her escapades, in which she often put herself in danger in order to obtain knowledge that respectable society considered taboo, her decision to offer her body for Morton’s experiment strongly aligned with her publicized image. Swan’s detailed account of her X-ray experience cast Morton in a role similar to a magician, and herself as his willing “vanishing lady.” In the first few months of X-rays in America, this event was remarkable for not only the technological accomplishment, but also for providing a modern female voice to the new experience of receiving radiation.

Swan’s article in the *New York World* begins by describing Morton’s completely dark room furnished with a large table, a vacuumed tube, and Morton’s static electric machine powering a high frequency current.⁴⁶ Sprawled out on the X-ray table, Swan notes the machine’s “sawmill”-like crackling sounds that caused “whizzing” vibrations along her spinal column while the room smelled of ozone. Once the tube powered up, electric sparks appeared inside the glass over her face. When she looked up at Morton’s oil painting of Rembrandt Peale’s *George Washington*, she “wondered what George’s immortal spirit thought of X rays.” With this consideration, Swan distinguished between the making of pre-

⁴⁴ From Thomas Edison’s hand-written letter dated June 1896, digitized by Rutgers University’s Thomas Edison Papers project.

⁴⁵ Edison refers *The World* to Morton mentioned in a private letter dated 6-15-1896 which can also be found in the Thomas Edison Papers Project.

⁴⁶ Kate Swan, “First Woman to Have her Heart X-rayed,” *New York World*, June 14, 1896, 17.

modern portraiture, which she referred to as “benign,” and the anxiety-inducing modern X-ray process. Morton had fixed the tube over her chest to record her heart, and when she asked if the sparks would jump onto her face, he replied, “No, and the tube won’t burst and throw glass in your face.” From Swan’s perspective, the experience grew more thrilling: “It sounded like a wholesale Fourth of July fireworks exhibit, in which I was the leading skyrocket.”⁴⁷

Although her reporting delivered the frightening experience with emphasis on the senses, she quickly turned her reader’s attention to the beauty of the glass bulb. Swan wrote that the tube became a glowing ball of “pale green radiance.” The green glow itself was not X-rays, but an indication that the tube had reached the frequency to release X-rays, thus generating invisible radiation. Swan, enthusiastic about the illumination, elaborated on this color:

The impressionist would despair, Beardsley would draw a new poster and the milliners who think they have run the gamut of greens this year have something yet to devise. It is the newest color, yet undiscovered by the dyers—it is X-ray green.⁴⁸

With the news story, she effectively sold the electrifying X-ray experience using articulations associated with fashion and art.

After the illumination dimmed, she accompanied Morton to a darkroom offsite to watch the glass plates develop. She recounted:

I had thought I was proof against all nerves where bones and skeleton and kindred objects were concerned. If any one wants a hair-raising sensation let him watch his own skeleton materialize; watch the ribs, one by one, come to a ghastly life on a rapidly developing plate; find a shoulder-blade suddenly outlined; a shoulder-joint and socket standing out sharply; recognize the

⁴⁷ Ibid.

⁴⁸ Ibid.

vertebrae of the spine and then be conscious of an enthusiastic voice exclaiming, "The heart! There's your heart! See it."⁴⁹

Swan's published story aided in commodifying the skills of Morton and his future endeavor as an interior portraitist. In 1897, Morton created what he claimed was the first full-sized X-ray picture, made of the entire living adult body in one exposure. The *New York Times* referred to her as "The X-Ray lady" (Fig 33).⁵⁰ She wore fashionable clothes, including a hat and boots, and bejeweled in rings, a bracelet, and a necklace. She removed her corset so that her ribs would appear well-developed. The X-rays erased her clothes and flesh to reveal her frame adorned with material accessories—including a hat pin "coquettishly" standing erect from her back, hairpins suspended in the air around her head, her boots laced in a zigzag pattern, and the metal clasps of her stocking supporters which were indented in position, indicating that her stockings clung tight around her legs.⁵¹ Morton's X-ray lady presents a climax of male and female desires, communicating eroticism and conspicuous consumption in full-bodied form. Although her body passively sprawls out on the image surface, her accessories are indicators of consumer agency and possession. She is a shopper of the marketplace. Importantly, the amalgamation of science and consumerism in the X-ray lady portrayed early radiography as glamorous, attractive, and marketable. She was a towering figure of American scientific progress, life-size, and photographically undivided—which future scientists and illustrators would re-create in the twentieth-century.

⁴⁹ Ibid.

⁵⁰ "Her Latest Photograph," *New York Times*, May 29, 1898, 14.

⁵¹ Ibid.

By this time, more concerns over radiation damage had surfaced in the popular press.⁵² However, Morton, in the same article reporting on the X-ray lady, reassured the lay public that if they placed their bodies in the care of a skillful technician, they could count on reliable, safe procedures. This claim made him more exclusive to the wealthy who could afford the best. Consequently Morton ran a side business of interior portraiture, marketing it specifically to female socialites. Women, he asserted, were easier to radiograph than a hot-blooded, strong, “laboring man.” The *Times*, which covered Morton’s business, proposed that it was more fashionable to have a hand X-rayed than to model it in plaster, and that the cost for his interior portraiture was “exclusively” priced. Thus, he re-purposed X-ray technology as non-functional “conspicuous waste” for bourgeois women.⁵³ Morton, the *World*, and *Times* newspapers suppressed growing concerns about radiation by effectively marketing X-ray experiences to women, encouraging this subculture of collecting.

Across the country, other physicians with X-ray apparatuses often opened their doors to groups of ladies who wanted to try out the fluoroscope or receive an interior portrait. In Rochester, NY, May Bragdon, the sister of modern architect Claude Bragdon, joined her girlfriends to visit the office of “Dr. Davis” to experience the fluoroscope and to receive a radiograph (Fig. 34). Her diary entry

⁵² “Experiments with X-Rays: The First Victim,” *Los Angeles Herald*, March 9, 1896, 1. “Poisoned by Roentgen Rays,” *Washington Post*, October 20, 1896. “X-Ray Electrocutions,” *St. Paul Globe*, December 6, 1896, 1. “Wonders of X-Rays,” *The World*, May 1, 1897, 12. “Dangerous X-Rays: Improperly Used They Produce Serious Injuries,” *Los Angeles Times*, June 1, 1897, 5. “For and Against the X-Ray,” *Los Angeles Times*, September 28, 1897, 6.

⁵³ Thorstein Veblen describes “conspicuous waste” as items that do not serve humanity, instead they are self-serving to the leisure class’s reputability. Thorstein Veblen and Stuart Chase, *The Theory of the Leisure Class; an Economic Study of Institutions* (New York: Modern Library, 1934), 97-98.

from March 14, 1899 revealed how this was a non-medical visit, a playful performative encounter: “he filled us full of electricity, etc. and took an x ray picture of my hand... It was queer to see Meta’s collar bone with the fluoroscope and to see money inside our pocket books and right thro’ the bills and thro’ our gloves, but not the buttons, etc. Dr. Davis gave me the negative.”⁵⁴ Dr. Davis did not give her the negative to protect her privacy, but rather as a souvenir from which she could make reproductions. May, an unmarried amateur photographer, made at least two prints from the doctor’s negative. As the family visual documentarian, she fastened one print in the Bragdon family photograph album and the other in her personal diary. Both prints were cyanotypes and displayed her jewelry in a pleasing geometrical design, with her bracelets forming concentric circles around her wrist.

Despite Claude Bragdon’s prestigious architectural commissions in Rochester, including the Livingston County Courthouse and the Rochester Athletic Club, his family remained in the middle class.⁵⁵ May worked as the secretary to architect James G. Cutler at the time of her interior portrait.⁵⁶ She spent much of her free time riding bicycles, photographing nature, attending slide lectures on exotic foreign lands, and having picnics with her girlfriends. In the case of May, X-ray portraiture attracted a middle-class woman who enjoyed the offerings of the modern lifestyle. No detailed evidence exists about how much

⁵⁴ May Bragdon, “Diary of May Bragdon,” March 14, 1899, Bragdon Family Papers, University of Rochester Rare Books and Special Collections.

⁵⁵ Per conversation with Andrea Reithmayr, Curator of the Bragdon Family Papers at the University of Rochester Rare Books and Special Collection.

⁵⁶ Bragdon Family Papers Collection Description. Accessed 11/1/ 2013.
<http://www.lib.rochester.edu/index.cfm?PAGE=803>

these radiographs cost. Morton, who served the elite clientele of Manhattan, could ask for a high price. However Dr. Davis in upstate New York likely offered such services for a moderate price that May Bragdon could afford. Therefore, X-rays served as vehicles of female self-fashioning regardless of class status.

In the cases of both Morton and Davis, the trend towards interior portraiture demonstrated that physicians participated in the commodification of X-rays by blurring the boundaries of science, art, and entertainment. On the one hand, the practice generated extra income and, on the other, it garnered enthusiastic approval for this new technology that had started to produce public anxieties about radiation. The X-ray experience could be purchased as a party, a performance, a work of fine portraiture, and a medical novelty. While quackery in medicine was still a problem at the end of the nineteenth century, having reputable physicians engaging in these commercial ventures made identifying an “x-ray quack” a dilemma. In fact, it was not uncommon to have reputable physicians call a space in their office a “gallery” devoted to exhibiting X-ray pictures. Morton had a self-described “art gallery,” which designated him as a medical aesthete.⁵⁷ Publicly presenting radiographs was a way for physicians to advertise their technological progressiveness. Physicians who invested in new X-ray equipment associated their services with modern medicine.

As 1896 progressed, X-ray commodities became available at amusement parks, fairs, department stores, and restaurants. In September 1896, Bloomingdale’s Department Store in Manhattan offered interior portraiture in its

⁵⁷ “Her Latest Photograph,” *New York Times*, May 29, 1898, 14.

"Art Gallery, on the sixth floor."⁵⁸ Herbert Hawks, a Columbia University student, operated the technology there for only four days before he discovered his own hair loss, lack of fingernail growth, vision impairment, chest burns, and swollen and inflamed hand.⁵⁹ Hawks stopped the radiography screenings to receive treatment for what he believed was a "mysterious electrical effect," but after treatment, he returned to his job at Bloomingdale's and continued to suffer for months later.⁶⁰ By the end of 1896, hand-held fluoroscopes in "X-ray Rooms" emerged around the country at entertainment establishments that had phonographs and kinetoscopes.⁶¹ In 1902, X-ray slot machines replaced the hand-held fluoroscope at some of those same establishments as well as at restaurants.⁶² Despite the increasingly known dangers of radiation, X-ray commodities were everywhere.

X-RAYS IN STYLE

The year 1896 also produced a striking lithograph of an X-ray lady, originally made in Paris, which circulated in the United States (Fig. 35). The print shows a young woman in a diaphanous gown with its translucent fabric barely indistinguishable from her skin below the neckline. Rather than a shroud to conceal her body, the gown facilitates the observer's X-ray vision. Her puffed

⁵⁸"Bloomingdale's (Advertisement)," *The World* (New York, NY), September 13, 1896, 36.

⁵⁹ Catherine Caufield, *Multiple Exposures : Chronicles of the Radiation Age*, (New York: Perennial Library, 1989), 9.

⁶⁰ *Ibid.*

⁶¹ "Beyond the Power of Man." *Chicago Chronicle*. n.d. X-ray Clippings. Thomas Edison National Historic Park.

⁶² "Items of Progress: X-Ray Slot Machines," *Wilson's Photographic Magazine*, March 1902, 117. Also see the patent for the Coin Controlled X-ray Machine by J.M. Hunter, Patented March 11, 1902, No. 695,154.

sleeves fade around the halo of her flesh and the impressions of her arm bones. The bell of the gown reveals the appearance of her skeletal legs underneath. Her heart is the most opaque of all a focal point marking the most intense absorption of radiation. The attention directed to her heart indicates the fetish, which the observer can see but is still contained and barred from access. This is a woman going out to a masquerade, wearing a dress that reveals and a mask that conceals. Indeed, she appropriates the aesthetic of phantasmatic space and makes it into a performance through her style. Her costuming indicates that X-rays could convey an empowering exhibitionism commodified in a woman's dress.

The diaphanous gown originated long before X-rays; however, after Röntgen's discovery, it acquired an association with X-rays. The "x-ray dress," the "x-ray shirtwaist," or the "x-ray skirt" had thin translucent material so as to show the seams and shape of the fabric or perhaps even the outlines of flesh underneath the dressing. Diaphanous material surged in popularity during the fin de siècle and even in the first two decades of the twentieth century. The performer Loie Fuller, famous for her Serpentine Dance in the 1890s, popularized the fabric. As early as 1896 when she toured the United States, Fuller visited Edison's laboratory while his assistants experimented with X-rays and radioactive matter. He demonstrated to her his hand-held fluoroscope and she recounted:

Mr. Edison explained to me that the wall [inside the fluoroscope box] was covered in phosphorescent salts which absorbed light as sand does water and they become luminous. This curious light held me spellbound. It was not the skeleton of my hand which interested me; it was the light that filtered through my fingers when I held my hand between the electric bulb light and the stereoscopic

box, and made the flesh appear to be a veil. No it was not a skeleton of my hand that interested me much at all. It was—the light. Could I permeate a dress with those wonderful salts...⁶³

Fuller's fascination with X-rays was not about the X-ray's ability to authenticate true and false materials. Rather, she admired X-rays' translucent effect on materials, and how flesh transformed into the diaphanous. Although she asked Edison to experiment with making her veil-like fabric glow with phosphorescent salts and X-ray tubes, he eventually abandoned the idea because of his knowledge of radiation dangers. After the discovery of radium in 1898, Fuller succeeded in applying radium to her diaphanous costumes to make them glow in dance performances and exhibit the immateriality of her physical form through layers of veil.

X-ray garments did not have to glow, and in fact they often did not, but they did have to be veil-like. In 1897, Paris created "x-ray pattern" gowns for Easter characterized by their thin material that showed "the lining underneath."⁶⁴ However, the popularity of these X-ray dresses in the United States peaked over a decade later during a contentious season of the women's suffrage movement.

When women wore the X-ray dress during women's suffrage, the performance was another indication of women's agency as active consumers and mediators of their own bodies. Hille Koskela has coined the phrase "empowering exhibitionism" to explain the pleasures and power dynamics of self-

⁶³ Loie Fuller, "A Draft of the Lecture on Radium," 1907-1911, Loie Fuller Papers. New York Public Library Performing Arts Division, 2-4.

⁶⁴ "Easter Gowns for Matrons: Styles That Will Rule in Paris, Where It Is the Duty of Every Woman to Be Young. X-Ray Goods by Far the Most Popular," *The Times*, April 4, 1897.

surveillance.⁶⁵ Inspired by Foucauldian theories of knowledge, judgment, and the internalization of control, Koskela addresses two regimes within the domains of transparency and visibility: the regimes of order and shame. The regime of order targets how society controls individuals by gathering knowledge and employing a “judgmental gaze” to maintain normative social roles and bodies. The regime of shame connotes how individuals internalize control and feel the need for privacy and modesty. To reject or resist both regimes, Koskela says, results in empowering exhibitionism: “conceptually, when you show ‘everything’ you become ‘free’: no one can ‘capture’ you anymore, since *there is nothing left to capture.*”⁶⁶ I contend that empowering exhibitionism is a way to understand the appropriation of the X-ray dress for women’s suffrage. The X-ray dress became a mode for women to mediate the visibility of their bodies and to reclaim self-ownership. It was a sheath to draw attention to the phantasmagoria of their anatomies.

In the spring of 1913, the Women’s Suffrage March on Washington increased social tensions and set up the summer for provocative demonstrations of gender. Wearing the X-ray dress was one way to direct attention to the female body. The folds of the diaphanous fabric revealed glimpses of the female form while simultaneously being a sheath for that form. The dress welcomed a variety of gazes from both men and women. Putting on the dress increased the visibility of women who were not yet recognized as equal citizens by the law. In one production of the play “The Suffragettes,” the character of the secretary of the

⁶⁵ Hille Koskela, “Webcams, TV Shows and Mobile Phones: Empowering Exhibitionism,” *Surveillance & Society* 2, no. 2/3 (2004), 207-208.

⁶⁶ Ibid.

suffragists sported the dress prominently, even after police arrested an actress in Richmond, Virginia, for wearing it: "The dress is a beautiful creation of peach chiffon, silver spangles, pale blue girdle, and dainty forget me nots."⁶⁷ In the case of the X-ray dress, the material mediated the body's tension of presence—the opening of the folds correlate with the appearance of the form and the closing, its disappearance.

This exhibitionism made the X-ray dress a target for different city governments across the country to police. In the summer of 1913, the backlash against X-ray dresses was widespread from Rochester, New York, to Richmond, Virginia, to Portland, Oregon. The mayor of Portland ordered the arrest of women wearing the dress and stated that "the question of whether a gown is really an 'x-ray' or otherwise objectionable is to be left to the judgment of the policeman who views it."⁶⁸ Los Angeles also considered passing a law that forbade the X-ray dress on the streets of its city.⁶⁹ There was no explicit definition of what constituted an X-ray dress, but it did indeed have to reveal or give the illusion of seeing a woman's flesh. This display of female sexuality was one device employed to increase the visibility of suffrage, and the timing of the X-ray dress's popularity in the summer of 1913 ties that fashion to the movement.

The safer place for the X-ray dress was in the theater or in motion pictures, where scantily clad women could perform their sexuality through costume without being arrested. In 1916, English stage actress Muriel Martin

⁶⁷ "X-Ray Dress Will Be Worn by Miss Claire Simpson in 'The Suffragettes,'" *Tuscon Daily Citizen*, September 4, 1913, 8.

⁶⁸ "Prohibits X-Ray Skirt," *New York Times*, August 20, 1913, 1.

⁶⁹ "Police Bar X-ray Skirt," *New York Times*, August 23, 1913, 1.

performed in “Midnight Frolic,” a production of Ziegfeld Follies in New York. Her stage photograph accompanied the publicity of the production (Fig. 36). In the photograph Martin wears a translucent hat, matching a diaphanous gown with a fluttering sash. The gown fails to conceal her undergarments or the shadows of her legs. The title directly infers that this is “An X-ray Portrait.” In this context, the rendering of her diaphanous material stands in for the halo of her flesh, and the shadowy limbs of flesh become her bones.

With the policing of such dresses, the X-ray effect became the object of a disciplinary gaze. Yet Martin’s portrait shows a woman who wears the dress as a performance to counter that gaze, rejecting the regimes of judgment and shame. Indeed, she welcomes the attention and re-directs the scrutiny of the X-ray to the revelation of her visibility and sexuality. The provocative aspect of this performance involves what is covered (arms, torso, pelvis, upper legs) and uncovered (hands, face, neck, and ankles). The folds of the dress present an ambiguous tease of the corporeal inside and outside. The X-ray dress was not just a commodity for purchase, but it commodified the woman and made her body into a fetish, offering glimpses of desire for men and freedom from the constraints of respectable fashion for women.

RE-APPROPRIATING MEDICAL X-RAYS AS PORTRAITS

As I described in Chapter 1, X-rays began to acquire an association with medicine within ten years of Röntgen’s discovery. For fear of being labeled quacks in the midst of being newly accepted into the medical field, radiologists

reduced or entirely eliminated the practice of making non-medical radiographs.

Professionalization stifled the making and circulation of interior portraiture.

However, in the beginning of the twentieth century, physicians still gave medical radiographs to patients. The irradiated body continued to have an allure as a commodified object; it became a collectible item for personal family albums and private collections. Instead of being a souvenir of a vanished body, the radiograph also became a souvenir of a medical problem that a patient could re-appropriate as an aesthetic portrait.

The reasons for collecting medical radiographs were diverse, ranging from the desire to maintain a visual memory of an injury, to discover the inner beauty of the body, to amass raw material for making art. In each of these cases, the appreciation for the radiograph did not put the medical origin in the forefront of consciousness. Rather, as commodities for non-medical eyes, these collected radiographs acquired personal or aesthetic value that concealed their origins as objectively medical. In 1910, six-year-old Ellen Maria Dryden, the niece of George Eastman, received a glass “Röntgen record” of her broken left wrist from Dr. Percy Brown of Boston.⁷⁰ The surviving radiograph is a positive image, made from the negative that Brown used for his diagnostic purposes. Dryden requested the radiograph as a souvenir of her injury. In the 1920s Carl Van Vechten, the American writer, photographer, and patron of the Harlem Renaissance, also requested copies from his doctor of the positive radiograph prints made of his

⁷⁰ The glass positive is archived at George Eastman House’s Eastman Legacy Collection.

skull.⁷¹ Van Vechten, an avid collector, treated these images as fine art portraits—even affixing the label: “From the Collection of Carl Van Vechten” on the back of them.

Collecting medical radiographs as personal mementos was largely the practice of women. In 1924, *Life Magazine* satirized:

She was showing him the family photograph album. He wore a surprised and startled expression... ‘Here’s mother’s fallen arches, and this is a profile of Sister Ruth’s spinal column. We like that one so well we think we’ll have a crayon enlargement made for framing.’ No need prolonging mystery. The modern family album is made up of X-ray photographs, cabinet size.⁷²

The short humorous article implied how X-rays had assisted everyone in the family (except the baby). The practice of creating, displaying, and narrating a family album often was the responsibility and pastime of a woman in the household.⁷³ Integrating medical X-ray photographs in an album was a performance of gender, and a demonstration of a matron’s knowledge of her family’s health through careful documentation.

During 1920s and 1930s, a significant appropriation of medical radiography was undertaken by the Mexican artist Frida Kahlo. Scholars often connect Kahlo to radiography for two reasons. First, as Gunderman and Hawkins have claimed:

Kahlo’s art has its basis in her body. Kahlo knew her body not only through her sexuality and elaborate costumes, but also through

⁷¹ “Radiograph of Skull,” ca. 1920s, Carl Van Vechten Papers, New York Public Library Manuscripts and Archives Division.

⁷² A. H. F., “The Family Album,” *Life*, October 23, 1924, 6.

⁷³ Elizabeth E. Siegel, “‘Miss Domestic’ and ‘Miss Enterprise,’” in *The Scrapbook in American Life*, ed. Susan Tucker, Katherine Ott, and Patricia Buckler, (Philadelphia: Temple University Press, 2006).

operations, doctors' diagnosis, medical textbooks, the metal apparatus on her deformed foot, and her plaster or metal corsets.⁷⁴

She had studied anatomy prior to becoming an artist. When she was eighteen-years old, Kahlo suffered serious injuries from an accident involving the collision of a trolley and bus. She experienced multiple bone fractures in her pelvis, right leg, and right foot, among others. Furthermore, a steel handrail impaled her through her pelvic region and ruined her reproductive organs. Kahlo endured thirty-two different surgeries and had many radiographs made of her body throughout the remainder of her life. While there is circumstantial evidence linking Kahlo to radiography, there were many other ties to anatomy that influenced her as well.

Scholars also connect Kahlo to X-rays because, as Bettyann Holtzmann Kevles has argued, she "used the message of transparency. [...] she painted the insides of her body frequently, isolating internal organs but keeping them connected to her and to each other."⁷⁵ As I have argued earlier, however, transparency is a vague term to apply to the irradiated body. Many of Kahlo's self-portraits represented the inner workings of her body with autobiographical elements and magical realism. Laura Mulvey has elaborated on Kahlo's phantasmagoria:

Frida depicted her face, in an infinite number of self-portraits, as a mask, and veiled her body in elaborate Tehuana dresses.

Sometimes the veil falls, and her wounded body comes to the surface, condensing her real, physical, wounds with both the

⁷⁴ Richard B. Gunderman and C. Matthew Hawkins, "The Self-Portraits of Frida Kahlo," *Radiology* 247, no. 2 (May 1, 2008): 303–6.

⁷⁵ Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century*, (New Brunswick, N.J.: Rutgers University Press, 1997), 134.

imaginary wound of castration and the literal interior space of the female body, the womb, bleeding...⁷⁶

While Kahlo's body in painting is a phantasmagoria, it neither represents an X-ray simulation of a body nor has a direct correlation to X-rays.

Holtzmann Kevles has claimed that Kahlo never incorporated actual radiographs in her art, but the scholar and collector Raquel Tibol recently unearthed an example. Tibol describes the appropriated medical radiograph as follows: "She is drawn in blue and red ink, showing her complete torso and feet joined to the ribs. At center, a vagina. Droplets fall from the breasts. The hands attached to the arm stumps. At left, a watery star."⁷⁷ Kahlo wrote a letter to her husband, Diego Rivera, on her radiograph:

Diego my love:

This is pure farce, even Freud would be bored by it.

Why did I set out to draw something that drives a destructive impulse in me?

I want to create. But I am only an insignificant yet important part of a whole of which I still remain conscious. There is nothing new inside of me. There are only those old and stupid things that my parents left me.

What is joy?

Creation at the moment of discovery;

Knowing anything else

Is an empty legacy.

When one lacks talent but has curiosity, it is better to disappear without a trace and leave it to others to "attempt it."

Nothing

Shit

Everything can contain beauty, even the most horrendous thing.

It is better to shut up.

⁷⁶ Laura Mulvey, "A Phantasmagoria of the Female Body: The Work of Cindy Sherman," *New Left Review* 188 (1991): 149.

⁷⁷ The radiograph was in the archive of Raquel Tibol, who is now deceased. Tibol first published the information in Spanish in her book. Frida Kahlo and Raquel Tibol, *Escrituras* (México: Plaza y Janes, 2005), 143. A translation into English is available in: Frida Kahlo, Leo Eloesser, Teresa del Conde, and Carlos Phillips Olmedo, *Querido Doctorcito: Frida Kahlo-Leo Eloesser: correspondencia = correspondence* (México: DGE Equilibrista : Consejo Nacional para la Cultura y las Artes, 2007), 42.

Who knows anything about chemistry?
Who knows anything about biology?
Who knows anything about life?
Who knows anything about creating things?
How marvelous life with Frida is.⁷⁸

In this example, Kahlo re-purposes the mechanically-made medical radiograph into an object that contains not only her most private sphere, but also her agency. By adding the colors of blood, veins, as well as the anatomical parts that resided outside the X-ray's vision, she effectively alters the original radiograph with her own mediation of her body. The alternative materials applied to the radiograph emphasize the materiality she brought to her depicted immaterial body. She re-inscribes the radiograph with raw, melancholy emotion, complementing the veiled clouds of her irradiated ribs with dripping breasts and a liquid star.

To accompany the materiality and immateriality in the image, Kahlo's written sentiments to her husband on her radiograph demonstrate tensions between incompleteness and wholeness, as well as creation and destruction. On her ribs, she exclaims that, despite her will to create something new, she has nothing new inside of her—all that remains are her biological ties to her parents. Her lack of new creation makes her feel incomplete and even destructive—for she may need “to disappear without a trace.” Yet she ends with the several strong statements about life and creation, in which she reasserts herself: “how marvelous life with Frida is.”

Through prose and the appropriated radiograph, Kahlo evokes not only the phantasmagoria of the body but also the vanishing woman. She effectively

⁷⁸ Ibid.

mediates what she wants to reveal and conceal to him. Kahlo verbally and visually presents her lack and incompleteness to her husband, further emphasizing the fetish she has created of her irradiated body. She fades in and out of materiality and threatens to disappear only to reappear in the end with concrete assertions. Contrary to the medical men who made the radiograph of Kahlo, her appropriation of the image has made her the master and subject of her own materiality and vanishing.

For many of the women who collected their family medical radiographs in the early half of the twentieth century, their appropriation for personal use inflated the value of the radiograph. If the radiographs had remained at the physician's office, they would have been discarded after their use value was over. As they acquired more subjective meaning from their non-medical owners, their repurposing masked their use value. Importantly, the collection of these radiographs demonstrated a persistent attraction to the irradiated body spectacle and the fetish it produced.

THE POSTURE MOVEMENT

Although the professionalization of radiology and radiography limited the access of radiographs to the American public, there were new non-medical X-ray practices that emerged to sell commodities *and* restructure women's posture. As Yosifon and Stearns have explained, in the early twentieth century:

the rise of consumer society created genuine anxieties about a loss of discipline; the fact that relaxed posture was one measurable result... naturally called attention to the need to new zeal in defense of literal and figurative backbones. Traditional standards of

body control required novel methods of support, including, in this case, the heightened appeal to self-discipline.⁷⁹

The X-ray became a critical component of this self-discipline as it could aid in seeing inside the architecture of the body for the purpose of re-constructing its positioning and alignment. Both as spectacle and disciplinary mechanism, the X-ray revealed and authenticated the skeletal arrangement and architectural composition of the female body against increasing demands for proper posture and beauty standards. As consumers, women sought to make informed choices to support their bodies and their expanding social roles as mothers, employers and employees, and women of leisure. Shoe fluoroscopy and the radiography of the spine offered a stimulating vision that helped women with their practice of self-discipline.

In 1927, Dr. Jacob Lowe of Boston patented the shoe-fitting fluoroscope. As Duffin and Hayter have explained, “Aimed especially at mothers—with lopsided structural accommodations of the viewing eyepieces to suit the smaller stature of maternal clients—the fluoroscope became yet another instrument of experts’ advice about ‘scientific motherhood’”⁸⁰ The contraption frequently offered two eyepieces: one for the child who inserted his feet in the fluoroscope, and one for both the mother and the store clerk. By gazing upon her child’s feet, the mother could gather orthopedic knowledge. However, the apparatus in the department store spoke to more than motherhood.

⁷⁹ David Yosifon and Peter N. Stearns, “The Rise and Fall of American Posture,” *American Historical Review* 103, no. 4 (October 1998): 1082.

⁸⁰ Jacalyn Duffin and Charles R. R. Hayter, “Baring the Sole: The Rise and Fall of the Shoe-Fitting Fluoroscope,” *Isis* 91, no. 2 (June 2000): 266.

With women's divergent lifestyles, and the increasing variety of shoes to support those lifestyles, the shoe-fitting fluoroscope offered clarity, transparency, and confidence that empowered female customers to amass information about how feet fit before buying the shoes. Material translucency, once valued during the craze when examining the authenticity of diamonds, redressed its worth with the shoe-fitting fluoroscope. From the eyepiece on the shoe-fitting fluoroscope, a woman could see inside to her toes, with the structure of the shoe or boot also visible as glass. The glimpse into the glass shoe to judge how well it fit spoke to the Cinderella fairy tale. Marketing shoes with the fluoroscope involved selling the perfect and exclusive fit, and X-ray vision eroded away superficial appearances to authenticate the beauty of substance.

The perfect fit with the fluoroscope enabled women to stand up straight and maintain an attractive posture. In 1934, Janet Lane—an authority on the subject, published *Your Carriage, Madam!* The book outlined the methods for women to attain good posture by understanding skeletal and muscular alignment and weight distribution. Her methodology aimed to re-make women with a "streamline build," addressing the mechanized parts that must work together to create efficiency. She compared the female body to an automobile that must maintain good working joints, foundations, and alignment in order to perform: "If it's out of its natural skeleton alignment, you not only shake yourself to pieces in a thousand infinitesimal ways, but your body won't 'stand up' as it should under

hard usage—either in looks or efficiency.”⁸¹ Lane’s evaluation of the female body began with the feet:

Your toes should point straight ahead. In other words, never toe out. No matter what your grandmother may have been taught, all posture experts as well as dramatic and athletic directors agree nowadays that the inside borders of your feet should be parallel either standing or walking, for the sake of both grace and control. [...] Your weight should fall, neither on the heels nor balls of your feet—either one of which would upset your whole balance—but directly through the center of your ankle bones. And for this we have the authority of both scientist and artist, the former speaking for health and utility and the latter for perfection of line. And its common-sense engineering again also, for under each ankle you are provided with a finely fitted arch of bones so placed that your body weight falls directly on the keystone, just as in all good architectural construction.⁸²

The shoe fluoroscope aided in the posture movement of the 1930s because it drew attention to the interior construction of the foot and ankle inside the shoe. The foot comprised twenty-six bones connected together that formed the foundation for supporting the weight of ankles, legs, and pelvic bones. While fitting for a shoe, the female consumer could not see if her toes pointed straight ahead or if the inside borders of her feet were parallel. The shoe also hid the arch from view, a key component to the body’s balance and support. Sylvia Blythe of the *Los Angeles Times* recognized that the solution to these problems was the X-ray, “Through the probing eye of a fluoroscope, a device that penetrates leather, you would see for yourself whether your toes were lined up properly. [...] If you want your feet to grow old gracefully and give you the most in

⁸¹Janet Lane, *Your Carriage, Madam!* (New York, NY: John Wiley & Sons, 1934), 9.

⁸²Ibid, 10-11.

good looks and comfort now, keep a pair of scientifically fitted shoes.”⁸³ The shoe fluoroscope empowered female consumers to make informed choices as active agents in constructing their anatomy and gendered identity.

At the same time, these devices had ambiguous benefits because they did not serve specific medical purposes and they were unregulated for use. On the one hand, posture advocates commended the shoe fluoroscope for contributing to a healthy physique. On the other, medical professionals felt that department stores had little concern for consumer health and incorporated the shoe fluoroscope as a spectacular attraction and marketing tool. According to Duffin and Hayter, in 1946, the American Standards Association required that the shoe-fitting fluoroscope restrict the maximum radiation exposure and demanded signage that recommended customers to limit their examinations to no more than twelve in a year.⁸⁴ Around 1950, medical professionals raised objections about the devices’ safety. Leon Lewis and Paul E. Caplan of the University of California at Berkeley conducted a test on one of the shoe-fitting fluoroscopes and discovered “stray radiation,” as well as a “wide variability of exposure of patrons and salesmen.”⁸⁵ Consequently, they labelled the apparatus a “radiation hazard.” Over the next decade, thirty-four states banned the shoe-fitting fluoroscope; thus, the apparatus gradually phased out of American stores.

⁸³ Sylvia Blythe, “For Beautiful Feet: Here’s How to Take Proper Care of Them,” *Los Angeles Times*, July 21, 1940, J12.

⁸⁴ Jacalyn Duffin and Charles R. R. Hayter, “Baring the Sole: The Rise and Fall of the Shoe-Fitting Fluoroscope,” *Isis* 91, no. 2 (June 2000): 274.

⁸⁵ Leon Lewis and Paul E. Caplan, “The Shoe-Fitting Fluoroscope as a Radiation Hazard,” *California Medicine* 72, no. 1 (January 1950): 26–30.

In the mid-twentieth century, the posture movement continued without the shoe-fitting fluoroscope. The field of chiropractic, which had a poor reputation as alternative medicine, made a new push to become accepted in medicine. Chiropractic focused on locating pathologies of the spine, improving posture, and preventing interferences with the body's nervous system. To draw attention to the field, chiropractic practices across the United States devised Posture Queen beauty pageants. In these pageants, chiropractors judged women based upon their poise, personality, and the perfect symmetry of their spine. Each contestant submitted her body to the X-ray, so that the radiograph would indicate the most exceptional neuromusculoskeletal system. The beauty pageant's surveillance of the female body suggested that inner corporeal health led to outer beauty. For the posture movement, these pageants created new expectations for women's beauty and propelled the need for corporeal self-discipline and self-maintenance.⁸⁶

The press photographs documenting the winners of these competitions depict the crowned contestant holding a trophy standing perfectly straight next to her radiograph. Figure 37 shows nineteen-year old Dorothy Tidwell from Dallas, Texas, who, in 1956, competed with twenty-seven other contestants from the same number of states. The judges made their decision based upon observing the radiographs of each candidate. For Tidwell, her radiograph distinguished the superior alignment of her spine from those of the other contestants, hence the

⁸⁶ "You Think Beauty Is Skin Deep? You're Not A Chiropractor," *NPR.org*. Accessed July 11, 2016. <http://www.npr.org/sections/health-shots/2012/07/13/156718782/you-think-beauty-is-skin-deep-youre-not-a-chiropractor>.

judges crowned her “Miss Perfect Posture.” In the press photograph, the radiograph authenticates her interior beauty and the proof of her excellent posture.

Tidwell’s press photograph demonstrates the commodity of the vanishing lady as well as the complex relationship between sexual objectification and agency. She stands in flesh and blood, wearing her tiara, next to her interior skeleton. The side-by-side comparison has a flickering effect of outside-inside, a tease of her materiality and immateriality. Just as the radiograph reflects her incompleteness and the fetish, her physical body is the re-appearance of the vanished woman. Even though she partakes in the practice of the male gaze, in the form of the beauty pageant, Tidwell shows agency in her stance next to the radiograph. She is a willing exhibitionist of her body, but also in a position to be sexually objectified.

Tidwell and the other Posture Queens served as the commodified front for not only chiropractic but also X-rays in general. The Posture Queen aestheticized the alternative medicine of chiropractic and made it marketable for future patients through the exposition of the female body. With these pageants, the chiropractic field raised the bar for the standards of female posture and also presented itself as the solution for many women to achieve those standards. The Posture Queen pageants took place during the radiation scare in the United States. In Chapter 1, I explained that the radiation scare emerged amid Cold War fears of fall-out after World War II and revived public anxieties about the hazards of X-rays. The Posture Queen was the antithesis of radiation anxiety. She was poised,

beautiful, visually inviting, and open to sharing the secrets of her interiority and immateriality. The Posture Queen repackaged the irradiated body as a commodified spectacle.

The movement to make chiropractic more accepted remained controversial. The Posture Queen pageants only helped to acquire new patients, not achieve medical status. In 1963, the American Medical Association Board of Regents constructed the “Committee on Quackery” to stop the progression of chiropractic field and eliminate it entirely. According to Reed Phillips:

In the short term, the committee failed. In the early ‘70s, chiropractic gained acceptance in Medicare on a limited basis. It took another 20 years to gain the right to take X-rays on Medicare patients. The Council on Chiropractic Education also gained recognition by the U.S. Office of Education in the early ‘70s.⁸⁷

THE COVER GIRL DURING THE RADIATION SCARE

While Posture Queens appeared in the press across the United States during the radiation scare, scientific serials also incorporated the irradiated female spectacle as a commodified front to soften the anxieties about X-rays by using a beautiful woman as an educator about X-rays. In the late 1940s and early 1950s, *X-rays and You* was an Eastman Kodak series of booklets that consistently featured women on the covers, including one with the photograph of a woman standing next to her full-body radiograph and another one with a young mother holding her child. The booklets served as domestic science for mothers

⁸⁷ Reed Phillips, “Truth and the Politics of Knowledge,” *Dynamic Chiropractic* 21, no. 8 (April 7, 2003), Accessed on 5/7/2016, <http://www.dynamicchiropractic.com/mpacms/dc/article.php?id=9129>.

and wives to educate themselves on the value of X-rays and to settle their concerns about irradiating their children.

At the time, Eastman Kodak was the world's leading manufacturer of X-ray film, and its commercial reputation was on the line while Americans panicked about radiation. The issue from 1947 asserted:

A GOOD many people are still afraid of the x-rays just because the apparatus that generates them is such an infernal looking machine. But you might just as well be afraid of your photographer because he puts his head under a black cloth. Having a radiograph made by a skilled radiologist is just as safe as having a photograph taken.
[...] As a matter of fact, what you ought to fear if your doctor suggests an x-ray examination is not having it made at once, because the x-rays can tell a lot of things that can't possibly be found out any other way. [...] So if your doctor wants an x-ray examination for any purpose at all, even if only for a clean bill of health, don't ever say, "Ridiculous, I'm perfectly fine," because you don't know whether you're fine or not till the x-rays tell you so.⁸⁸

There are a great number of hyperboles in this passage, from equating the safety of making a traditional photograph with the making of a radiograph, to the urgency of having every radiograph made that a doctor suggests. However, most important is how Kodak commodifies the radiograph. On the cover, the company chooses an irradiated cover girl to displace attentions from the "infernal looking machine" that produces X-rays. The phantasmagoria of the female body replaces the phantasmagoria of the X-ray apparatus. Furthermore, the last lines of the passage play upon the commodity's gap between knowledge and belief. Kodak argues that the American woman does not know how healthy she is, whereas the X-ray knows. Redirecting the popular belief that "mother knows best," Kodak

⁸⁸ Eastman Kodak Company, *X-Rays and You*, 125190, (Rochester, NY: Eastman Kodak Company Medical Division, 1941), 7-9.

personifies X-rays (and the corporations selling them) into patronizing beings that see and know and offer the best evidence to maintain perfect health. With the right information and complete compliance to X-ray technology, women can be the bearers of great knowledge and optimum health.

At the same time, *Science Illustrated* released its August 1947 cover “X-rays and You” (Fig. 38). The cover features a beautiful model’s face in split form, a design emphasizing her fragmentation. Her left side presents her cosmetic flesh and materiality, complete with curled hair, red lipstick, mascara, rouge, large earrings, and a strand of pearls. Her right side is the X-ray rendering of her, drawing attention to her immateriality not only of the flesh but also the luxury items that adorn the counterpart. The strand of pearls and the earring are suspended in air without gravity. The accompanying article for “X-rays and You” pictorially demonstrated the accomplishments of radiography and radiology, presenting spectacles of an irradiated fractured skull, an X-ray lady without accoutrements, a gall bladder full of stones, kidneys, colon cancer, the birth of a baby, and the gastrointestinal tract.

Contrary to the Kodak booklet of the same title, the “You” in this magazine does not directly address women, but rather a diverse American audience. At the same time, the magazine genders the “You” as female. The female face on the cover illustrates the front for its popular readership as well as the progress of X-ray technology. Andreas Huyssen has identified a modern cultural shift that sought to preserve the hierarchy of the arts and sciences through the separation of mass culture from the male-centric high culture. He has argued that modern

cultural institutions framed and presented mass culture as “the feminization of culture.”⁸⁹ *Science Illustrated* was a popular science magazine, neither predominately medical nor scientifically elite. With the beautiful face on the cover, the magazine gendered the “You”—as in the masses, female.

During the radiation scare, pictures of irradiated women helped advertise the fields of radiography and the commercial enterprise associated with it. They spoke to women who were concerned with domestic science, they represented modern women, and they helped sell commodities such as X-ray films and magazines. Reaching out to women and using women as models were methods that made X-rays more acceptable and palatable for domestic, consumer, and medical life in the twentieth century.

MEMORY IS YOUR IMAGE OF PERFECTION

Different irradiated women comprised the twentieth-century visual culture of X-rays, each repackaging the spectacle of the irradiated body to the American public. One X-ray lady in particular captivated scientists, graphic designers, engineers, and artists throughout the century. Arthur Fuchs, Eastman Kodak’s head of the Medical Division, exposed her in 1934, three decades after William James Morton’s full-body X-ray lady. Fuchs unveiled his X-ray lady for the Century of Progress Exhibition in Chicago in the same year (Fig. 39). Like Morton’s spectacle, Fuchs made the image of her life-size, with a single exposure.

⁸⁹ Andreas Huyssen, “Mass Culture as Woman: Modernism’s Other,” in *After the Great Divide: Modernism, Mass Culture, Postmodernism* (Bloomington: Indiana University Press, 1986).

Time Magazine reported that the model for the radiograph was an occasional Kodak Girl—a role that required the woman to demonstrate the pleasure and ease of the Eastman Kodak Company's cameras in advertisements.⁹⁰ To emphasize her physical lack of flesh and surface, *Time* filled in her empty spaces with description:

soft brown eyes, a cupid-bow mouth, wavy bobbed brown hair. When...Fuchs took the picture, the girl was wearing a white cotton dress. Visible were her jewelry: a necklace and pendant of gold and jade, a white-gold wrist watch, a silver bracelet, two rings, an earring.

Although Morton's model could not stand for her exposure because of antiquated processing, Fuchs' model posed standing behind a metal screen emphasizing her high heels planted on an invisible ground. Between the two X-ray ladies, the New Woman as a consumer emerges as a theme.

Drawing from Morton's radiograph, Fuchs' resurrects the past—a time when radiography held the promises of the future. With his X-ray lady, he succeeded in revising the image of the modern woman: her lack of stable presence, her role as the primary and informed consumer, and her ability to stand on her own two feet. By debuting at the Century of Progress exhibition, she became the centerpiece demonstrating the wonders of the latest science and progress made in radiography. She stood among a display of medical radiographs that detailed the effects of different diseases so that visitors could compare her healthy body to the bodies depicted in poor health. Her conspicuous accessories indicated a healthy full-functioning person, a consumer

⁹⁰ "Beauty's Bones," *Time* 24, no. 5 (July 30, 1934): 44, 144.

who participates in the market and contributes to the economy. She was, in effect, an immaterial girl wearing the luxuries of the material world.

Magazines reproduced Fuchs' X-ray lady, some even claiming she was the first radiograph of the human figure made with one exposure. As her image circulated in the popular press, more creative people were inspired by her. In 1940, German-American illustrator Fritz Kahn, famous for his picture of "Man as Industrial Palace," incorporated her into one of his renderings for the *Der mensch gesund und krank, menschenkunde* magazine. Kahn's illustration enlarged her irradiated anatomy to explore its structural mechanisms. In 1950, French-American industrial designer Raymond Loewy illustrated his argument about car design with Fuchs' X-ray lady, accompanied with this text: "Automobile body design, based upon a chassis (or skeleton), obeys the same aesthetic canons of slenderness and economy of means as the human figure."⁹¹ Furthermore, variations of Fuchs' X-ray lady have appeared in countless examples of graphic design.

In the mid-twentieth century, George Eastman House in Rochester, New York, acquired and displayed Fuchs' negative of the X-ray lady in their Mees Gallery against a glowing large-scale screen. There, she was the centerpiece among other radiographic artifacts. Beyond the Mees exhibit, she lived on primarily as a reproduction printed in magazines, until the art of Barbara Kruger.

Kruger, whose work gained the attention of the art world in the 1980s, appropriated Fuchs' X-ray lady for one of her pieces: *Untitled (Memory is your*

⁹¹ Raymond Loewy, *Never Let Well Enough Alone* (Baltimore, MD: The John Hopkins University Press, 2002), 313.

image of perfection), 1982 (Fig. 40). Fuchs' original film was approximately 32 x 72 inches, whereas Kruger enlarged a printed reproduction to almost life-size at 33 ¾ x 61 inches. Kruger composed her text to highlight the X-ray lady's anatomical proportion, with the words alternating between positive and negative simulating an electrical flicker. The text addresses the observer with the word "YOUR." Previously, Kruger's works have spoken to both men and women with respect to the gaze of the observer.⁹²

Memory in the context of X-ray visual culture speaks to the vanishing lady. The irradiated female body is the corporeal remnant of her disappearing and reappearing trick. The X-ray captures a visual memory of her state in between presence and absence. Therefore, "MEMORY" is directly related to the X-ray lady herself. The irony is that Fuchs made the X-ray lady to signify progress for the Century of Progress exhibition. However, memory is the antithesis of progress. In Kruger's appropriation of the image, she redirects attention to the memory as opposed to progress—to the woman subject as opposed to the male operator. At the same time, she uses the pronoun "YOUR" as a possessive to show ownership of the "IMAGE." The individuals who have controlled the images of memory were, for the most part, men.⁹³ "PERFECTION" is a direct product of "IMAGE." This perfection is therefore under disciplinary controls. The memory of the female body is an image, and also a site where ideas of perfection are

⁹² Barbara Kruger, Ann Goldstein, and Rosalyn Deutsche, *Barbara Kruger* (Los Angeles, CA: Museum of Contemporary Art, 1999). Barbara Kruger and Kate Linker, *Love for Sale: The Words and Pictures of Barbara Kruger* (New York: H.N. Abrams, 1990).

⁹³ Rosalyn Deutsche also came to the same conclusion that the address speaks to a male audience. Rosalyn Deutsche, "Breaking Ground: Barbara Kruger's Spatial Practice," in *Barbara Kruger* (Los Angeles, CA: Museum of Contemporary Art, 1999), 77-84.

manufactured. Although historically the vanishing lady can have agency, Kruger is directly criticizing men for producing a cultural arena in which women have occupied unstable positions and endured penetrative gazes as subjects.

Kruger's voice speaks to a broader cultural memory, rather than an individual memory. With the exception of the latter part of the twentieth century, white men are mainly the framers and manufacturers of American cultural memory in books, movies, art work, business, and music. Idealizing the memory employs the image as a screen to filter out the imperfections, the embarrassing moments, and the "skeletons in the closet." In this way, memory allies with the phantasmagoria that depends on, as Mulvey states, "[the] constructing of images and representations that conceal more than what they record."⁹⁴ On the surface, cultural memory is man-made. What has cultural memory forgotten, passed over, covered up, or ignored? Kruger prompts the observer to see beneath the surface. Women, and their contributions to history, need to be revealed.

With her text, Kruger interrupts the surface of Fuchs' original image. The text intercepts and becomes the new façade for Fuchs' X-ray lady, projecting a revised address that offsets the man-made surface and thwarts the voyeuristic fetish of the X-rayed spectacle. The text awakens the consciousness of the viewer. However, unlike the pleasure of seeing the fetish, Kruger's intent is to defetishize the image and put the observer in an uncomfortable position. Layering the text over the skeleton emphasizes that behind is also a series of layers. The X-ray lady is not simply a glass window to see-through; the bones,

⁹⁴ Laura Mulvey, "A Phantasmagoria of the Female Body: The Work of Cindy Sherman," *New Left Review* 188 (1991): 141.

what is left of the flesh, and the accessories are veiled layers that do not have well-defined spatial relationships. Kruger stimulates the phantasmatic space with her text and, in effect, impedes the complete visual unveiling of the irradiated lady. Instead of the visual interrogation penetrating the X-rayed body, the language of Kruger's work directs the questioning outward towards the observer. The path between observer and subject stretches into the phantasmatic space, in which the gaze materializes and is returned to the surface through Kruger's language. In effect, the skeleton comes out of the closet.

CONCLUSION

In the twenty-first century, new anxieties about X-rays emerged over the Transportation Security Agency's body scanners. Americans were outraged over the disclosure that the backscatter X-ray technology created, effectively stripping passengers so that they appeared nude on the surveillance screens. In 2010, the same year as the mass installation of these body scanners in the United States, the German medical imaging company Eizo released its annual calendar to advertise its product line. The 2010 calendar comprised simulated X-rayed women in highly sexual pin-up poses. The Internet latched onto these images and new memes emerged. Americans, so frustrated with the invasion of their privacy, tagged the images "Miss TSA." The appropriation of the calendar pin-up transformed the regimes of shame and judgment, which the TSA imposed, into empowering exhibitionism.

This empowering exhibitionism in the face of new forms of surveillance continued even after the TSA removed the backscatter X-ray technology—and in fact, has become commodified. More X-rayed women occupy popular culture because computer simulations of X-rays have improved the look of the irradiated skeleton. Citrical, a company that manufactures calcium supplements, produced a line of commercials in 2014 depicting sexualized simulations of irradiated women (Fig. 41). In one commercial, an X-ray lady walks on high heels, swings her pelvis, rolls her arms down her sides, and seductively dances to striptease music. More X-rayed women join her. Each wears some additional accoutrement, such as long pearls or bracelets, to emphasize her lack of clothes. An X-rayed woman kicks the screen, and then walks towards the screen. Her skeletal body dissolves and her flesh and clothing appear. The revelation doubles down on the spectacle that she is not just made of flesh but she is also an aging woman. The narrator argues, “Defiance is in our bones. Defiance never grows old.” Then the advertisement ends with a jar of Citrical and the slogan “Beauty is Bone Deep.”

The perspective of this commercial returns the focus to the vanishing lady and the phantasmatic space of the female body as commodity. Drawing upon the sexualization of the irradiated woman, the commercial turns the table on the penetrative male gaze. The narrative of the commercial is not about making a lady vanish, but making her appear. “Defiance” is the X-ray lady returning to her material form and demonstrating her agency. The commercial addresses the phantasmagoria of the commodity as the female body by explicitly drawing attention to the composition of the female anatomy. The skeletal architecture

requires calcium to comprise its mass, which the Citrical provides. Passing through layers, the phantasmagoria of the female body moves from the calcium, to bone, to material woman. The commercial effectively transforms calcium, a mineral in the periodic table of elements, into a sexualized commodity of empowering exhibitionism, selling the product to women.

This chapter has shown that the irradiated female spectacle, first seen in Frau Röntgen's hand, has persisted through time until today. The spectacle has survived through new technological mediums and commodities directed at or representing women. Irradiated women, decorated with materialism, exhibited the front for the ease, pleasures, and hopes of the technology, while providing distraction from public anxieties about X-rays. Most of the women in this history were not passive consumers or subjects, but rather were active agents over the mediations of their bodies. Male scientists have owned many of the benchmarks for progress and captured the attention of historians, but this chapter, I hope, has released the female skeletons in the closet.

CHAPTER 3

THE X-RAY MAN: FITNESS FOR DUTY

“From the first moment on his eyes fascinated me. They were clear and big, calm and confidently fixed on me. But his gaze did not come from his eyeball, it came from much farther in, I thought perhaps from infinity. One couldn’t read those eyes. But they spoke, they wanted to speak. They didn’t ask, they talked,” wrote Otto Wagener of his friend Adolf Hitler.¹ According to Claudia Schmöders, Hitler’s contemporaries referred to his face as the “mask of the Gorgon,” which projected a “panoptic basilisk gaze.”² Hitler’s corporeal exterior protected the mystery of his discriminating vision that sought to purge the world of Jews, whom he considered to be human deviants. The phantasmagoria of his body interested many graphic designers around the world--including American B. F. Long, who illustrated anti-fascist propaganda for Axis series postcards, and German John Heartfield, who produced several photomontages lampooning the Nazi dictator for leftist publications during the 1930s. Both artists appropriated X-ray vision to see inside the workings of Hitler’s body, locating the roots of pathological evil in his depths, and cleverly revealing his crimes. Few other male bodies in the twentieth century conveyed such global fascination. Examining the corporeality of Hitler remained an imaginative preoccupation for political criticism over the course of World War II, and alternatively, the serious work of his devoted doctors.

¹ Ott Wagener, *Hitler--Memoirs of a Confidant* (New Haven: Yale University Press, 1985).

² Claudia Schmolders, *Hitler’s Face: The Biography of an Image*, trans. Adrian Daub, (Philadelphia: University of Pennsylvania Press, 2009), 2.

Weeks before Hitler's suicide on April 30, 1945, the U.S. Military Intelligence System launched a classified operation to capture and interrogate his doctors. Between April and May 1945, the American forces interrogated several of his personal physicians and, in a report entitled "Hitler as Seen by His Doctors," recorded their medical testimonies and files. Contrary to the artistic probing that revealed Hitler's maniacal tendencies, the military report detailed the following:

medical data useful for the identification of Hitler or his remains; further material for the debunking of numerous 'Hitler Myths'; the knowledge needed to expose those frauds who in later years may claim to be Hitler, or who may claim to have seen or talked to him; research material for the historian, the doctor and the scientist interested in Hitler.³

This report included detailed descriptions of his entire body, five positive X-ray pictures of Hitler's head and several electrocardiograms tracking his beating heart.

Through the military's documents, one could glean the history of his body including its damages and repairs. Exposed in September 1944 at the Army Hospital at Rastenburg, the plates [Figure 42a and 42b] enabled Hitler's physician, Dr. Erwin Giesing, to inspect his head's condition after an assassination attempt in July of that year. His doctor asserted that the form of his head was "slightly dolichocephalic," referring to a long-shaped cranium associated with the Aryan standard of beauty and prestige over other races.⁴ Removed from their context, the deep cavernous spaces that make up the

³ United States Military Intelligence Service, "Hitler As Seen By His Doctors," Report 1945, Declassified 1958, 1, National Library of Medicine.

⁴ Ibid, 3.

chasms of his eye sockets, sinuses, and jaw may look no different from any other irradiated skull. However, by placing these pictures in relation to the archive of information that comprised the Military Intelligence Service report, they become significant components of Hitler's own identity among data about his chest, face, scars, skin, eyes, lungs, heart, lymphatic glands, rectal and genital regions, cranial nerves, sexual and digestive health, reflex centers and spinal root functions. Each line of inquiry offered by the doctors effectively built an intimate profile of Hitler's corporeality, both inside and out. The X-ray pictures, however, were integral to completing the U.S. Military's secret operation, as they exposed Hitler's individualized re-construction of his mouth—which ultimately led to his identification.⁵

The oral region of his irradiated skull shows some unique dental work. Sognnaes and Strøm's "Roentgenological interpretation" purported that "Hitler had only four remaining teeth which were not involved in either bridging a gap or supporting a bridge between adjacent teeth," and the opaque matter revealed by

⁵ After Hitler's suicide, his men subsequently burned his body to destroy the evidence of his death. Due to the condition of his charred corpse, most of the U.S. intelligence data was not useful. Soviet journalist Lev Bezymenski, who reported on Hitler's autopsy, argued, "The most important anatomical finding for identification of the person are the teeth, with much bridgework, artificial teeth, crowns and fillings..." L. Bezymenski, *The Death of Adolf Hitler: Unknown documents from Soviet Archives* (1968), cited in Reidar F. Sognnaes and Ferdinand Strøm, "The Ontological Identification of Adolf Hitler: Definitive Documentation by X-Rays, Interrogations and Autopsy Findings," *Acta Odontologica Scandinavica* 31 (1973): 47. Weeks after Hitler's suicide, the United States captured and interrogated Hitler's dentist, Dr. Hugo Blaschke, for information on May 28, 1945. Using the X-ray images of the skull exposed by Dr. Giesling, Dr. Blaschke drew by hand a diagram of Hitler's teeth and provided his dental history. United States Military Intelligence Service, "Hitler As Seen By His Doctors," Report 1945, Declassified 1958, National Library of Medicine. Annex 1, 2). When the Soviets conducted their autopsy, they compared the body with Blaschke's notations made from the X-rays pictures of Hitler's skull. In 1973, Sognnaes and Strøm evaluated the Soviet autopsy and the United States intelligence documents, revealing that the radiographic evidence and dental diagrams confirmed Hitler's identity. (Reidar F. Sognnaes and Ferdinand Strøm, "The Ontological Identification of Adolf Hitler: Definitive Documentation by X-Rays, Interrogations and Autopsy Findings," *Acta Odontologica Scandinavica* 31 (1973): 66-69).

the X-ray comprised metallic restorations of dental crowns, as well as a “very peculiar and very unusual dental bridge construction,” also of metallic material.⁶ The Soviet autopsy report confirmed that yellow gold and porcelain fashioned the bridges and crowns.⁷ Recent scholarship on Hitler’s doctors has focused on the source of the gold. Neumann and Eberle discovered that Dr. Blaschke “managed the dental gold from Jewish victims... of which he had a personal supply of approximately 50kg.”⁸ So, contrary to the imaginative renderings of Hitler, the X-ray’s revelation located his pathological evil not behind those penetrating, discriminating eyes, but rather in his mouth.

Based upon this evidence, Hitler reconstructed his mouth, filling in its gaps with very specific materials to strengthen his public image. Hitler’s gold teeth were trophies with which he adorned and reconstructed his body. A complete set of strong teeth was necessary for the oratory skills that made him a charismatic dictator, creating an illusion of wholeness to affirm his manliness and his ability to serve as a leader. The X-ray’s photographic revelation rendered Hitler’s physical composition against the cultural standards of masculinity.

The above example demonstrates that the corporeal phantasmagoria, which Laura Mulvey introduced, and I expanded upon in Chapters 1 and 2, cannot only be applied to the irradiated female body but also the irradiated male body. While the phantasmagoria of the female body was a commodified item of desire, the male body revealed man’s re-making, authenticating or debunking his

⁶ Ibid 64.

⁷ Ibid 46.

⁸ Henrik Eberle and Hans-Joachim Neumann, *Was Hitler ILL?: A Final Diagnosis* (Malden, MA: Polity, 2012), 73, 140. Their reference is BA Berlin (former Document Centre), SS-O no.75, personal file Hugo Blaschke.

ability to perform his social role. The X-ray exposed a man's strength and fragilities, his histories of injuries and re-construction, held against the measurement to carry out his duty in daily life and in the military. Although the X-ray can be directed upon the female body for inspecting health and pathology in some similar contexts, by and large, the burden of the fitness for duty has been bound to the male body.

Fitness for duty is a phrase emerging in the late twentieth century, usually in reference to the American Disabilities Act of 1990. Fitness for duty examinations have surveyed workers by scrutinizing their emotional, physical, and mental states, and their ability to work safely while satisfying minimum job requirements. Policies pertaining to disability benefits branch from the concept, as these examinations can help distinguish a victim of duty-inflicted injury from malingering. However, the meaning of the phrase resonates throughout the history of American masculinity in circumstances of maintaining and preserving optimum health to provide for family, to serve and defend the country, and to wear the mark of discipline. Male physicality, character, and performance mingle in the concept of duty. Most notably, General Douglas MacArthur made the association in his 1962 West Point speech:

Duty, Honor Country. Those three hallowed words reverently dictate what you ought to be, what you can be, what you will be. They are your rallying points: to build courage when courage seems to fail; to regain faith when there seems to be little cause for faith; to create hope when hope becomes forlorn [...]They build your basic character. They mold you for your future roles as custodians of the nation's defense. They make you strong enough when you are weak, and brave enough to face yourself when you

are afraid [...] They teach you in this way to be an officer and a gentleman.⁹

MacArthur's words instructed that mastery over the body and character brought about self-control, which—as “custodians of the nation’s defense”—constructed the building blocks of civilization. While the spectacle of the irradiated female body distracted the public from the uncertainties and ambiguities of the technology, the male body processed through X-ray technology drew attention to the vulnerabilities of man against the measurement of duty.

According to Laura Mulvey, the un-X-rayed male body has maintained a perception of wholeness. The perceived physical completeness of the male body contrasts that of the female body whose commodification, fetishization, and spectacle comes from her fragmentation, immateriality, and unstable presence. Since X-rays effectively strip bodies down to their armature, and radiographs effectively show bodies in the state of vanishing, the irradiated male body enters the same visual terrain as the female body. However, the spectacle exhibits less of a fetish than a fear of the male body’s unstable presence due to the cultural perception that it must maintain and control its presence. With most of the flesh and organs dissolved, the X-rayed male skeleton appears to be incomplete, reduced to its fragmentary structural components, much like the female body.

⁹ Douglas MacArthur, “Duty, Honor, Country: General Douglas MacArthur’s Speech to the Corps of Cadets at the Military Academy at West Point, N.Y.” May 12, 1962, Accessed on 5/30/2016, http://penelope.uchicago.edu/Thayer/E/Gazetteer/Places/America/United_States/Army/USMA/MacArthur/1962_speech_to_the_Corps.html.

Without specifically addressing X-ray effects, other scholars have echoed Mulvey's general assertions about the contingency of masculinity. For example, Frank J. Barnett has argued that masculinity is relationally constructed through associations of gender difference.¹⁰ Alternatively, Michael Kimmel has contended, "American men define their masculinity, not as much in relation to women, but in relation to each other."¹¹ Gail Bederman has shown that White "manliness" can also be built upon racial differences.¹² Expanding upon their arguments, the present chapter argues that the maleness of the body depends upon corporeal distinctions that X-rays can make ambiguous. In other words, I will demonstrate some of the ways in which the irradiated male body has prompted anxieties about the loss or blurring of difference. Conversely, this chapter will show how the X-ray has offered its proof of inspection as a disciplinary tool for distinguishing honorable, dutiful men from malingeringers and diseased male bodies. From this dialectical perspective, the irradiated male body therefore becomes part of the "spectacular culture" identified by Jonathan Crary, in which men's skeletons are "isolated" from their protective and seemingly impenetrable muscular coverings. This isolation compounds the fears produced by the lack of visible anatomical differences in irradiated bodies. Radiographic revelation of the concealed interior can also puncture the illusion of male health and vitality. The muscular surfaces of men's exteriors can hide

¹⁰ Frank J. Barrett, "The Organizational Construction of Hegemonic Masculinity: The Case of the US Navy," *Gender, Work, and Organization* 3, no. 3 (July 1996).

¹¹ Michael S. Kimmel, *Manhood in America: A Cultural History* (New York: Oxford University Press, 2012), 5.

¹² Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917* (Chicago, IL: University of Chicago Press, 2008).

unhealthy tissue and bone underneath. At once disciplining its subject and prompting fears of mortality, the X-ray can reveal pathology that threatens a man's fitness for duty, or the X-ray can detect a malingerer's evasion of duty with its revelation.

The spectacle of the irradiated male body captures the making and remaking of manhood. Yet, the construction of masculinity with the aid of X-rays was not just a matter of perception, but an actual physical process relating to the male body—including amputation, infections, prosthetics, implants, and missing or distorted joints. X-rays exposed these conditions and aided physicians in correcting them. So, in addition to the anxieties prompted by lack of corporeal difference, the irradiated male body has exhibited a fearful association to mortality far more than did the irradiated female body. Thus, the irradiated male body has appeared less frequently in visual culture outside of medical imagery.

This chapter will explore the remnants of the American irradiated male body in a narrative that considers men in different wars, civic duties, and art. I will also show that the cultural perspectives of men's duty to civilization varied along the racial binary. A Black man's burden to perform his masculinity will diverge from a White man's due to his struggle within White patriarchal society. With the exception of books and articles that have discussed works by male artists who appropriated or made X-ray pictures for their art, the scholarship on the irradiated male body is limited to just some specific works, not placed within a framework considering X-rays in American history. As a complement to the previous chapter

on women's commodification in spectacles of distraction, this chapter will present the male's fitness for duty as a spectacle of disciplinary attention.

A CIVIL WAR VETERAN'S PROOF OF PATRIOTISM

Years before the discovery of X-rays, military veterans were liable for scrutiny when they claimed injuries that discharged them and requested compensation for health care. The burden to perform duty created social stigmas for men who served, ranging from the most brave and honorable to the coward. Samuel B. Wing, a soldier for the Union Army during the Civil War, experienced an extraordinary injury—a ball entered into his chest that shattered parts of his ribs and punctured his lung. He documented his life as "the man who was killed, but did not die."¹³ For the remainder of his life he coughed up blood, along with the dressing of the injury and fragments of bone. Despite his abnormal coughing for which he received a small pension, he had no visible evidence to prove the extent of his physical damage. As a result, Wing received wavering financial assistance from the government over the course of his lifetime. With shortness of breath and intermittent hemorrhaging, he could not hold a stable job and had difficulty in providing for his family. In his recollections, he professed:

I never knew a sick day until I was wounded, and I have not known a well one since I was wounded [...] Any one who has tried these things, as I have, and has passed from perfect health to perfect invalidism, as I have, will know of what I speak [...] To speak of a pension, should be to call up thoughts of honor for the soldier, for wounds received who that it is an honor dearly brought. To speak

¹³ Samuel Wing, *The Soldier's Story : A Personal Narrative of T...* (Phillips, ME: Phonograph Steam Book and Job Print, 1898), 9.

<https://archive.org/stream/soldiersstoryper00wing#page/104/mode/2up>.

of the pension as a dishonor is not patriotic. No one can be a lover of his country and reproach its defenders.¹⁴

Wing was left with a long “miserable existence” so that his call to serve honorably in the war, left him without the fitness for duty to perform his social roles in daily life.

His hope to legitimize his ailing body came soon after the discovery of X-rays. On April 17, 1897, Wing visited Professor W.C. Strong of Bates College in Lewiston, Maine, who directed the X-ray onto Wing’s grievous chest. Strong first administered a fluoroscopic examination. Then Strong held up a mirror so that Wing could also see what the X-ray vision presented. The professor also made two X-ray photographs of Wing’s chest, each exposure ranging from twenty to thirty minutes. Figure 43 represents the thirty-minute exposure, which Strong narrated as follows:

In the photograph, the shadow of the ribs and vertebrae are distinct because they were stationary and near the photograph plate, while the shadow of the upper edge of the liver is indistinct because it was moving up and down at each act of respiration. The shadow of the bullet, too, loses its roundness because of the movement of the lung, a fact which the fluoroscopic examination amply confirms. Most curious perhaps of all, are the two fragments of the bullet lodged in the 7th and 8th ribs, and the piece of broken bone out of the 7th rib, which appears to have been the source of the bone fragments coughed up by the patient. The bullet is evidently a spherical one of large size, and seems to be such as was formerly used in the old fashioned Springfield rifle. That a bullet of such size and weight could be carried for thirty four years in the delicate tissues of the lungs has been thought by some impossible. Of the fact, however, there can be no longer any doubt.”¹⁵

Upon seeing this validation of the injury that damaged him for decades and caused him great physical, emotional, and financial distress, Wing asserted,

¹⁴ Ibid, 100.

¹⁵ Ibid, 108-109

"There, at last, is revealed the object which has caused all my sufferings, and which has been in motion with every breath for thirty-four years."¹⁶ Radiography proved his duty to his country; his complaints of pain originated not from idleness, but rather from serving bravely as a soldier. Wing's case demonstrates that, soon after Rontgen's discovery, X-ray pictures of the male body were bound up in ideologies of masculinity and fitness for duty.

THE RACIAL CONSTRUCTION OF IRRADIATED MANLINESS

During the fin de siècle, Gail Bederman has shown that the "invention of masculinity" and "remaking manhood" emerged with complex intercessions of race, class, and gender. White manliness distinguished and asserted itself within civilization by contrasting the strength and perceived savagery of African American men. At the turn of the century, both White body-builder Eugen Sandow and Black boxer Jack Johnson publicly posed for X-ray pictures. Each man, strong in exterior form, performed their masculinity for the sake of duty in front of crowds of people. Bederman has shown that White cultural perceptions sought to distinguish the civilized body from the uncivilized. The White male's fitness upheld a reputable character, anatomical strength, and discipline, whereas the Black male body maintained a state of persistent primitivism. Historical interpretations of their X-ray pictures demonstrate that anatomical glimpses of their interiors upheld this racial coding. The X-ray showed the architecture behind men's manhood.

¹⁶ Ibid, 109.

Sandow first interfaced with X-rays in March 1896.¹⁷ He kicked open a glass door and stepped on its shards. Although his foot bled, doctors could not find any glass and he tried returning to work. Yet the pain continued for several days and interfered with his performance. Dr. William James Morton, who created the spectacle of the X-ray lady in the previous chapter, came to Sandow's aid and exposed his foot to X-rays for one-hour and twenty-five minutes, while Sandow smoked cigars and inquired about the new marvel. The X-ray plates revealed the embedded glass for removal. Sandow's experience of viewing his own interior was so remarkable that he incorporated more radiographs of his body in his publication, *Sandow's Magazine of Physical Culture*.

In 1901, the magazine featured two different radiographic views of Sandow (Fig. 44a-44b). The bulk of his physique is visible. Figure 43a establishes his massive torso and Figure 43b shows his bulging biceps. Both radiographs capture not only bones but also shadows of his spectacular muscle mass. Despite his "colossal strength," the author Medicus noted how the pictures show "the extreme smallness and delicacy of the bones."¹⁸ The perception of the White male architecture brought out some characteristics that reflected the irradiated female body. Medicus continued, "where the humerus of the upper-arm

¹⁷ The following clippings are from William James Morton's Scrapbook in the New York Academy of Medicine collection. "Foot Full of Glass," *The New York Journal*, March 19, 1896. "X-Ray in Sandow's Foot," *New York Journal*, March 16, 1896. "X-Rays on Sandow's Foot," *Kansas City Star*, March 18, 1896.

¹⁸ Medicus, "Sandow Under X-Rays," *Sandow's Magazine of Physical Fitness*, June 1901, 452-454.

and the radius and ulna of the forearm are shown, the medical eye will at once notice that the bony structure approaches that of a woman in grace and size.”¹⁹

This interpretation resonated with the Progressive Era’s middle-class preoccupation with inscribing civilization in the White male body. Bederman has contended that there were efforts to establish evolutionary continuums for boys who supposedly began as “primitive” and grew up to be mature, self-restrained “supermen.”²⁰ Furthermore, she has asserted that aside from physical strength and endurance there were two distinguishing characters attributed to the male body: “civilized manliness” and “primitive masculinity.”²¹ The dual perspective sought to shape males from primitive masculinity, characterized by savagery and lack of physical control, into the civilized manliness of self-control. Importantly, the meaning of civilization took on a racial role in public discourse, so that White bodies were able to achieve civilized manliness in contrast to Black bodies that such discourse associated with primitive masculinity.

With this framework, the feminine attributes associated with Sandow’s bones did not make him less of a man. The X-ray presented Sandow’s body with gradations of transparency through which corporeal shadows could form delicate shapes. The shadows of his muscular build and these bones revealed the civilized manliness that public discourse idealized. His body’s massive structure with a graceful interior architecture exhibited extraordinary maintenance, self-

¹⁹ Ibid.

²⁰ Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917* (Chicago: University of Chicago Press, 2008), 108-110.

²¹ Ibid, 23, 74, 91.

governing, and mastery of movement. The X-ray pictures trumpeted Sandow's body's fitness as a champion of White civilization.

By contrast, the irradiated Black body received different cultural projections. Public interest in irradiated Black men's bodies appears as early as 1896. A Black newspaper, the *Commercial Appeal*, interviewed a physician of Memphis:

By it [Röntgen's discovery] you can photograph the interior of a living animal, of metal, a book, a leather case and countless other substances. Only one thing more and I shall devote much time to it, and that is to photograph the interior of a genuine, full-blooded negro... a genuine negro's skin is perfectly black, and black being perfectly opaque, it seems that it would offer some resistance to the cathode rays.²²

From the perspective of this physician and others, the Black man's body was not human but rather raw material, much like the common everyday objects cited in the aforementioned passage. Other experiments sought to turn Black skin into White with the bleaching of X-rays.²³

The fascination with irradiating the Black male body accelerated with the prospect of X-raying the Black boxer, Jack Johnson. In 1910, Johnson fought and won the "fight of the century" against retired White boxer James J. Jeffries. Former champion John Sullivan touted that "a black man is the undisputed champion of the world."²⁴ Racial tensions ran high as Johnson remained undefeated perpetuating anxieties of White male deficiencies in strength,

²² "They're Keeping Eyes on It," *The Commercial Appeal*, February 13, 1896, 3.

²³ "Negroes Made White by X-rays" *The New York Herald*. December 28, 1903. Np. "Can the Ethiopian Change his Skin or the Leopard his Spots?" *Boston Globe*, January 25, 1904, Np.

²⁴ Ethan Michaeli, *The Defender: How the Legendary Black Newspaper Changed America* (Boston: Houghton Mifflin Harcourt, 2016), 33.

stamina, and power. Indeed, his physique held the mystery of his impenetrability that the White middle class sought to expose.

In 1911, Johnson posed for X-ray pictures of his skull at the German Hospital in San Francisco as the subject of non-medical intrigue and fascination.²⁵ A group consisting of the director of the hospital, a chemist, X-ray operators, and physical culture specialists managed the exposures and interpretation. At the time, the usual exposure was between five to fifteen seconds. However, press releases disclosed that Johnson's exposure lasted five-and-a-half minutes. The increase in exposure time, they asserted, was due to "his muscular and cartilaginous covering."²⁶

One publicly released portrait shows a lateral radiographic-positive view of Johnson's skull (Fig.45). It is an unclear mostly-opaque image because, unlike hand portraiture discussed in the previous chapter, the human skull contains dense brain matter (soft tissue) held by a solid osseous covering (hard tissue). According to one journalist who speculated upon the long exposure time, "The brain cavity of the world's champion is larger than that of the average man and is set in a dome which is almost impregnable. [...] The same blow which would kill a steer at the stock yards would barely jar Johnson. He has been built to

²⁵Johnson was at German Hospital because his younger brother Charles suffered from blindness and underwent tests. While Charles had medical X-ray pictures taken of his head, doctors persuaded Jack Johnson to pose. "X-Ray Shows Jack Johnson to Be Almost Bullet Proof," *The Evening World*, March 22, 1911, 14.

²⁶ Lengthening the exposure time of dark skin began many years earlier. In 1905, Dr. Otto Juettner asserted: "Experience has taught me that the skin of the negro offers more resistance to the X-rays than non-pigmented cuticle. It is harder to get a good skiograph of a negro's spine than that of a white man. The large surface exposed (abdomen and back) contains so much pigment that a good deal of X-ray energy is lost, being absorbed by the pigment. The pigment in the red blood cells absorbs X-rays. Thus, we can explain why it is comparatively easy to skiograph a bloodless part." Otto Juettner, "Principles and Practice of X-Ray Therapy." *Medical Brief* 33 (1905): 880.

withstand all but the blow of a steel projectile.”²⁷ The medical team purportedly measured one-half to three-quarters of an inch thick of osseous hard tissue with the radiograph.

Although the X-ray itself did not socially discriminate, the socio-historical perceptions that interpreted Johnson's portrait demonstrated a colonial gaze and an assertion of White civilization over Black masculinity.²⁸ The X-ray, harnessed by White male scientists, penetrated Johnson and exposed his anatomical secrets that were impenetrable by White pugilists. At the time, using the X-ray to aid in measuring the human brain cavity was neither common practice, nor medically accepted, as methods were not in place to properly immobilize and clearly expose the human skull. Indeed, the radiograph fails to clearly capture the outline of the actual brain cavity, so that the press's assertions of measured cranial thickness were largely hyperbolic and perhaps even pure fabrication.

The emphasis on the brain cavity and the articulation of Johnson's thick skull resonates with the long history of craniometric measurements that purported racial distinctions and deviations from the anatomical ideal.²⁹ By the end of the nineteenth-century, scientists such as Cesar Lombroso theorized that

²⁷ “Johnson's Brain Has Armor-Plate Cover,” *Los Angeles Times*, March 23, 1911, III1.

²⁸ Although the press articles were hyperbolic, they encouraged an unexplored inquiry to apply X-rays as a means of measuring the skull for finding and creating an anatomical ideal. In 1912, Austrian physician Julius Tandler suggested the use of X-rays for “the anthropometry of the skull.” Andrew D. Dixon, David A. N. Hoyte, and Olli Ronning, *Fundamentals of Craniofacial Growth* (Boca Raton: CRC Press, 1997), 146. However the application was still not widely practiced and did not enter American medical discourses until the 1920s. In 1921, American physicist A.J. Pacini notably proposed and advocated for applying the X-ray in the practice of cephalometry--measuring the living skull, and craniometry--measuring the dried dead skull. Expanding upon the works of Cesar Lombroso and Petrus Camper, Pacini presented a “teleroentgenographic technique for standardized lateral head radiography...[that] measure[ed] the growth and development of the face,” which he designated the normal and pathological radiographic facial angles. One decade later B. Holly Broadbent in the U.S. devised an apparatus to accomplish standardized head radiographs.

²⁹ Stephen Jay Gould, *The Mismeasure of Man* (New York, NY: W. W. Norton & Company, 1996).

a large brain and thick skull had associations with uncivilized and criminal forms of behavior.³⁰ With the historical perception predisposed to such ideology, observers of Johnson's radiograph recognized an undisciplined and primitive anatomy that the X-ray demystified. With the radiographs of Johnson, a White colonial gaze anatomically mastered the champion of the Black population.

The X-ray aided in verifying Johnson's fitness for duty as an undefeated boxer. Unlike Sandow's radiographs, which emphasized his delicate bones, Johnson's anatomical formation was a dense mass. His corporeal shell was understood as an "armor" and "bullet proof," impermeable to feeling. The construction of White manliness, bound up in the duty of advancing civilization, appeared through Sandow's radiographs as the affirmation of White manliness, whereas Johnson's radiographs distinguished White manliness from Black masculinity.

FITNESS TO SERVE THE STRENUOUS LIFE

Theodore Roosevelt's 1899 speech, entitled "The Strenuous Life," called for American men to take on the duties of their fathers—to have the faculties of President Abraham Lincoln and the courage of General Ulysses S. Grant—in order to further advance American civilization. The "strenuous life" respected the "man who embodies victorious effort; the man who never wrongs his neighbor, who is prompt to help a friend, but who has those virile qualities necessary to win

³⁰ Ibid, 152-156.

in the stern strife of actual life."³¹ His call to the strenuous life brought distinctions between those who were fit for duty and those who resisted that calling.

Roosevelt continued, "The timid man, the lazy man, the man who distrusts his country, [...] the ignorant man, and the man of dull mind, whose soul is incapable of feeling the mighty lift that thrills 'stern men with empires in their brains'—all these, of course, shrink from seeing the nation undertake its new duties." Bearing the strenuous life was a significant part of manhood in the early twentieth century that focused on those who successfully served and those who avoided duty.

Men who refused to work failed to live up to the standards of manhood in the early twentieth century. Equally as bad, if not worse, were men who feigned injuries so that they would not have to work. In the first decade of the twentieth century, malingering and workmen's compensation preoccupied American attention. Malingering was understood as "a fraudulent mimicry of disease or injury."³² Since the exaggeration of pain was a children's performance, the malingerer conveyed the primitive on the evolutionary scale. Workmen's compensation legislation in the states attempted to detect the honesty of each workman and weed out the deceptive hyperboles of malingerers who avoided the strenuous life.

Insurance companies frequently required radiography in the screening for workmen's compensation to prove or disprove the validity of injuries. In cases of

³¹Theodore Roosevelt, "The Strenuous Life," *Voices of Democracy: The U.S. Oratory Project*, 1899, Accessed on 5/30/2016 <http://voicesofdemocracy.umd.edu/roosevelt-strenuous-life-1899-speech-text/>.

³² John J. McGovern, "Hysteria and Malingering and Their Diagnosis," in *Annual Meeting: Transactions of the Minneapolis, St. Paul & Sault Ste. Marie Railway Surgical Association Sixth Annual Meeting Held at Duluth, Minn., October 10 and 11, 1912* (Minneapolis: Press of the Journal-Lancet, 1913), 156.

industrial accidents, in which a workman sustained a bruise or bump on his body, the X-ray aided in detecting what caused the injury—which would ultimately allot compensation for the worker for the fate of his injury. F. D. Patterson, Chief of the division of industrial hygiene at the Pennsylvania Department of Labor and Industry remarked, "I hope that I may live to see the time in this country when every accident board in every State and Territory of our Union will adopt the use of the X ray."³³ The strength of using the X-ray for screening workers' bodies sorted men who were fit for the strenuous life, those who had lived it and needed proof in spite of their disability, and those who avoided it by making fraudulent claims about their bodies.

Roosevelt cited the United States Army and Navy as the upholders of the strenuous life. They performed "the duties to the nation and duties to the race."³⁴ The advancement of civilization took precedence through these duties, as Roosevelt explained, "A man's first duty is to his own home, but he is not thereby excused from doing this duty to the State. [...] We must send out there only good and able men, chosen for their fitness, [...] remembering that, with such people as those with whom we are to deal, weakness is the greatest of crimes."³⁵ As X-rays entered into the medical mainstream to restore men's health for the home, they also aided in screening military recruits and reconditioning the war injured. The Spanish-American War initiated the first use of X-rays for the American

³³ Arial George, "The Workmen's Compensation Act." In *Workmen's Insurance and Compensation Series: Proceedings of the Fourth Annual Meeting of the International Association of Industrial Accident Boards and Commissions. Held at Boston, Mass., August 21-25, 1917* (Washington, DC: U.S. Government Printing Office, 1918), 124.

³⁴Theodore Roosevelt, "The Strenuous Life." *Voices of Democracy: The U.S. Oratory Project*, 1899, accessed on 5/30/2016, <http://voicesofdemocracy.umd.edu/roosevelt-strenuous-life-1899-speech-text/>.

³⁵ Ibid.

military.³⁶ Between this War and World War I, significant changes happened in X-ray technology that made the apparatuses more transportable for military aid, such as the invention of Kodak X-ray film (ca.1914), the design of the Coolidge tube (1913) and the X-ray portable unit (1916).

Military recruiting for World War I involved a strict screening process that evaluated men on physical strength as well as aesthetic perfection. Disciplinary character was reflected in exterior anatomical aesthetics, such as having symmetrical heads and faces, no blemishes or scars, and no “marked ugliness”—“which could bring unpleasant notoriety to the man and are therefore subversive of discipline.”³⁷ Yet the exterior physical examination could not show what weaknesses resided underneath the body’s surface.

Highly contagious tuberculosis was a global threat during World War I. In 1912, the American Department of Commerce reported that tuberculosis caused 90,360 deaths in the United States, not counting the individuals diagnosed and still suffering with the disease.³⁸ Before World War I, doctors diagnosed individuals with the Manoux tuberculin test, sputum tests, or by observing symptoms. Though not yet routine or widespread, radiography also supplied a view of the soldier’s chest to scrutinize whether the lungs were clean or

³⁶ The Surgeon General equipped hospitals with seventeen apparatuses, five were static electric machines and twelve were electric coils. Each had their benefits and disadvantages. The static electric machines were well-constructed, but not portable at 500 pounds. The coil apparatuses were more portable, with a primary current carried by batteries, storage batteries, or dynamos. Of those, storage batteries were the most common, but also added bulk and weight. W. C. Borden, *The Use Of The Roentgen Ray By The Medical Department Of The United States Army In The War With Spain, 1898*, ed. George M. Sternberg, (Washington, DC: Government Printing Office, 1900), 14.

³⁷ Frank T. Woodbury, “Recruiting for the Military Service,” *The Military Surgeon: Journal of the Association of Military Surgeons of the United States* XL (June 14, 1917), 21.

³⁸ Cressy Wilburg and Department of Commerce, Bureau of the Census, *Mortality Statistics 1912: Thirteenth Annual Report* (Washington, DC: Government Printing Office, 1913), 17.

contained infected tissue that would inhibit athletic ability to fulfill the call of duty. The cost to operate equipment and photographic developing kept the radiographic tests for tuberculosis on a small scale. The Army believed it was cost-effective to block tubercular men from serving and to assemble only the physically fittest as the front for America's body politic. Major Frank Woodbury of Army Medical Corps declared:

[The infantryman] must have excellent heart and lungs, in a capacious chest, to supply him in his exertions; a good frame to carry his pack, a good eye to sight his rifle, a good ear to hear the enemy patrol, good teeth to chew, and good digestion to assimilate his plain but nourishing ration. He must be intelligent and have the stamina of manhood in its prime, to bear with triumphant fortitude the hardships of service.³⁹

These demands on the military male body derived from Roosevelt's march of civilization that sought to advance the superior race and call upon men to take on the task of the strenuous life. This declaration required a thorough knowledge of the male body, inside and out. During World War I, tuberculosis threatened prospective and enlisted men's "capacious chests." The military delayed screening men for tuberculosis until the end of the War due to the lack of equipment and the cost of operating it. In 1917, the Army used X-rays to screen their soldiers' lungs to "free the Army from tubercular men" by "[weeding] out men with the disease"⁴⁰ However, due to costs, the practice was not routine. The cost of not detecting tuberculosis when men first enlisted amounted to estimates of about one billion dollars, costing approximately ten-thousand dollars per

³⁹ Ibid, 19.

⁴⁰ "X-Ray to Free Army of Tuberculosis," *New York Times*, August 5, 1917, 13.

serviceman.⁴¹ Although radiographs aided in making decisions as to who to enlist or reject, they accompanied the exterior physical examination for overall judgment. Still, medical military professionals called for radiographs of "at least 10,000 men of the National Army 'for the benefit [...] of future drafts and for the benefit of the whole civil population.' A comparison of the physical signs, or lack of them, and the roentgenological findings of this large body of men would be most interesting and instructive."⁴² The X-ray screenings sought to reveal the overall composition of the military body politic and its endurance.

In the service, the military exposed the body to conditions vulnerable to injury, amputation, or even death. Bullets shattered bones and flesh, portions of bodies could go missing. As much as X-rays dissolved the pictured body into fragments, the military context physically subjected the male body to such threats of fragmentation, loss of wholeness, and penetrability. Visual renderings of the fragmented military body presented anatomical permeability.

As a young artist, Ivan Albright enlisted in World War I and offered his drawing services in the Medical Corps' X-ray division. Albright sketched and made watercolor paintings of injuries, surgeries, and X-ray pictures, which he admitted offered "the best art training" because they could "[see] right through the body."⁴³ During the war, he referred to radiographs for his renderings of the wounded. Albright once explained, "I worked on the X-rays which showed where the shrapnel was and if there was a broken tibia or anything; and then my

⁴¹ Alton L. Blakeslee, *And the Spark Became a Flame: The Beginnings of Mass Chest X-Ray* (New York: Queensboro Tuberculosis and Health Association, 1954), 22.

⁴² Edward Otis, "The Soldier and Tuberculosis," *Medical Record* 94, no. 2 (July 13, 1918): 48.

⁴³ Robert Cozzolino, "Ivan Le Lorraine Albright," *Illinois Historical Art Project*, n.d., accessed on 5/20/2016, <http://www.illinoisart.org/#ivan-albright/c1mng>.

drawings would show how the wound healed.”⁴⁴ Figure 46 shows two different views. His left sketch simulates a composite of two radiographs of an injured arm, whereas the right sketch renders the exterior arm in surgery. In Albright’s simulations, he reduces the X-ray’s vanishing aesthetic into clearly definable outlines to aid in the localization of the injury in the anatomy. The outlined X-ray arm on the left also enables an accurate comparison of the exterior view on the right, creating composite information of the anatomical knowledge. As war and X-rays broke down male bodies, the medical-aesthetic eye sought to restore their wholeness with these composites of knowledge.

With the risks for carnage in serving in wars, some men—like workmen malingeringers—sidestepped the strenuous life by becoming military malingeringers. Men created self-inflicted injuries in order to be discharged early from service—including one soldier who alleged a horse bit his hand, but the X-ray photograph revealed that he placed needles inside his hand to impair his mobility and create swelling.⁴⁵ During the World War I, many soldiers claimed “disabilities of hand or foot.”⁴⁶ These men were at risk for acquiring the label of malingerer or “sick call soldiers” who felt too much pain to bear the burden of duty. The X-ray ostensibly aided in distinguishing the men who, according to prevailing military standards, rightfully suffered the strenuous life with disability, from those who wanted to avoid the strenuous life.

⁴⁴ Paul Cumming, Oral history with Ivan Le Lorraine Albright, February 5, 1972, Archives of American Art, Smithsonian Institution.

⁴⁵ “Self Inflicted Injuries Diagnosed by the Roentgen Rays,” *Archives of the Roentgen Ray* 4, no. 13 (August 1899), 22.

⁴⁶ R. W. Hinds, “Medico-Military Notes,” *The Military Surgeon: Journal of the Association of Military Surgeons of the United States* 42, no. 1 (January 1918), 33.

In 1914, Congress initiated the War Risk Insurance Act under the Department of Treasury to provide compensation for the Marines. This provision expanded in 1917 and 1918 to include Military and Navy servicemen. The insurance paid “family allowance, compensation and indemnity for death or disability, and insurance against death or total and permanent disability.”⁴⁷ At the time of discharge from service, soldiers and sailors received physical examinations to account for their corporeal health and maladies. This screening involved taking X-ray pictures of men’s bone structures to determine fractures or their state of healing, and pictures of men’s lungs to check for tuberculosis infected during the time of service.⁴⁸ Screenings for the War Risk Bureau reduced the possibility of military malingeringers who sought compensation, claiming maladies as a result of their service, but in fact received the maladies after service. Screened before entering the military, during service, and at discharge, the X-ray picture contained anxieties for men as they awaited the image’s authentication of their honor, duty, and service to their country.

During the war, viewing inside soldiers’ shoes became a point of interest to recognize the fitness of the foot anatomy in the shoe. Frank R. Keefer, author of *A Textbook of Military Hygiene and Sanitation* (1914) argued that the military had to care for its enlisted soldiers because they could not be trusted to do it right themselves. He asserted, “No one article of the soldier’s clothing plays so large a

⁴⁷ Samuel McCune Lindsay, “Purpose and Scope of War Risk Insurance,” *Annals of the American Academy of Political and Social Science: War Relief Work* 79 (September 1918), 56.

⁴⁸ War Department, *Compilation of War Risk Insurance Letters: Treasury Decisions and War Department Circulars, Relating to War Risk Insurance from December 21, 1917, to April 1, 1919* (Washington, DC: U.S. Government Printing Office, 1919), 107.

part in his efficiency as the shoe.”⁴⁹ Keefer drew attention to the shape and material structure of the shoe and its corresponding health effect on the foot. The poorly constructed shoes of soldiers caused disabling injuries. According to Duffin and Hayter, Dr. Jacob J. Lowe in Boston constructed a shoe fluoroscope specifically for returning injured soldiers to the United States with broken and damaged tissue in the feet.⁵⁰ The shoe fluoroscope enabled treatment without having to remove their boots.⁵¹ In 1912, the War Department recognized the importance of providing safe, flexible shoes for enlisted men in order to reduce disability claims: “Hereafter an undue amount of injury and disability from shoes will be regarded as evidence of inefficiency on the part of the officers concerned and as a cause for investigation.”⁵² In Figure 46, Keefer presents two fluoroscopic views of men’s feet in shoes. The left view demonstrates a well-crafted and fit army shoe, which he described as being big enough to hold the weight of a soldier and his obligations to “carry a load of clothing and equipment amounting to at least 40 pounds.”⁵³ The right view shows the foot deformed by a pointed, store-bought shoe that demonstrated the military’s paternalism to remake American men into soldiers fit for duty.

In the early twentieth century, the strenuous life combined with a revival of discussions on the “survival of the fittest” a phrase coined by Herbert Spencer to

⁴⁹ Frank Keefer, *A Text-Book of Military Hygiene and Sanitation* (Philadelphia, PA: W.B. Sanders, 1914), 106.

⁵⁰ Jacalyn Duffin and Charles R. R. Hayter, “Baring the Sole: The Rise and Fall of the Shoe-Fitting Fluoroscope,” *Isis* 91, no. 2 (June 2000): 261.

⁵¹ Although the foot screenings with the fluoroscope began as a medical aid, Lowe later commercialized the invention for shoe-fitting in retail establishments. *Ibid.*

⁵² Frank Keefer, *A Text-Book of Military Hygiene and Sanitation* (Philadelphia, PA: W.B. Sanders, 1914), 92.

⁵³ *Ibid.*, 108-105.

describe Charles Darwin's theory of natural selection. Different newspapers, dignitaries, and scholars used the phrase to debate the justification for or argument against World War I. "War is a biological necessity of the first importance, a regulative element in the life of mankind," wrote the military historian Friedrich Bernhardi.⁵⁴ In this necessity is the "law of the struggle" for the fittest to advance the race of civilization. White men's physical and mental fitness continued to be bound up in the movement of progress. Alternatively, Professor I. W. Howerth argued that the violent competition between persons at war was unnecessary in the grand scheme of the survival of the fittest. According to him, the struggle of civilization could effectively continue without the violence of war: "man can be strenuous without being destructive."⁵⁵ The discussions on the fittest men in relation to war persisted and developed in tandem with the need to improve men's health for serving the duties of daily life.

FIGHTING THE WHITE DEATH

In the interwar period, international voices asserted that the First World War had "created nervous tension, anxiety, and surmenage, leading to 'fatigued organisms' ripe for tuberculosis."⁵⁶ The belief persisted that the more a man performed industrial work, the more likely he would be to contract the infection. Herein was the conundrum: an overexertion of the strenuous life could in effect

⁵⁴ Cited in I. W. Howerth, "War and the Survival of the Fittest," *The Scientific Monthly* 3, no. 5 (November 1916): 490.

⁵⁵ I.W. Howerth, "War and the Survival of the Fittest." *The Scientific Monthly* 3, no. 5 (November 1916): 492.

⁵⁶ Joan Tumblety, *Remaking the Male Body: Masculinity and the Uses of Physical Culture in Interwar and Vichy France* (New York: Oxford University Press, 2012), 27.

cause the destruction of the body. Although the strenuous life in relation to masculinity did not completely vanish, the responsibility to maintain corporeal health for the betterment of civilization took precedent. Limiting the spread of tuberculosis required early diagnosis and treatment. To diagnose tuberculosis, physical examinations were still necessary, but the X-ray aided in identifying the hidden enemy within the body. Men had the responsibility to be X-rayed as a hygienic civic duty for reducing the spread of the disease.

In the 1930s, scientists developed miniature paper film strips coated with emulsion that was sensitive to X-rays, which they used to produce low-cost radiographs of lungs. Doctors magnified these films in a viewing box to examine close details. At the start of the decade, school children in poor districts participated in the first mass X-ray surveys. Afterward, men and women submitted their bodies to X-rays through about 1965, which comprised the age of mass X-ray screenings for tuberculosis. The screenings took place inside workplaces, schools, and finally in mobile vehicles where the press covered long lines of businessmen, the working class, and school children awaiting X-ray screenings, even during the lunch hour. While the American Lung Association—in collaboration with the Christmas Seals campaign—unabashedly promoted the screenings, members of the public and the medical community had objections to the safety and the accuracy of the films.⁵⁷

The Christmas Seals of the American Lung Association distributed posters that depicted the male bodies undergoing their X-ray examination. Figure 48

⁵⁷ Alton L. Blakeslee, *And the Spark Became a Flame: The Beginnings of Mass Chest X-Ray* (New York: Queensboro Tuberculosis and Health Association, 1954), 15-16.

entitled *A Good X-ray is Your Doctor's Best Aid in Discovering Early Tuberculosis* (ca. 1930s) targets the White male audience. In the top left corner, a beam of light shines down upon the upper anatomy of a well-postured, straight-forward, pensive, muscular White man who has nothing to hide, at least nothing above the waist. The light is godlike, radiating from some unknown source. The man's representation does not suggest that he is a patient under the scrutiny of a medical doctor, but rather illuminated with power. A dotted line projects outward from his chest connecting his outer appearance with the X-ray picture of his chest. Next to the man, the script says "A Good X-ray," making a positive association with the man's body. Adopting the pose of a superhero and floating without gravity, he looks down with a patriarchal gaze, because ultimately his submission to the X-ray is for the good of civilization and will confirm his anatomical strengths.

Physicians used to associate White Americans with the tuberculin infection giving it the moniker of the "White Death." In the nineteenth century, Dr. Samuel A. Cartwright of New Orleans believed that "phthisis [tuberculosis] is, par excellence, a disease of the sanguineous temperament, fair complexion, red or flaxen hair, blue eyes, large blood vessels, and a bony encasement too small to admit the full and free expansion of the lungs; that phthisis is a disease of the master race of men, and not of the slave race."⁵⁸ This rhetoric followed the assumption that Black bodies were impenetrable and offered more resistance to injury and disease. However, during the 1930s, tuberculosis' mortality rate

⁵⁸ Charles S. Johnson, *The Negro in American Civilization* (American Social Science Series) (New York, NY: H.H. Holt and Company, 1930), 134-135.

among the White American population decreased, while the rate among Black Americans increased. Tuberculosis ranked seventh as the cause of death among Whites, whereas it ranked second among the Black population.⁵⁹ Due to this shift in demographics, the National Tuberculosis Association supported the theory that tuberculosis spread through the close and unsanitary conditions of the poor communities in which Black Americans lived.⁶⁰ The Association's response resonated with White Americans' duty as patriarchal leaders of civilization and the need to fix Black American bodies for fitness, citing C.R. Grandy:

...white people...are extremely interested in the Negro tuberculosis problem—both from the fact that consumption in the Negro is an ever-present danger to the whites and because we feel that, to a great extent, we are the guardians of the Negro and we hate to see him suffer needlessly.⁶¹

In the 1930s, physicians observed Black American communities and their interactions with tuberculosis. The poster *Healthy looks can hide Tuberculosis, the X-RAY will show it before YOU know it* (ca. 1930s) targets the Black male audience (Fig. 49). Under a physical examination by a Black physician, the Black patient is a tired working man. He stands half-dressed, with poor posture, turned to the side, lacking the straightforward appearance of the man in the previous poster. The script above the patient and doctor underscores this: "Healthy looks can hide tuberculosis." Unlike the White man's frontal representation, the Black man's profile asks for scrutiny, implying that he must have something to hide. He receives no radiant light of power but rather a patronizing glare coming from the

⁵⁹ National Tuberculosis Association and Benjamin Kendall Emerson, *Report of the Committee on Tuberculosis among Negroes; a Five-Year Study and What It Has Accomplished*, National Tuberculosis Association, 1937, 10.

⁶⁰ Ibid, 23.

⁶¹ Ibid, 15.

doctor. The exchange between the two of them is charged with anxiety, seriousness, and gravity because the doctor likely has discovered the hidden enemy.

The depiction communicates the goals of the National Tuberculosis Association to get more Black Americans screened with X-rays. In the 1930s, efforts by the Association worked to increase the number of Black Americans screened at clinics for the disease by hiring Black medical staff. The Association aimed to form “Negro clinics” in the rural South for securing connections to Black churches and schools, which would ultimately encourage their small communities to go to the clinics staffed without Black medical personnel.⁶² The practices of the clinics varied nationally as far as the use of X-rays, due to the variables of different equipment, materials, and budgets. Mobile clinics frequently performed physical examinations before X-rays, so that physicians would only employ X-rays if there were suspicions of infection from the physical exam. However, the Association found this practice limiting in terms of how many patients a clinic could see in one day. Instead, the Association praised the Southern states who screened patients with X-rays first so that a large number could be handled, and the paper X-ray film kept costs low.⁶³

Both of these posters address radiography’s connection to men’s fitness for duty in the context of civilization, including the racial binary. The first depiction presents a strong White man who receives the X-ray exposure for the good of maintaining a healthy American population. The White man is the overseer,

⁶² Ibid, 41-42.

⁶³ Ibid, 39-40.

imbued with powers, and must maintain health in order to continue this position. Alternatively, the depiction of the Black man reflects the historical stereotypes that associated African Americans with inferiority, laziness, unkemptness, and harboring disease. Yet the Black man's encounter with radiography is not only dutiful but he also receives discipline, and discipline cultivates, civilizes, and remakes men into citizen-soldiers. Each poster is a call of duty for men on both sides of the racial binary to protect civilization from the spread of the deadly tuberculosis infection.

The call for duty to eliminate tuberculosis was overseen by White men to maintain the public health of White and Black communities. This call for duty also appeared in special exhibitions like the 1939 New York World's Fair. At the Medicine and Public Health Building, the centerpiece was The Hall of Man, a space devoted to human physiology. A twenty-two foot transparent man towered over the audience participants with a glowing, pulsating electric heartbeat. A citation by St. Augustine translated into thirty-two languages introduced the room: "Man wonders over the restless seas, the flowing water, the sight of the sky and forgets that of all wonders man himself is the most wonderful."⁶⁴ Around the Transparent Man were interactive stations that explored the human body's functions and senses—including fluoroscopes to view the bones in visitor's hands. The Transparent Man, as well as the other stations, projected the idea that knowledge of the body was paramount for maintaining dominance over nature. Although the Transparent Man had no racial attributes attached, the

⁶⁴ New York World's Fair 1939, Department of Feature Publicity, "Medicine and Public Health at the New York World's Fair 1939," February 15, 1939, 4-5, New York World's Fair 1939 Papers. New York Public Library Manuscripts and Archives Division.

attendance at the Fair, with the theme entitled “World of Tomorrow,” was overwhelmingly White.⁶⁵

In the Hall of Medical Science, adjacent to the Transparent Man, a tuberculosis exhibit taught visitors what diseased lungs looked like, and demonstrated a portrayal of a tuberculin test. However, the exhibit also offered X-ray screenings of visitors’ lungs. Although the Medical Society of Queens sponsored the X-ray screenings, the Long Island Radiological Society condemned the exhibit: “the presence or absence of tuberculosis of the chest based on paper film alone is inadequate, detrimental and dangerous, and therefore must be condemned as improper medical practice.⁶⁶ They further underscored that the American Roentgen Ray Society, the Radiological Society of North America, and the Inter-Society Committee for Radiology disapproved the use of paper film.⁶⁷ Yet the exhibit remained. The spectacle of transparent irradiated bodies in this World’s Fair perpetuated complicity to continue X-ray screenings. The public believed they were safe and efficient for the instrumental purposes to protect and maintain the health of the strenuous workers and military men.

⁶⁵ “African Americans and the World of Tomorrow,” *New-York Historical Society*, November 18, 2011, accessed on 3/5/2016, <http://blog.nyhistory.org/african-americans-and-the-world-of-tomorrow/>.

⁶⁶ Marcus Wiener, “Letter to Mr. Grover Whalen,” April 17, 1939, New York World’s Fair 1939 Papers, New York Public Library Manuscripts and Archives Division.

⁶⁷ Ibid.

MAN'S REMAKING IN WORLD WAR II

War manufactured men as much as it manufactured weapons and technology. Men entered the service, either by enlisting or the draft, and had their hair cut, their muscles chiseled, and their mental stamina shaped by discipline. They learned how to operate machinery, how to kill, and how to follow orders over a variety of terrains and weather. With such high stakes during World War II, men's bodies had to be in top form to compete with the Germans and the Japanese. The technologies applied to their bodies equally needed to be competitive.

Unlike World War I, during which the U.S. military implemented chest-pathology screenings late and inconsistently, World War II was marked by earlier and more routine screenings. The need for these routine screenings arose from "men being jammed into boats as never before, and periodic chest X rays for the seagoing personnel were considered essential."⁶⁸ Beginning in late 1940, and spreading to different urban induction stations in 1941, the Army utilized the low-cost paper film to screen drafted men's chests for service.⁶⁹

At the same time, the Brazilians, Danish, and the Germans developed miniature 35mm X-ray films for mass screenings of chests, which outmoded the American paper film of the 1930s.⁷⁰ The Germans could make four-hundred X-ray pictures in one hour. American developer, Doctor Brown of New Orleans, developed a fluoroscopic apparatus that captured eight X-ray pictures per

⁶⁸ Hermann Deutsch, "Camera Fights a Killer," *Saturday Evening Post* 215 (May 29, 1943): 26.

⁶⁹ Alton L. Blakeslee, *And the Spark Became a Flame: The Beginnings of Mass Chest X-Ray* (New York: Queensboro Tuberculosis and Health Association, 1954), 22-23.

⁷⁰ Hermann Deutsch, "Camera Fights a Killer," *Saturday Evening Post* 215 (May 29, 1943): 26.

minute. To be competitive with the Germans, Americans used these fluoroscopic 35mm films in place of the paper film technology during the war. Thereafter, this type of screening expanded throughout the country at different induction stations. The photo-fluoroscopic equipment became routine for discharge examinations in the anatomical evaluations of veterans for insurance purposes.

While the X-ray pictures of soldier's chests aided in remaking the body politic of the military by screening out the weak, they also helped remake soldiers' bodies in emergency surgeries. The portability of different apparatuses made it possible to expose the interiors of men's bodies in different poses under diverse circumstances, such as: "emergency work in base camps, with improvised beds; in the open over wayside stretchers; in hastily erected huts near a field of battle..."⁷¹ Moreover, the Army reconstructed airplanes and ambulances to be fit for radiography. In combat zones X-rays aided in localizing shrapnel, broken bones, and damaged tissue. As a result, X-rays made repairing men's bodies for duty easier, cleaner, and more efficient.

In addition to X-raying for chest pathologies and combat surgeries, wartime funneled funding for technologies to accessorize soldiers' bodies. Even though World War I initiated the interest in X-raying feet for proper shoe-fitting, World War II implemented the practice. The military installed shoe fluoroscopes to check the fitting of soldiers' boots for improving the kinesthetics and comfort of soldiers' bodies in combat. Radiography had become part of re-making men as never before in wartime.

⁷¹ Xenia, "Our Fighting Radiographers," *Radiography: The Journal of the Society of Radiographers* 7, no. 74 (February 1941): 94–95.

In the 1940s, Eastman Kodak created the advertisement “Man in the Re-Making.” Figure 50 depicts a composition of medical staff and glowing radiograph of a man's chest that has a piece of shrapnel inside. Although the radiograph is luminous, it does not emit the golden yellow light that bathes the medical staff. This light enhances a religious analogy in a composition power triad. The surgeon stands as the god-like figure who does the "re-making" of man, supported by the female nurse—who reverently gazes upon him and the X-ray technician. The X-ray film is, as the advertisement says, the “blueprint... for the *remaking of men.*” Indeed, the soldier becomes the proverbial Adam, remade not from the dust in Genesis but from the futuristic material of radiography. Through this material, the advertisement says, “wounded men...have already been restored to useful activity.”

The military medical clinics, where this scene likely occurred, were places that patriotic soldiers feared to be sent because they preferred not to be away from duty. Soldiers who spent long periods of time or repeated visits in the medical clinics received the social stigma of the “sick call soldier”—a soldier who dodged dangerous combat in a sick bed while his peers risked their lives in his place. One soldier who had a sore throat and went to the military hospital for an examination received biting criticism from his First Sergeant who said that “anyone who goes on sick call and is not hospitalized is ‘goldbricking’” or feigning an ailment to avoid duty, in other words a malingerer.⁷² For men, their pressures mounted as medical clinics kept them away from duty, receiving disdain and

⁷² David Rothbart, *A Soldier's Journal: With the 22nd Infantry Regiment in World War II* (New York: Simon & Schuster, 2005), 18.

scorn from their superiors and peers. Indeed, the pains and discomfort that came with war could either be serious or minimal and the tests in the clinics deciphered the authenticity of the claims.

Martin Duda, “son of a [Pennsylvania] tin mill worker,” served at the end of World War II and returned to duty in 1950 during the Korean War.⁷³ In a letter to his wife, Duda wrote that he injured his back and was on sick call. He had multiple radiographs made of his body to uncover the source of his pain.⁷⁴ However, the doctors found nothing wrong with his bones in the radiographs other than a wide gap between his vertebrae that they believed existed at birth. This revelation disconcerted Duda, as the doctors minimized his complaints and put him in the position of potentially being a malingerer. Duda’s response was defiant and argued that his doctor was “F.O.S.” (full of shit). He was so insistent to show his wife the reality of his pain that he drew two diagrams for her on the back of the pages that simulated his radiograph.

Figure 51 shows his drawing, with simple outlines to shape the bones. He roughly sketches his ribs from which to balance the symmetry of the vertebrae. He has numbered each vertebra, with number six being the source of his discomfort. He explains to his wife in his note that his sixth bone should be lower and more “flush” with the rest of his pelvic bone; thus, he believed this caused him pain. Indeed, his drawing and notes showed what the radiograph induced—a sense of anxiety. According to the X-ray’s revelation, he is fit for duty but not by

⁷³ Martin Duda’s information is from Earl Gregg Swem Special Collections Database, Accessed on 3/27/2016, <http://scdb.swem.wm.edu/?p=creators/creator&id=4763>.

⁷⁴ Martin L. Duda, “Letter to Mrs. Phyllis Duda,” March 17, 1951, Martin L. Duda Letters, 1950-1951, Earl Gregg Swem Library Special Collections.

the measure of his own corporeal experience. The burden of masculinity emerges from this picture as he attempts to justify his need to rest from duty.

Duda has demonstrated that, as X-ray photography could help re-make the man in so many different ways, man also wanted to re-make the X-ray visualization to his own liking. He provides a man's interpretation of his body over that of an experienced medical professional. His visualization of the radiograph demonstrated his agency against the surveillance technology, and his pursuit of proof, which he felt the X-ray failed to provide.

MEN ARTISTICALLY DESIGN IRRADIATED BODIES

Duda's drawing demonstrated his masculinity because, in designing his own X-ray image, he expressed self-mastery over the image of his body. During the Civil Rights era, when bodies were under scrutiny for race, gender, and sexuality, artists re-designed the male X-rayed body as a way of turning the X-ray's disciplinary scrutiny into self-agency. Their works of art displayed the irradiated male body as an assertion of self, with masculine symbols and accessories that supported this selfhood. Artists Robert Rauschenberg and Lev T. Mills appropriated the X-ray spectacle to present their respective visions of manhood, which diverged based upon their respective ethnicity.

Drafted for World War II at the age of 18, Milton E. Rauschenberg succeeded in physical fitness and military boot camp, and he received the title of the "honor man" at Camp Scott.⁷⁵ Despite his achievement, Rauschenberg railed against war and the suffering it imposed on the human condition. He vocalized

⁷⁵ Mary Lynn Kotz, *Rauschenberg, Art and Life* (New York: H.N. Abrams, 1990), 56.

his concerns with the Navy recruiters, explaining that he did not want to fight in combat. As a result, the Navy granted him a reprieve from combat and, alternatively, they assigned him to duty in a military hospital. First, Rauschenberg served as a nurse “in a tuberculosis ward,” where he had to “bathe and wrap corpses.”⁷⁶ Next, he treated “maimed and crippled servicemen” at a “rehabilitation center,” before finally serving as a neuropsychiatric technician, during which he nursed “sailors and marines with brain damage.” Rauschenberg reflected, “No, I was not forced to fight. What I witnessed was much worse. I got to see, every day, what war did to the young men who barely survived it. I was in the repair business.”⁷⁷

In the repair business, Rauschenberg witnessed first-hand the remaking of men post-injury and illness. Each of his positions took place in environments decorated with X-ray pictures that showed the tuberculosis of the lungs, broken limbs, and damaged skulls. His duty in the medical wards allowed his body to remain whole and opaque in the midst of the fragmentation, fragile presences, and diseases of the war wounded. Rauschenberg drew portraits of the soldiers he treated, which set him on an artist’s path.

Milton later became known as “Robert Rauschenberg” the twentieth-century modern artist. Throughout his art in the mid-twentieth century, Rauschenberg demonstrated an interest in transparency—from the contact-printing of the human figure with cyanotype photography, to the painted color

⁷⁶ Ibid. And see John Richardson, “Rauschenberg’s Epic Vision,” *Vanity Fair Magazine*, April 30, 2008. Accessed on 3/29/2016, <http://www.vanityfair.com/magazine/1997/09/rauschenberg199709>.

⁷⁷ Mary Lynn Kotz, *Rauschenberg, Art and Life* (New York: H.N. Abrams, 1990), 56.

washes of historic figures like John F. Kennedy overlaying construction buildings. Rauschenberg's surfaces were porous and veiled, with human forms represented as fragile presences.

In 1967, Rauschenberg began work on a self-portrait, in which the centerpiece was a life-size construction of his irradiated body. His doctor agreed to X-ray him at one-foot increments from head to toe and advised "him to stay well for the next two and a half years. He'd had enough radiation to last a while."⁷⁸ At five-foot ten-inches, Rauschenberg posed for six radiographic exposures in the nude wearing only a pair of sneakers: the head, the shoulders and half the torso, the lower torso and pelvis, the genital region, the knees, and the lower legs to the feet.

Rauschenberg assembled these X-ray negatives to create *Booster* (Fig. 52), then the "largest print ever produced by hand-lithography" that matched the grand scale of modern paintings.⁷⁹ Collaborating with Gemini G.E. L. (Graphic Editions Limited) workshop and publisher in Los Angeles, Rauschenberg used two lithographic stones to re-create his full-but-fragmented skeleton, along with transparent overlays and border images. In the top-left corner is an image of a simple wooden chair that Rauschenberg used in previous works. Below it, he printed male athletes, men at work, a tilted chair, and a peculiar white space outlining what appears to be an upside down skull-shape. On the top-right corner are male athletes. Below it, he printed a drawing that replicated the lines of the chair, the top of a tilted chair, two power drills that face the observer with circular

⁷⁸ Ibid, 153.

⁷⁹ Ibid.

arrows, and a bounding black male athlete. Just under Rauschenberg's lungs, he overlaid an astronomer's chart for the year 1967 and it extended it to the bordering images. The lower portion of his body is then further divided into "sunset" on the left and "sunrise" on the right. The line demarcating p.m. runs through his left leg, and the a.m. line runs through his right leg.

Booster centrally locates Rauschenberg's body within the cultural expectations of a man's fitness for duty: the ability to be the structural support (the chair), physically fit (the athletes), employed (the men at work), and a powerful agent that repairs things (the power drills). The repetition of these totems bordering the X-ray man imposes a sociological structure onto which his X-rayed body extends. In addition, the astrological chart overlays the X-ray man, offering another kind of structure that reflects the ephemeral. As the chart maps time and space over the architecture of his irradiated body, Rauschenberg emphasizes the temporality of his biological existence. On one side of his body, the sun sets and on the other it rises. The chart inscribes memory upon the body, as much as the X-ray aesthetic itself expresses the transience and vanishing of corporeal layers. Thus, Rauschenberg demonstrates that the irradiated male body does not convey concreteness, reliability, and opacity. Indeed, his manliness would fail to live up to General MacArthur's contemporaneous demand for men to "stand as the Nation's war guardians, as its lifeguards from the raging tides of international conflict..."⁸⁰

⁸⁰ Douglas MacArthur, "Duty, Honor, Country: General Douglas MacArthur's Speech to the Corps of Cadets at the Military Academy at West Point, N.Y.," May 12, 1962. Accessed on 7/11/2016, http://penelope.uchicago.edu/Thayer/E/Gazetteer/Places/America/United_States/Army/USMA/MacArthur/1962_speech_to_the_Corps.html.

Rauschenberg did not serve in the Vietnam War, which occurred contemporaneously with *Booster*, but the timeliness of another brutal war with returning injured veterans must have resonated with his pacifist disposition. While serving in World War II, Rauschenberg was no broken man that needed repair. He was the physically fit agent that repaired other bodies. During Vietnam, however, Rauschenberg reversed this identity in *Booster*. He fragmented his own body amongst the very images that comprise masculinity's measuring stick. By this time, he had homosexual relationships and, against the scrutiny of the U.S. military that banned homosexuals, he was no longer eligible for the draft. The X-ray man addresses the artist's new shortcomings. Standing out from Rauschenberg's other images, his irradiated body is the spectacle of the art which he achieved with great contrast in tonality. He accentuated not the wholesome classical beauty of the male skeleton as Sandoz did, but rather its fragmentation, temporality, and memory. Rauschenberg's X-ray man exemplifies White manliness in anxious tension with the measurements of duty that surround him.

Five years later, African American artist Lev Mills created a self-portrait with an X-ray man entitled *I'm Funky, But Clean* (Fig. 53). Mills was a young student working on his M.F.A. in Printmaking at University of Wisconsin-Madison when he made the work at the end of the Vietnam War. Unlike Rauschenberg, Mills was not a war veteran. He actively opposed the war in Vietnam and avoided the draft.⁸¹ In so doing, Mills resisted the measurement of duty decided by the White patriarchy. Yet civil rights was the battle that Black men at the home-front

⁸¹ Personal correspondence with Lev Mills. 3/31/ 2016.

had fought for decades and continued to fight. In the later period of the Civil Rights movement, Black masculinity had redefined itself not against the White patriarchy, but by its own standards of measurement.

During the late Civil Rights movement, some of the strongest images of Black masculinity came from the Black Panther movement, which Erika Doss has argued “projected black power, not egalitarianism. [...]” and “subverted [the] civil rights image by reconfiguring and romanticizing Black men as the very embodiment of revolutionary rage, defiance, and misogyny.”⁸² Performing Black masculinity in this vein took the form of wearing “black berets, leather jackets, their afros, dark glasses, raised fists, and military drill formation.”⁸³ While the performance of defiance and anti-authoritarianism attracted Mills, he contends, “I did not make art for protest.”⁸⁴ Rather, he explored the Black identity in its fight for human rights recognition. More than the Panthers, the 1968 Olympic salute by African American medalists—who raised their black-gloved fists while “The Star-Spangled Banner” played—inspired Mills’ to artistically incorporate the Black experience of poverty, pride, and the history of racial injustices through the human figure.

I'm Funky, But Clean features Mills himself at the bottom-center, carrying a heavy backpack. He wears a trendy hat, pants, and sunglasses to shield his eyes. He positions his hands on his hips while extending his capacious chest with a performance of defense and strength. Mills presents his body and the X-

⁸² Erika Doss, “Revolutionary Art Is a Tool for Liberation,” in *Liberation, Imagination and the Black Panther Party: A New Look at the Black...*, ed. Kathleen Cleaver and George Katsiaficas, (New York, NY: Routledge, 2001), 248.

⁸³ Ibid, 247.

⁸⁴ Personal communication with the artist Lev Mills, 4/1/2016.

ray man not in profile, as in anthropological scrutiny, but facing forward in direct confrontation with the observer. Like Rauschenberg, Mills charted the male body structure with a grid in the composition. In the top corner of the grid, a cat with a dislocated eye suspends its vision to the X-ray man and the representation of Mills, both of which fall outside of the frame of the grid. The displaced cat eye lies outside the grid with a strong degree of opacity and succeeds in projecting its surveillance on the representation of Mills, who appears in varying states of materiality. Mills in the foreground has more opacity and contrast than his lighter double behind him. The two amalgamate in the center to create a third shape that imitates the posturing of Mills and his double. All of these components work dialectically to compose a landscape of various relationships and meanings. However, Mills has stated that the work, as a whole, is about “liberation and Black consciousness.”⁸⁵

Mills’ X-ray man visualizes the burden of surveillance on Black masculinity. He is transparent with nothing to hide, but that doesn’t mean he is straight. His crooked position in the grid runs in parallel with the cat-vision directed upon the Mills’ representations. So while the cat eye searches for indicators of social deviance, the title suggests, “I’m funky but clean.” Indeed, Mills creates a dynamic of power that is not localized in any singular body, but in an ongoing tension between the X-ray man, Mills’ representations, and the cat eye of surveillance. The spectacle of the Black X-ray man demonstrates his endurance after the proof of inspection by the X-ray.

⁸⁵ Personal correspondence with the artist Lev Mills 4/1/2016.

The X-ray man is a form dislocated from the representations of Mills, yet it becomes a significant part of the work that Mills has created. Mills has reflected:

More and more the artist is becoming a technician, constructor, or a ‘structurist.’ This is due to the ever-changing society in which we live. All of us are living closer to machines, tools, computers, and materials that are used in our everyday endeavors.[...] The ongoing effort of a ‘structurist’ is to struggle with forms—to build up, modify, tear down, and build up again before the resolution of a given piece of work finally does take place.⁸⁶

The X-ray man is the product of the machine, as much as it is the vision of the dislocated cat eye. The dislocation of forms, and the stripping of the exterior of the X-ray man, and Mills’ representations of liminality all speak to the landscape of structure that he wanted to *tear down* and *build up* again. This perspective also places the artist in the position of a medical doctor, one who deconstructs in order to reconstruct. The duty here is not to serve the government’s war or to satisfy the masculine ideals of White patriarchy, Mills shows his fitness within the new framework of Black masculinity—a strength in the social defiance, postured directness, and style. Thus, Mills presents the Black male as fit for duty in the midst of the struggle for civil rights.

Both Rauschenberg and Mills have shown that during the Civil Rights movement, there was an artistic interest in turning the disciplinary tool of the X-ray—used for scrutinizing men’s bodies—into a tool for self-agency. These male artists displayed the irradiated male body not for medical scrutiny, but as a mode for self-analysis and introspection of masculine identity based upon their ethnicity and sexuality.

⁸⁶Samella Lewis, Mary Jane Hewitt, and Floyd Coleman, *African American Art and Artists* (Berkeley: University of California Press, 2003), 268-269.

THE PROSTHETIC X-RAY MAN

Screening men for military service with X-rays decreased in the latter half of the twentieth century. Beginning in 1957, routine tuberculosis screenings began to dissolve. The United States Public Health Service put forth a recommendation to discontinue the mass chest surveys for the general public and limit them to only “high risk” individuals, which included “low-income groups, migrant workers, and those known to be exposed from the disease.”⁸⁷ There were new ways of controlling and limiting the spread of the disease, such as a new anti-tuberculosis drug called kanamycin. Also, the mounting evidence that even small doses of radiation could have damaging “cumulative effects” caused the program to shrink. With the routine medical screenings for tuberculosis decreasing because of radiation concerns, the same occurred with shoe fluoroscopy. More medical voices condemned the practice of X-raying feet in shoes.⁸⁸ The removal of mass chest screenings and shoe fluoroscopy left the military with combat and hospital radiographic practices, which focused primarily on repairing men’s bodies and documenting men’s bodies when they entered service and left it—either dead or alive. The twentieth-century American wars left more war veterans than ever in need of extra care and treatment so that they could return to civic duties.

⁸⁷ “Science Notes: Limited Use of Chest X-Rays--A New Anti-TB Drug,” *New York Times*, November 24, 1957, 209.

⁸⁸ Leon Lewis, “The Shoe-Fitting Fluoroscope as a Radiation Hazard,” *California Medicine* 72, no. 1 (January 1950): 26-30. E.D. Dyson, “Shoe-Fitting X-Ray Fluoroscopes: Radiation Measurements and Hazards,” *British Medical Journal*, (August 4, 1956): 269–72.

Although prosthetics to support lost limbs were nothing new to war, the developments in prosthesis construction and attachment improved exponentially with X-rays. From 1974 and 1983, the Fitzsimons Army Medical Center treated between “100 and 120 amputees in its amputee clinics.”⁸⁹ One of its most challenging prosthesis fittings was that of the femur. Before the 1970s, few prostheses of the femur that went above the knee achieved proper alignment and adduction (or the extension where the knee would be). Yet at Fitzsimons, they conducted a series of experiments with X-rays that aided in localizing what William Eversmann, Jr. calls the “accuracy of the fit of a suction socket and the leveling of the knee unit.”⁹⁰

Figure 54 displays one of the radiographs from the study. The image presents the reconstruction of a man, with the grid behind him to demonstrate balance and alignment in this re-making. Eversmann, who worked on the project, explained that he used a long X-ray cassette, approximately 36 inches, “to make sure that the lower spine was straight, the pelvis was level, and the position of the proximal amputated femur similar to that of the opposite side allowing for the expected norm for that level of amputation.”⁹¹ The radiograph contains a range of color from grey, to blue-green, to blue, which, according to Robert Shanebrook, originated with the film stock itself being dyed blue in the 1970s so that the image

⁸⁹ William W. Eversmann, Jr., “Recollections of the Radiographic Control of the Position of the Femur in Prosthetic Fitting of the AK Amputee Fitzsimons Army Medical Center 1974 to 1983,” Denver, CO, n.d., Accessed on 4/5/2016,

www.oandplibrary.org/.../letter_from_Bill_W._Eversmann_jr-ocred.pdf.

⁹⁰ Ibid.

⁹¹ Ibid.

would appear to have a neutral color against the backlit 3200k light source.⁹²

Shanebrook also explained that the green came from “a mercury spike in the light source output” that backlit the X-ray film.⁹³

In the early twentieth century, disabled veterans were, as David Serlin has explained, “amputees who returned from war to their homes, hometowns, and places of work—if they could find work—often suffered from lack of due respect, despite the best efforts of the federal agencies like the Veterans Administration to promote the needs of the disabled.”⁹⁴ Yet in the late twentieth century, the male anxiety of pathology revealed by the X-ray was redefined by the improvements of prosthetics and a warmer social acceptance toward the disabled veteran.

Disabled men, once thought of as unfit for duty in the military, were welcomed for a variety of posts.⁹⁵ Men who had prosthetics evoked a masculinity of the postmodern cyborg, in which machinery fused with the organic body to make them appear indestructible, more efficient, and novel. In addition, starting in the 1970s, the anthropometrics of industrial design began to include measurements for people who were “in wheelchairs, using canes and crutches, and with limited vision and reach.”⁹⁶ According to Bess Williamson, American industrial designers created “universal design” for their products, such as food processors,

⁹² Robert Shanebrook, “The Curious Case of the Blue-Green X-Ray Images from Fitzsimons Army Medical Center,” December 14, 2007, Accessed on 4/5/2016, [www.oandplibrary.org/assets/.../The curious case of blue green X.pdf](http://www.oandplibrary.org/assets/.../The%20curious%20case%20of%20blue%20green%20X.pdf).

⁹³ Ibid.

⁹⁴ David Serlin, “Engineering Masculinity: Veterans and Prosthetics after World War Two,” in *Artificial Parts, Practical Lives: Modern Histories of Prosthetics* (New York: NYU Press, 2002), 48.

⁹⁵ Personal correspondence with Major William “Bill” Chesher, 9/18/2015.

⁹⁶ Bess Williamson, “Getting a Grip: Disability in American Industrial Design of the Late Twentieth Century,” *Winterthur Portfolio* 46, no. 4 (2012):221.

door handles, and lever-shaped faucets.⁹⁷ Likewise, the American Disabilities Act in 1990 prohibited discrimination practices in the workplace and in the military. The improvements in the quality of life for disabled people assisted the amputee to be fit for civic and military duties.

Radiography was the critical tool in charting the physical rebuilding of the prosthetic body and making it fit for duty. One physical therapist at Fitzsimons recalled, “It was a dramatic, almost immediate change in their walking. [...] The patients would make comments about how the new prosthesis and the alignment felt much more secure and much more balanced.”⁹⁸ The prosthetic-amputee redefined the spectacle of the irradiated male body. He visually conveyed an unstable presence and a lack of wholeness beyond the normal irradiated male body. The radiograph conveys an anxiety to maintain balance, alignment, and extension under its disciplinary scrutiny. Despite this anxiety and the fragmentation of the body, the radiographic tests from Fitzsimons conveyed a sense of hope and progress in their representations of restoring wholeness.

CONCLUSION

In 1975, Kodak released an advertisement marketing a special film for dentistry—the extraoral radiographic film, also known as the panorama radiograph (panorex) (Fig. 55). Panorex became the standard for military dentistry and was a requirement for entrance into service because the panoramic films aided in the identification of servicemen’s remains. As Michael Sledge has

⁹⁷ Ibid, 213–36.

⁹⁸ Charles King, “Modern Research and the Forgotten Prosthetic History of the Vietnam War,” *Journal of Rehabilitation Research and Development* 46, no. 9 (2009), xiv.

stated, “It was not until after Vietnam that the military began a conscious effort to gather and use dental X-rays in identification. [...] With panorex, not only do the teeth of remains give clues, but the sinus passages and bones of the face provide additional evidence.”⁹⁹ The Kodak advertisement reinforces this connection between teeth and mortal remains as much as it asserts a White portrayal of masculinity.

On the left side of the advertisement, a White man dressed in theatrical clothing with a pleated shirt and vest holds the radiograph of a skull. The right side provides the clue that this is a “dramatic performance.” The man on the left is an actor playing the role of Hamlet in the key graveyard sequence in Act 5. In Shakespeare’s play, Hamlet takes a skull in his hands and says, “Alas, poor Yorick! I knew him, Horatio: a fellow of infinite jest, of most excellent fancy: he hath borne me on his back a thousand times; and now, how abhorred in my imagination it is!”

The combination of the actor as Hamlet and the radiograph underscores the White masculine presence of the irradiated skull in profile. Hamlet’s words in response to finding Yorick’s skull draw attention to the shock and horror of his fleshless friend. Yet the radiograph itself is softer and cleaner than what Shakespeare envisioned in the dirty churchyard. In the play, Yorick has no duty other than to play dead in this scene; however, the advertisement makes Yorick the focal point. Kodak says the radiographic film delivers “dramatic performance,” suggesting the male irradiated skull is the point of spectacle, whereas the Hamlet

⁹⁹ Michael Sledge, *Soldier Dead: How We Recover, Identify, Bury, and Honor Our Military Fallen* (New York, NY: Columbia University Press, 2007), 108.

actor assists in only the secondary role. The panoramic irradiated skull on the right side underscores the spectacle as Yorick's skull opens up like a stage production into a horizontal grin. Indeed, the X-ray man in this work of visual culture was emblematic of the performance of duty.

I have shown that the spectacle of the irradiated male body was tied to the performance of gendered social roles. However, as this example demonstrates, the interpretation of masculinity depended upon the historical context and the ethnicity of the irradiated body. The advertisement's classic European sequence was a far cry from how Americans conceived of the Black irradiated male in recent years.

On July 29, 2013, *TIME* magazine released its issue following the acquittal of George Zimmerman, a volunteer neighborhood watchman from Sanford, Florida, who had gunned-down unarmed teenager Trayvon Martin on the pretext of Florida's Stand-Your-Ground law. *TIME*'s cover features the image of an X-rayed hoodie, radiographed and digitally enhanced by British artist Nick Veasey. The cover represented the item of clothing worn by Martin on the night of his death on February 26, 2012, in Sanford (Fig. 56). *TIME* overlays its headline on the disembodied hoodie: "After Trayvon." In the context of the case's racial tensions, the hoodie became a powerful signifier of Martin's African American identity and a national debate ensued over whether the hoodie was also a signifier of criminality, leading Zimmerman to profile Martin with suspicion. On the significance of the hoodie, Lonnie Bunch, Director of the Smithsonian's National Museum of African American History and Culture, mused, "it's rare that you get

one artifact that really becomes the symbol” to “ask the bigger questions” about race in America.¹⁰⁰

In the heated discussions about race that year, the hoodie received negative projections about Trayvon’s blackness, including the suspicion of delinquency and laziness, from largely non-Black populations. As clothing, the hoodie covered the upper body and the back of the head, casting a shadow over the owner’s face, making identification or even the prospect of criminality indecipherable. The hoodie was relaxed apparel so it could conceal a less than ideal body composition. It did not serve as attire in high-paying or even middle-class men’s work. As such, the hoodie expressed languor and the avoidance of doing culturally-accepted work. The hoodie also contained a deep pocket, which could conceal contraband and hands from view. As a result, wearing a hoodie raised the suspicion that its owner had something to hide and evaded respectful forms of duty.

While non-White populations negatively framed the hoodie under these associations, the Black population embraced the hoodie. The hoodie became emblematic of a new fight for Black civil rights—the start of the Black Lives Matter movement. This movement largely drew attention to the deaths of Black men and boys at the hands of policing entities. More broadly, however, it addressed the disposability of Black bodies in a White patriarchal society. As a performance of Black pride, donning a hoodie indicated an alliance with Martin

¹⁰⁰ Manuel Roig-Franzia, “What Will Become of Trayvon’s Hoodie, the Latest Piece of Iconic Trial Evidence?” *Washington Post*, August 2, 2013, Accessed on 4/9/2015
http://www.washingtonpost.com/lifestyle/style/what-will-become-of-trayvons-hoodie-the-latest-piece-of-iconic-trial-evidence/2013/07/30/0882de30-f951-11e2-afc1-c850c6ee5af8_story.html.

and sympathy to the injustice of racially profiling Black men. For the Black population, wearing the hoodie displayed not only loyalty but also a performance of duty to their communities and social frameworks.

As an artistic work, the *TIME* cover presents a haunting sight. The X-ray spectacle—which dissolves Martin into darkness and configures his hoodie into a diaphanous shroud, suggests that the cultural misperception of Black men renders them politically and socially immaterial, not far from the opening monologue in Ralph Ellison's *The Invisible Man* (1952):

I am an invisible man. No, I am not a spook like those who haunted Edgar Allan Poe; nor am I one of your Hollywood-movie ectoplasms. I am a man of substance, of flesh and bone, fiber and liquids—and I might even be said to possess a mind. I am invisible, understand, simply because people refuse to see me. Like the bodiless heads you see sometimes in circus sideshows, it is as though I have been surrounded by mirrors of hard, distorting glass. When they approach me they see only my surroundings, themselves, or figments of their imagination—indeed, everything and anything except me.¹⁰¹

In the case of the irradiated hoodie on *TIME*'s cover, the X-ray re-directs observers' attentions to Martin's culturally invisible body. This cover is not neutral but sympathetic to the young Black life that was disposed of too soon.

This chapter has explored the phantasmagoria of the male body as revealed by X-rays. Just as the X-ray recorded the passing of layers through the female body, it had the same visual aesthetic of vanishing on the male body. However, the images throughout this chapter have demonstrated that anxieties prompted by fears of mortality, fragmentation, lack of anatomical difference, and social judgment shaped the subjectivity of the irradiated male spectacle. Despite

¹⁰¹ Ralph Ellison, *The Invisible Man* (New York, NY: Modern Library, 1994), 3.

the *Hamlet* Kodak advertisement, the X-rayed male body was far less commodified than the female body. The reason, I have argued, was because the male body in American visual culture carried the burden of duty and wore the mark of discipline, both of which were emblematic of manhood.

CHAPTER 4

FOREIGN BODIES: THE SPECTACLE OF DEVIANCE

Radiographs do not only show bones and tissue, but also objects appended to the outside or concealed within the inside of the body. The X-ray spectacle of the unnatural object that is foreign to the natural body, known as the *foreign body*, has historically provided shock and awe in the news media.¹ One such example is Figure 57. In 1940, three- year old Donald Boe from Brooklyn swallowed a toy plane. The *Washington Post* reported: “what looks like a Dornier bomber soaring across the British Midlands is a toy warplane lodged in the... boy’s throat.”² Boe’s positive radiographic print shows his ribcage and the X-ray’s uncovering of the foreign body of the plane against his cervical vertebrae. The shock value of images like this discomforts the observer—how could such an oddly-shaped object get inside the body and not injure or kill a person? The X-ray has detected a wide variety of foreign bodies, from blades intentionally-ingested by sword swallowers, to a nail accidentally driven into the eye. Yet, regardless of how these objects get inside, the X-ray is the tool that authenticates the presence—aiding the observer in knowing what he or she cannot see.

More important is the question of how the foreign body can indicate evidence of innocence or intentional malice. The *Washington Post*’s description of Boe’s radiograph characterizes the human body like a geographical

¹ According to the Oxford English Dictionary, the foreign body is “introduced from outside; not belonging to the place in which it is found; esp. in Surgical use, of substances embedded in tissues of the body.” “foreign, adj. and n.” *Oxford English Dictionary Online* (New York: Oxford University Press), accessed on June 7, 2016, <http://www.oed.com.proxy.wm.edu/view/Entry/73063?redirectedFrom=foreign+body>.

² Associated Press, “Don Downs a Bomber,” *Washington Post*, December 6, 1940, 40.

topography that the plane's foreign body has crossed and invaded. The innocent toy plane becomes a dangerous *bomber*. As a threat, the foreign body does not belong within the borders of normal anatomy; therefore, it acquires the attribution of deviance because it deviates from the normative. While anatomical deviance does not always signal moral deviance, the cultural imagination shapes a foreign body with suspicion and anxiety. Radiography offers a vision of material discrimination between the natural and artificial, but human subjectivity and context can shape the corporeal owner of the foreign body with divergent moralities. If Boe had swallowed the toy plane while traveling by boat or aircraft to evade the customs authorities, the radiograph of the foreign body might take on a new meaning and implicate Boe (or his parents) in a crime of smuggling.

Beyond the body's epidermal border lies an abstract realm of imagery where the foreign body can appear in different tones, making its detection difficult to varying degrees. In an aesthetic sense, it corresponds to photographer László Moholy-Nagy's concept of the light modulator: "Any object may be considered a light modulator, for as it reflects the light it also modulates or changes the rays which strike it. It reflects some rays, absorbs others, possibly permits others to pass through..."³ Depending upon the level of radiation absorption, the foreign body can look opaque in the case of metal and, alternatively, translucent in the case of a pure diamond. The shapes result from the radiant light's performance on the material and can appear distorted by perspective as well as the forms of positive and negative space around them. Within these layers of abstraction,

³ L. Moholy-Nagy, "Make a Light Modulator," in *Moholy-Nagy: An Anthology*, ed. Richard Kostelanetz (New York: Da Capo Press, 1970), 99.

then, trained observers must make meaning from these shapes of foreign bodies, identifying them as a nail, gold teeth, bullet, ring, or glass.

As Boe's case vividly demonstrates, the X-ray becomes a detective of sorts, uncovering the disguises of the flesh. Dr. Alan Hart, a mid-twentieth-century transgender radiologist, lived and performed his profession as a man while concealing the secrets of his corporeal past in a woman's body. Dr. Alan Hart wrote in his memoir about his profession:

All detectives are not found in police departments or private agencies or even in the ranks of those gifted amateurs whose exploits are so beguilingly described by Dorothy Sayers, Ellery Queen, Leslie Ford and company. I think no one could work long in an X-ray laboratory without feeling himself a sort of detective; for where other doctors must make diagnoses by observing symptoms and reactions and by examining the patient's bodily fluids, the roentgenologist finds out what is wrong by literally looking through people and making photographs of the hidden details of bones and lungs and brains. Sometimes the things he discovers are somewhat ludicrous.⁴

Hart begins to describe what I refer to as the spectacle of deviance, a process that begins when the X-ray detects a deviation from the normal irradiated body, such as the unusual shape of a foreign body that the body itself does not create naturally. Foreign bodies trigger the human observer's attention that something is wrong or abnormal. Although the X-ray itself does not socially discriminate, it is a critical part of a process of social discrimination by photographically bringing attention to material difference. The X-ray discriminates by detecting radiation's absorption of different tissues, bone, and

⁴ Alan Hart, *These Mysterious Rays: A Non-Technical Discussion of the Uses of X Rays and Radium, Chiefly in Medicine* (New York: Harper & Brothers, 1943), 18.

foreign objects, rendering some materials with opacity and others with more transparency. Even though the presence of the foreign body signals some anatomical aberration, it does not always signify moral or social deviance.

The determination of moral or social deviance rests in the discriminating subjectivity of the policing observer under specific contexts beyond the medical setting, including the custom house, the police station, the prison, and airport security. This kind of policing has had many complications. Historically, the policing observer has identified suspicious-looking individuals prior to X-ray screenings—yet the definition of a suspicious person has been largely subjective and individualistic. Once a policing observer selects the individual for an X-ray screening, the radiographic image can display different kinds of foreign bodies that compete for attention. For example, foreign bodies attached to fashion, which are socially acceptable, can distract from foreign bodies hidden as contraband. Such examples have triggered false alarms or required a more invasive screening.

The history of policing by X-ray will demonstrate the difficulty in mediating what should be seen and how much should be seen. Policing by X-ray has constructed the irradiated body as a spatial domain of power with borders that can be technologically crossed and temporarily invaded with radiant illumination. The X-ray has facilitated the searching of suspected criminals for foreign bodies without touching, yet even this corporeal traversing can appear invasive at different historical moments. The Fourth Amendment has protected the rights of individuals to be “secure in their persons, houses, paper, and effects against

unreasonable searches and seizures.” As Matthew Kugler argues, though, those rights are “substantially relaxed at the border.”⁵ I have argued in Chapter 2 that Americans were not concerned with X-ray’s invasion of female modesty in medical, performative, or artistic contexts. However, in the context of X-ray policing, I will show that Americans developed anxieties and deep frustrations about being suspected of deviance.

This chapter focuses on the policing of human bodies and foreign bodies at the borders of the United States with respect to smuggling, through a historical exploration of the technology, imaging, and popular visual culture that has developed from it. Until now, secondary scholarship has only shown X-rays’ use for inspecting cargo and luggage.⁶ However, I present the history of searching the body by X-ray at the borders as a practice from the late 1890s until the twenty-first century. I argue that X-ray inspection of the human body for foreign bodies anticipates a spectacle of deviance.

Visualizations of such inspection exacerbate what the X-ray already does, namely, it challenges what the observer sees and what the observer knows. In the context of policing, the criminal conceals more than the traditional X-ray subject. He or she relies on performing an illusion by hiding material objects within his or her clothing or inside his or her own body. Sometimes the performance has demanded prosthetics, stuffing, and hairpieces. Although the

⁵ Matthew Kluger, “Perceived Intrusiveness of Searching Electronic Devices at the Border: An Empirical Study,” *University of Chicago Law Review* 81, no. 3 (Summer 2014): 1165.

⁶ R. F. Mould, *Mould’s Medical Anecdotes: Omnibus Edition* (Philadelphia: Institute of Physics Publishing, 1996), 266. Michael J. Thali, B. G. Brogdon, and Mark D. Viner, *Forensic Radiology* (Boca Raton: CRC Press, 2002), 25-27.

purpose of such materials is to not draw attention, an anatomically non-normative person may raise the suspicion of a policing observer. As a consequence, the suspect undergoes the often traumatic and humiliating search that tests the Fourth Amendment's rights.

The borders of the United States are porous and penetrable much like the human body by X-rays. In the context of X-ray policing of smugglers at the country's borders, my argument is two-fold. First, I argue that the X-ray's discrimination of material has led to social discrimination. Second, the American imagination has envisioned the anticipated spectacle of social deviance with the suspicion raised upon human bodies that appear transgendersed in visual media. In recent years with the Transportation Security Administration's screenings, transgendersed individuals have borne some of the burden of suspicion, along with ethnic minorities. However, the current concept of the *transgender terrorist* is strongly tied to the visual history of X-raying smugglers. Moreover, a continuous trope in this history is the *suspicious woman*, the woman who has goods to hide in her skirt or corset. The suspicion is that she is not a woman at all but a man pretending to be a woman in order to pass security checkpoints. These visualizations have imagined a transgendersed spectacle at the revelation of the criminal smuggler possessing foreign bodies in radiography.

Since this history explores the policing of individuals by X-rays at the national borders, it is also a history of what Americans have recently termed *body scanning*—or the X-ray surveillance of the bodies for detecting smuggled weapons belonging to terrorists. Although terrorism was not of primary concern in

the 1890s, the X-raying of foreigners for transporting unclaimed materials at custom houses was the beginning of this history and has continued intermittently through time. I begin by addressing the X-rayed body in the criminal archive as a means to understand how bodies were socially sorted. Then I introduce the X-raying of bodies at the custom house and, finally, at airports. At the heart of this chapter are the irradiated human-foreign bodies carrying object-foreign bodies and their ability to attract attention and cause distraction.

POLICING THE IRRADIATED BODY IN THE ARCHIVE

Policing the body, with or without an X-ray, begins with the concept of the archive. In his seminal essay, “The Body and the Archive,” Allan Sekula presented the concept of the *archive* as a “terrain” comprising photographic portraiture.⁷ This archive offers an indexical method of comparison, which identifies and distinguishes corporeal variations of sitters’ bodies, re-inscribing their social bodies within a cultural hierarchy. Within this archive are subsets (or subarchives) of different kinds of portraiture, including portraits of dignitaries, medical portraits, and portraits of the vernacular variety.

The nineteenth-century criminal archive incorporated the photographs by Alphonse Bertillon, the French police officer who invented the concept of the modern mugshot and fingerprinting system. Bertillon understood the value of the photographic camera as a biometric technology, or the governance of an entity through measurements and records of the body’s physicality and its processes,

⁷ Allan Sekula, “The Body and the Archive,” *October* 39 (Winter 1986): 10.

as well as a means for social sorting. In Paris, he measured criminal bodies and photographed such corporeal markers as ear lobes, noses, eyes, and skin, so as to compose a blueprint or index of personality for each individual. Through Bertillon's archive and system of identification, the outward signs of each body (such as scars, tattoos, and deformities) became a text from which to glean information about the person's "physical history" and could be applied to identify and track offenders. According to Sekula, the United States adopted Bertillon's system of comparative biometric photography at the World's Columbian Exposition in Chicago in 1893—just three years before X-rays entered public discourse.

After Röntgen's discovery, the X-ray craze produced many observations on how technology exposes different materials on and inside the body. While the middle and upper classes desired to showcase the authenticity of their jewelry under the X-ray, and doctors found bullets inside of bodies, governmental authorities conceived of an alternative instrumental purpose for X-rays: screening the body for criminality. As early as 1896, Chicago's police department considered applying Röntgen's discovery to Bertillion's system of criminal identification.⁸ Since criminals increasingly found ways to disguise their bodies and their goods, the X-ray provided the method to see underneath the layers of veneer—exposing the truth or fraudulence of the physique. Chicago's police department requested to purchase Edison machinery and to "try it on one of its

⁸ "Roentgen and Bertillon," *Chicago Daily Tribune*, February 10, 1896, 6.

Bertillon subjects.”⁹ The question remained whether Bertillon’s system of measuring the exterior body would be just as helpful in the quantification of the interior anatomy.

The immediate outcome of this proposal in America is unclear. On the one hand, no evidence exists that suggests U.S. police departments made X-ray prints of every criminal to identify individual characteristics, even though the Germans reported that they made X-ray photographs of criminals’ hands as a supplement to the fingerprinting method. However, the series of prints in Figure 58 shows a remnant of this method. Figure 58a displays a standard radiograph of a fingertip with the soft tissue creating a halo around the bone. This picture shows the bone more clearly defined than the other two that follow it. Figures 58B and C depict fingertips covered in a “creamy substance containing a metallic salt.”¹⁰ As a result, the latter two figures reveal the crevices of the skin in which each ridge and line is visible. Indeed, the set-up of all three of these images with the antero-posterior view as well as the lateral view is reminiscent of head mugshots. The theory was that “most criminals, especially chronic offenders, suffer during the practice of their profession some more or less permanent malformation of the fingers of the hands, wrists, or forearms, which would serve as positive identification signs if recorded graphically by the X-rays.”¹¹ The police did integrate X-ray machines into their practice in major cities over the course of

⁹ Ibid.

¹⁰ Lucy Frank Squire, *Fundamentals of Roentgenology* (Cambridge, Mass: Harvard University Press, 1966), 14.

¹¹ “Identified by X-Ray,” *New York Times*, July 12, 1914, C3.

the twentieth-century, but they only produced X-ray photographs to serve as prosecutable evidence of either theft or assault.¹²

These images would enter into the police photography archive, often referred to as a “rogue’s gallery.” On the other hand, the criminal archive itself began the important process of social sorting, which would lead to X-ray screenings of profiled groups of people at different historical times. The method began with an external survey of bodies that a policing entity categorized as normal or deviant, so that if there was visibly perceived deviance, he or she would administer the X-ray to inspect the inside. Thus, a pre-disposed bias of criminal suspicion would color the viewing of an irradiated body.

Sekula has argued that while the criminal archive demarcated bodies with tattoos, scars, and piercings as deviant, it alternatively bolstered the prestige of other bodies, indicating education, wealth, and professionalism. So within the archive, the inverse of the criminal defined the subset of portraiture depicting the socially respected man or woman. Therefore, the archive has a consequential effect, presenting a “double system of representation capable of functioning both honorifically and repressively in photographic portraiture.”¹³ The archive of the criminal influenced the profiling of bodies prone to social deviance, as well as the

¹² “Secrets Revealed by the Camera,” *The Watchman*, August 22, 1901, 3. According to Brecher and Brecher, as well as Brogdon, the first time in North America the police used X-rays in a court case occurred immediately after Rontgen’s first communication of his discovery. In Montreal, George Holder shot Tolsom Cunning in the leg but the authorities could not prove the violent act until February 1896, when the X-ray detected the foreign body of the bullet still wedged between the tibia and the fibula. Police submitted the X-ray plate as evidence to the court, which effectively convicted Holder for attempted murder. Edward Brecher and Ruth Brecher, *The Rays: A History of Radiology in the United States and Canada* (Baltimore, MD: Williams and Wilkins Co, 1969). B.G. Brogdon, *Forensic Radiology*, Boca Raton: CRC Press, 2002), 20-21.

¹³ Allan Sekula, “The Body and the Archive,” *October* 39 (Winter 1986): 6.

establishment of socially normative bodies. Specifically, the criminal archive functioned as a repressive tool for non-normative social groups by having the police track them based on their visual characteristics, and at the same time it reinforced class status and privilege for normative groups. Thus, as a new surveillance tool within communities, photography integrated both discipline and pleasure, and each photographic portrait “took its place within a social and moral hierarchy. The *private* moment of sentimental individuation, the look at the frozen gaze-of-the-loved-one, was shadowed by two other more *public* looks: a look up, at one’s ‘bettors,’ and a look down at one’s ‘inferiors.’”¹⁴

Since the 1890s, the United States has not had national standards for distinguishing normal from abnormal irradiated bodies. Rather, X-ray work encouraged the independent collection of images by individuals and institutions to further the research in the developing field. Operators of the technology maintained collections of X-ray images for reference and exhibition in their offices or businesses. Likewise, hospitals collected pictures of their patients to create an archive that differentiated a normal limb from one that was broken or infected, a normal organ from one that was diseased, as well as congenital oddities.

For example, Figure 59 shows a radiographic positive of a six-fingered left hand, which, for the archive, would demonstrate a congenital abnormality. Clinically, this image assisted medical personnel in identifying similar conditions. However, this radiograph itself is a spectacle of anatomical deviance that authenticates the naturalness of the anatomy. The sixth finger is not a prosthetic.

¹⁴ Ibid, 10.

If it were, it would appear as a foreign body in the radiograph. Each finger has the same degree of tonality and projection; thus, it is unlikely a forgery.

Contrasting this deformity within the archive is Figure 60, labelled “The Normal Hand,” found in a national medical archive. The irradiated hand in this image is not only uninjured and natural, but also extraordinarily beautiful and clear as an X-ray image—a fact acknowledged in the caption. The phalanges accentuate a fractal-like pattern of repetition, coming to five delicate points under a soft veil of the flesh’s shadow. On the fourth proximal phalanx rests an elaborate ring; the photographic silvering of the print outlines the jewelry’s shape to separate it from the tonality of the bone. The recurring motif of the wedding ring in X-rayed hands implicitly affirmed heterosexual marriage as a normative cultural value. Although the label does not assign gender, this ornamentation designates the normal hand as female.

Within the context of the archive, this comparison of examples demonstrates how the abnormal body reinforced the prestige and desirability of the normal. A body with its health and wealth intact was a thing of beauty, thereby receiving a label of “normal.” Alternatively the aforementioned abnormal hand in Figure 59 acquired a grotesque dimension because of its aesthetic divergence from the normal in Figure 60. Clinically, finding the normal was not a path to find the beautiful. In fact, the normal could not be based upon just one image such as the one in Figure 60. Rather, the archive revealed the normal by association with multiple other normals.

Finding the normal in the X-ray archive worked in a manner similar to Belgian statistician Adolphe Quetelet's proposal to find the "average man" in the early 1830s. According to Sekula, Quetelet "argued that large aggregates of social data revealed a regularity of occurrence that could only be taken as evidence of determinate social laws."¹⁵ For his methodology, the average body revealed itself through an archive of photographic portraiture as a singular composite portrait, which captured the similarities that all average bodies contained. Quetelet's "average man" in this composite body, observes Sekula, "defined the social norm" and "constituted an ideal, not only of social health, but of social stability and beauty."¹⁶ Likewise, the X-ray archive revealed the average by allowing the trained physician and policing inspector to find internal similarities among established normal bodies. Although these professionals did not need to make an actual photographic composite, after examining many X-ray images, they synthesized their knowledge to produce the "normal" body. With increased experience, the mind could index by memory what constituted normal corporeal health. Eventually, the diagnostic eye habituated to seeing the normal so it could quickly detect any distractions or irregularities.

As institutions and individuals acquired reference collections of X-ray pictures, they published them in different formats. Medical and the early X-ray journals frequently paired healthy normal limbs next to ones diseased. However, X-ray atlases offered the most significant references to the archive. Published as large books, these atlases sought to distinguish diseases. For example, *An X-ray*

¹⁵ Ibid, 20.

¹⁶ Ibid, 22.

Atlas of the Normal and Abnormal Structures of the Body (1925) offered four different views of normal and abnormal limbs. Its methodology began by first establishing the normal joints of the limbs, and then proceeded into the injuries and diseases of the limbs. The authors acknowledged that “radiographic interpretation can only be satisfactorily learned from a careful study of actual negatives, and by assisting at ‘screen’ examinations. To those, however, who have not these facilities, an atlas is essential.”¹⁷ The X-ray atlases made vast contributions to the archive, educating professionals on how to locate the normal and lay the groundwork for restoring the body to the normal. Detecting anatomical deviance emerged after training the eye to see the normal.

Discovering deviance with X-rays soon acquired a racial dimension. An old idiom, finding the “nigger in the woodpile [or haystack],” referred to the detection of something that was wrong or suspicious. During the X-ray craze, this expression gained in popularity. The *Electrical Journal* wondered, “if the X ray will ever be able to discover that mythical gentleman who is known to the world as the ‘nigger in the wood pile.’”¹⁸ This articulation even seeped into scientific and medical studies:

At first nothing more than the location of fractures or foreign bodies was expected of the X-Ray in head work, but today we find it useful in depicting lesions of even the deepest sinuses. No one is more appreciative of its value in this line of work than the rhinologist, for if the cor[r]ect diagnosis is not made the patient continues to suffer until the ‘nigger in the woodpile’ is discovered and the proper treatment applied.¹⁹

¹⁷ Archibald M’Kendrick and Charles Richard Whittaker, *An X-Ray Atlas of the Normal and Abnormal Structures of the Body* (Edinburgh: E. & S. Livingstone, 1925).

¹⁸ “Reflected X Rays,” *The Electrical Journal* 1, no. 22 (April 15, 1896): 440.

¹⁹ C.H. Ballard, “X-Ray Examination of the Sinuses,” *Western Medical Review: A Journal of Medicine* 20, no. 12 (December 1915): 665.

Popular magazines carried the analogy further by relating a fictionalized story of a “nigger” who “stole and swallowed a valuable ring” that the X-rays could expose inside of his anatomy.²⁰ In these analogies, the dark opaque foreign bodies seen in X-ray imagery represented the blackness of human character. Cultural prejudices conflated the X-ray’s discovery of anatomical deviance with social deviance, making a critical comparison between swallowing the “valuable ring” in the case of a smuggler, and wearing the valuable ring in the case of the desirable norm.

X-RAYS IN THE CUSTOM HOUSE

While X-ray atlases and X-ray journals initiated the establishment of what constituted the normal body and bodies that deviated from that norm, governmental authorities in Europe and America thought of expanding the practicality of the X-ray. In fact, just three months after Röntgen’s published discovery, the *Stamford Advocate* suggested, “Photographing by means of Roentgen rays may prove invaluable to custom house officers. They may be able to see just what is inside of trunks, pockets, and cloaks.”²¹ The United States Custom House Service considered the implementation of X-rays for the purpose of catching criminals after officials in Paris, France, made several

²⁰ “X-Ray Detection,” *St. Louis and Canadian Photographer* 27 (March 1903): 135.

²¹ “State Press Comment,” *The Day*, March 26, 1896, 2.

successful tests screening passengers at their custom house in the Summer of 1897.²²

During the fin de siècle, Paris was a popular European destination for affluent American travelers. Paris offered a range of cultural activities for tourists, such as visiting the Opera House, the Louvre, and Montmartre. Erica Hirschler has shown that American art students traveled there to study the old masters and the more recent developments in French Impressionism.²³ Nancy Green has discovered that American families settled in France “for pleasure, health, and the education of their children in that order” and “mothers and daughters started coming for several months of art, music, and shopping.”²⁴ At the same time, this bourgeois and elite constituency was only one part of the influx. David Harvey has demonstrated that Paris received a flow of dislocating working-class immigrants caused by the Baron Haussmann’s renovations of the urban center.²⁵ Yet, licentious goods from French bohemia, such as absinthe and erotic photography, cast an allure for people to experience and traffic such items to other countries. Globally, Paris also commanded the world’s attention because it hosted the Exposition Universelle of 1900, which drew approximately 50 million people. From 1897-1907, the French Customs tested the X-ray apparatuses only intermittently. So, while the technology was used inconsistently it nonetheless

²² Overseeing this trial was M. Pallain, director of the Paris Customs House, who used an apparatus designed by M. Seguy.

²³ Erica E. Hirshler, Janet L. Comey, and Ellen E. Roberts, *A Studio of Her Own: Women Artists in Boston, 1870-1940* (Boston: MFA Publications, 2001).

²⁴ Nancy L. Green, *The Other Americans in Paris: Businessmen, Countesses, Wayward Youth, 1880-1941* (Chicago, IL: University of Chicago Press, 2014), 8, 17.

²⁵ David Harvey, *Paris, Capital of Modernity* (New York: Routledge, 2004).

lurked as a possibility for many foreign travelers wanting to experience Parisian life.

The Paris Customs House's first testing of the X-ray method examined cargo and luggage as well as the passengers. French Customs officials did not X-ray every individual, only those whom they suspected were looking, behaving, or moving suspiciously. With the introduction of this new surveillance, passengers became more self-conscious, internalizing the disciplinary gazes of both the inspector and the X-ray, resulting in controlled behavior around the Custom official. This kind of policing exemplified what Michel Foucault's has called panoptic power.²⁶

Like the X-ray's phantasmagorical technology, panoptic power succeeded by withholding the knowledge of the apparatus to the few who operated it, while revealing the bodies of the many for the inspection of the few. In darkened rooms, Customs surveyors used a "human lorgnette"—similar to the hand-held fluoroscope—to examine the cargo exposed by the Crookes tube. Alternatively, passengers stood on top of a table with the tube behind them while assistants held a fluoroscopic screen to see inside their clothing. By encouraging passengers' self-discipline through the prospect of exposure, this policing

²⁶ Michel Foucault, *Discipline and Punish: The Birth of the Prison* (New York: Vintage Books, 1977). As discussed by Foucault in his classic study *Discipline and Punish*, Jeremy Bentham's eighteenth-century architectural model for the Panopticon, an all-purpose structure of surveillance and management, consisted of a circular building with cells around its perimeter and a central tower for observation. Bentham's plan envisioned the cells having transparent windows, one facing outside to illuminate the cell and its inmate, and the other facing the central tower so that the tower's surveyor could see inside, while being virtually imperceptible to the prison inmates. However, as Foucault indicates, there may be no individual in the tower at a given moment. The central tower symbolically stands to incite the inmates' anxiety that a surveyor might be in there watching them, causing an adjustment to their behavior. Viewing the Panopticon as epitomizing the surveillance and body politics of modernity, Foucault interpreted Bentham's design as constructing a space of power and a method for instilling discipline.

inculcated social conformity and moral behavior. Customs' sorting of passengers, prior to the X-ray screening, looked for any deviation from the normal body or predictable behavior that attracted attention. Respectively, this policing's success depended upon the X-ray apparatus itself to command attention by compelling others into voluntary submission.

In 1897, the popular French magazine *L'Illustration* published an illustrated story of the “Fraudeuse,” which circulated around the world (Fig. 61). According to this story—written in sensationalist style, the Fraudeuse was a suspicious woman caught smuggling a bottle in front of her legs, beneath her skirt. The male customs officer, trained in detecting the motions of fraudulent behavior, requested that the woman walk and “asked spectators if they remarked anything abnormal about her. The inexperienced answered, No; but a customs officer present was not to be deceived. ‘This woman,’ said he, ‘has something under her frock.’”²⁷ The X-ray proved this assertion without the officer touching the woman.

The trope of the Fraudeuse has reappeared again and again throughout the history of policing by X-ray. The American press reported that more women smuggled than men because women were the fashionable international shoppers and souvenir collectors.²⁸ They also had more places to hide small items like lace and pearls in their multiple layers of garments. Since foreign women shopped in Paris and needed to return to their respective countries, the X-ray

²⁷ “The X Rays in the Custom House,” *Scientific American* 27, no. 6 (August 7, 1897): 88.

²⁸ “X Rays for Smugglers,” *Chicago Daily Tribune*, August 1, 1897, 27. “The Lure of the Smuggling Game: True and Thrilling Attempts to Outwit Customs Officers,” *Washington Post*, July 27, 1913, MT1.

took on a morally important role, in addition to the economic role of preventing smuggling, of protecting the virtue of honest women from being physically violated by mistake. Alternatively, if the X-ray revealed the smuggled goods hidden within the clothes or the body, the spectacle of this vision justified the detention and stripping of the criminal—female or not. Administered by the government, X-rays offered a supervising eye to preserve and protect the morality of its citizenry by weeding out the criminal.

However, this new power was not universally well-received. M.C. E. Guillaume, French journalist for *La Nature*, relayed his doubts about the value of the overall process of the X-ray method:

At first sight nothing could be more seductive. By examining the travelers through the screen (let us remark, in passing, that this could not fail to raise a delicate law-question) we shall recognize at a glance the bottles, jewels, watches, fraudulently brought in. We pass from this to the more complete examination of the travelers to whom suspicion has been directed by the screen. Next we attack the trunks, which there is no need to open, to the passengers' great joy. What shall we see? Arms, pieces of metal, metallic cartridges, articles of glass, mirrors, and toilet bottles, jewelry. Shall we know, in addition whether the arms are prohibited, whether the jewels are brought in fraudulently, whether the bottles contain liquors forbidden by law? Evidently not. The rays will give only preliminary information, which will not obviate the necessity of opening the trunk.²⁹

Guillaume's report communicated the inefficiency of the X-ray method and, more importantly, the fallibility of a technology presumed to record actual physical truths. Although the X-ray did reveal the physicality of a foreign body, it failed to determine the appropriateness and legality of the object because interpretation of

²⁹ Quotation originally published in *La Nature* (Paris, August 7, 1897), "Examination of Metallic Objects with X Rays," *Literary Digest* 15, no. 21 (September 18, 1897): 614–15.

the physical truths depended upon human interpretation. Thus, the process was not only unwise and unnecessary but also nonsensical and imprudent.

Reflecting Guillaume's criticism was a short film by French director, Gaston Bretteau, entitled *L'Utilité des Rayons X* (1898) made one year after Paris's first trial experiments with the X-ray apparatuses at their Customs House.³⁰ Bretteau's film opens at the Customs House with a booth labelled Octroi, which formerly stood for a tax placed on trafficked food and beverages through Paris (Fig.62a). A man and a young girl walk through a gate labeled "Paris Entrée;" an obese woman follows right behind them. Her abnormal appearance raises the suspicion of the authorities that she is a Fraudeuse and they detain her. They point to her stoutly shaped abdomen. She responds angrily but agrees to have an X-ray screening. The film presents an imaginative simulation of the X-ray process, using a large camera to make the exposure on an oversize X-ray plate, and does not show the fluoroscope or dark room that Customs officials used to inspect smugglers.³¹ One of the Octroi officers holds the X-ray plate while the other operates the camera that exposes what the woman has hidden underneath—a large cut of beef (Figs. 62b-c). As they disrobe her, the officials find other items like a string of sausage and a barrel containing liquor. The removal of her dress also presents another revelation—the

³⁰ Alison McMahan's argues that Alice Guy Blache made this film. Alison McMahan, *Alice Guy Blache: Lost Visionary of the Cinema* (New York, NY: Bloomsbury Publishing USA, 2014), 18. Lobster Films, the managing archive of the film, attributes it to Gaston Bretteau. Personal correspondence with Serge Bromberg, Owner and Founder of Lobster Films, maintains that Bretteau made it (June 22-23, 2014).

³¹ As I explained in Chapter 1, the X-ray process is camera-less.

Fraudeuse is a transvestite—and, in fact, he is the film's director wearing women's undergarments.³²

Although the X-ray method appears to have succeeded halfway through the film's narrative, the second half argues that this policing discloses not a citizenry protected from a dangerous criminal but rather an elaborate theater of the absurd. As the Octroi officers finish removing the smuggled goods from the male transvestite, other men and women walk in through the gate, see the sight of the officers clumsily touching the transvestite, and break into laughter (Fig. 62d). The audience at the gate may have read the transvestite as a male prostitute, not as a smuggler, since cross-dressing men masqueraded as women to solicit other men for sexual favors at the turn of the century. So the audience at the gate likely assumed the encounter was sexually deviant and thus humiliating to the authorities. The officers quickly move the transvestite into the Octroi booth but cannot escape the embarrassment of their actions that go against the morality that their profession attempts to patrol. Bretteau has not only revealed the Fraudeuse, caught by the X-ray image, but has also drawn attention to the social deviancy of policing smugglers. If the success of smuggling depends on fooling authority, and X-rays fool the smuggler, both the authority and smuggler—Bretteau suggests—are fools.

In this film, the Fraudeuse enacts the role of the suspicious woman who smuggles, but with the addition of the gendered disguise that hid more than just contraband. According to Susan Stryker, "Since at least the mid 19th century, the

³² Personal correspondence with Serge Bromberg, Owner and Founder of Lobster Films. (June 22-23, 2014).

figure of the publicly gender-discordant individual has been associated with criminality.”³³ Prostitution was one form of crime for the transvestite, but this film suggests that smuggling was another. Men dressed as women because appropriate female garments had many places to hide things that would not distract from normative fashion. However, as the film shows, Customs officials grew suspicious of women who had dense masses around the middle, whether corporeal or artificial. So a perceived woman with a bulging girth would attract the attention of the inspector and would undergo the surveillance of the X-ray machine. Customs became a site of contested space between the apparatus and the body, in which the machine attempted to uncover the strata of the corporeal mass, while the body attempted resistance by increasing its mass of disguise.

The French X-ray method for screening people received mixed reviews in the American press. The *Chicago Daily Tribune* praised how the use of the X-ray could save much time during the inspection process, but said “the rays may seriously affect the nervous system of the traveler.”³⁴ The *Jewelers’ Circular* (New York) likewise extolled X-rays as an efficient time-saving asset for the rationalization of labor.³⁵ One the other hand, *Scientific American* (New York) echoed Guillaume’s reservations, saying that X-rays were not only unnecessary but also “inadequate, and [would] not allow travelers to escape an inspection of their trunks.”³⁶ While the publication recommended the use of X-rays for

³³ Susan Stryker, “Multiple Anomalies: Transgender Terror, Ethological Probes, and the Queer Politics of Whole-Body-Image Security Screening,” The Cultural Impact of New Medical Imaging Technologies, University of Queensland, Brisbane, Aug 30, 2011.

³⁴ “X Rays for Smugglers,” *Chicago Daily Tribune*, August 1, 1897.

³⁵ “X-Rays as a Means to Detect Smuggled Goods,” *The Jewelers’ Circular* 34, no. 23 (July 7, 1897): 19.

³⁶ “The X Rays in the Custom House,” *Scientific American* 27, no. 6 (August 7, 1897): 88.

examining “small parcels, postal packages, and valises,” it predicted that the technology would not become a substitute for the human surveyor in detecting the smuggler. Although newspapers had already circulated reports of radiation damage by 1897, the New York State Medical Association raised no objections other than “the authorities will have plenty of work on their hands.”³⁷ The silence of the medical field demonstrated the degree to which physicians and technicians held onto the hope that the technology could be implemented for good use.

The citizen’s standpoint may have been more ambivalent than the generally positive views expressed in the press. Just seven years earlier, in 1890, the eminent American lawyers (and future Supreme Court Justices) Samuel Warren and Louis Brandeis published their monumental treatise “The Right to Privacy” in the *Harvard Law Review*. Prompted by the increased use and portability of new inventions like the Brownie camera, Warren and Brandeis were concerned that these devices would “invade the sacred precincts of private and domestic life.”³⁸ The American metropolitan scene had become inundated with tools and devices that recorded individuals without their permission or knowledge. The right to privacy, they argued, was synonymous with the right to life, and the right “to be let alone.” Importantly, they sought to re-define and expand the meaning of property to include tangible and intangible things, encompassing corporeal and intellectual property. The X-ray’s emergence in this period prompted no widespread discussion of privacy in America. Indeed, the

³⁷ New York State Medical Association, *Transactions of the New York State Medical Association for the Year 1884-1899, Volume I-XVI*, 1897, 493. Reprinted from *Pharm Journal* 5, Fourth Series, 32.

³⁸ Samuel Warren and Louis Brandeis, “The Right to Privacy,” *Harvard Law Review* 4, no. 5 (December 15, 1890).

apparatus to screen passengers was still only in France, not yet in the land of the free, so there was no urgent need to have such discussions in the United States. Furthermore, the exposed human body by itself did not evoke an invasion of privacy. As I will show later, when the apparatus came to America, the context of the search and the suspicion of deviance brought attention to privacy in its domain of the human body.

America's tepid reaction to the X-ray method of screening bodies and parcels reflects the context of cultural production at the time. During the fin de siècle, the efficient use of time and labor for the rapidly industrializing United States was paramount for capitalist production to succeed. Since the X-ray method promoted with these values, no concerns about health or privacy were raised in official circles. The proposal that this new technology could have a practical application outside of medicine brought fresh laurels to its promise of progress. For the most part, Americans valued France as the cultural capital of the world in the 1890s, and instead of criticizing their inventions, embraced them.

After the success of the Paris Custom House, experiments with the X-ray method spread to the Paris Railway Station, the Detective Service, and the Post Office. Since many institutions screened people, the international travelers interested in antique art and architecture experienced a collision with modern X-ray technology. *The Chicago Tribune* considered the implications of this new surveillance for many unsuspecting people:

Who will suffer the most by the new system is an open question. Will it be more painful to the male contingency, who conceal cigarettes, cigars, jewelry, and such articles between the lining and cloth of their coats and overcoats, to say nothing of their methods

of hiding dutiable articles in their trunks; or will the fair sex most bemoan their fate when the unerring Roentgen ray is turned full upon their ‘chignon,’ where women have a passion for concealing precious stones and bits of rare lace, and the pockets distributed with care on the inside of skirts, in the hosiery and even around the corsets of many women, who can never be brought to see the least impropriety in smuggling everything they can from lace to furs.³⁹

With the X-ray’s new practical uses expanding throughout Paris, other countries around the world began using X-rays to examine packages and passengers. By 1902, Buenos Aires and cities in the United States had already installed X-ray machines at post offices to detect smuggled goods.⁴⁰ However, evidence suggests that some points of entry along the United States border faltered in exposing passengers with X-ray machines. In 1904, an American traveler from Clifton, Arizona, journeyed to the Mexican border town of Naco, Sonora, and commented on how “parties will purchase diamonds on one side, swallow them, go over and cough them up on the other, the customs people not being provided with an X-ray machine.”⁴¹ The inconsistency and intermittent use of the X-ray technology for screening passengers might have resulted from the apparatuses breaking down, or insufficient funds or space for the method at different ports of entry.

The belief persisted that if every Customs House in the world had an X-ray machine, smuggling in all forms would cease, thereby morally cleansing populations of that genre of social deviants. Consequently, the market for X-ray

³⁹ “X Rays for Smugglers,” *Chicago Daily Tribune*, August 1, 1897, 27.

⁴⁰ “Smugglers Trapped by X-Ray,” *Broad Axe*, January 2, 1902, 2.

⁴¹ Frank Aly, “Astride the Line: A Visiting Gringo’s Description of the Lively Border Town of Naco,” *Los Angeles Times*, April 17, 1904, E3.

production grew and technological methods for screening the body continued to sound innovative and valuable. In early 1907, Parisian inventor Alphonse Le Roux and Ferdinand Freytag from San Francisco devised and tested their improved X-ray apparatuses for screening passengers at ports of entry.⁴² Contrary to the 1897 Parisian model, Freytag's passengers did not stand on a table with the hand-held fluoroscopic screen raised to their bodies. Rather they entered a space that functioned like a "slowly descending elevator. When the passenger enters the elevator, the door, spring-actuated, closes and locks itself. The inspector, hidden behind the screen, sees, instead of the outlines of a human body, only a number of articles of various shapes and sizes apparently suspended in the air."⁴³

Differing from America's response to the 1897 inventions, in 1907, the press more directly addressed the health concerns of radiation and corporeal privacy. For example, the *San Francisco Sunday Call* drew attention to the lead glass that protected the customs inspector from repeated exposure that could

⁴² Freytag's method, adapted from Le Roux, was as follows: "the revenue inspector [viewed] by means of a chemically prepared screen, every dense object on the person of any traveler from a foreign port, while practically eliminating such details as clothing and flesh. This screen is arranged that the traveler passes it in a slowly descending elevator, which is without elevator boy, rope or electric lights. When the passenger enters the elevator the door, spring-actuated, closes and locks itself. The inspector, hidden behind the screen, sees, instead of the outlines of a human body, only a number of articles of various shapes and sizes apparently suspended in the air. [...] If the inspector has reason to believe that the traveler has contraband articles aboard he signals another inspector at the bottom of the shaft, and, as the passenger, serenely unconscious of espionage, steps from the elevator door he is met by a suave official who informs him either that he may 'pass on' or that the Government will relieve him of a few articles that he happens to be carrying.... As soon as the traveler has emerged from the lift it shoots p again with velocity and another passenger enters to undergo the same ordeal." "To Catch Smugglers with an X-Ray," *San Francisco Sunday Call*, March 3, 1907.

⁴³ Ibid. Powered by the Ruhmkorff coil, the tube received an electrical current of 50,000-100,000 volts.

cause cancer.⁴⁴ However, the paper expressed little concern for the passengers, arguing “this danger is wholly averted, for their exposure to the rays is of such short duration that no bad effects can possibly ensue.” The publication dismissed objections about the invasion of privacy, contending that the X-ray eliminated the flesh of nudity so that inspectors only saw the shadows of bones, thereby preserving modesty. The positive appraisal of the apparatus once again touted the technology for saving operating expenses by the amount of duty collected for undeclared items. In April 1907, the *Washington Post* reported that the testing of the apparatus was successful in New York City, calculated by the examination of 167 passengers in only forty-five minutes.⁴⁵ Freytag sent his plans to the Department of Treasury for review so that the invention could be installed at every major U.S. Custom House. However, the legality, funding, or durability of the invention may have delayed some of Freytag’s apparatuses to be installed for regular use beyond testing. What is clear is that the discussion to X-ray passenger’s bodies for finding the smuggler continued.

In 1910, *Life* released a cartoon by A.I.B. Walker entitled “The New Method,” disclosing that a new X-ray machine would be installed at Custom Houses across the United States “to be used on persons whose appearance suggests smuggling” (Fig. 63). The cartoon portrays a scene that is strongly reminiscent of Bretteau’s 1898 French film, including the trope of *Fraudeuse*. A plump woman in a hat and long dress stands opposite the gaze of the X-ray

⁴⁴ Ibid.

⁴⁵ “X-Rays to Fool Smugglers,” *Washington Post*, April 14, 1907, M2.

apparatus, imagined as a hybrid of a film and photography camera, with its electrical generator connected underneath. One of the Custom Officials inspects the woman's exposed body on the rear glass of the camera. He lifts the skirt of the camera over his head to help his eyes adjust to seeing the fluoroscope image; however, this action also points to the invasiveness of the process. Meanwhile another Official keeps his eyes on the suspicious woman.

The expression of contempt on the passenger's face contradicts the overwhelmingly positive press reports of the X-ray method. *Life*, unlike the newspapers and journals that took the perspective of the authorities and inventors, manages to capture the feelings of the civilian—women in particular—under this new surveillance and an invasion of privacy. Although the caption suggests that the officials have profiled her as a prospective criminal, the picture implies that she could be innocent, as suggested by her upright posture with chest thrust forward indignantly as if she has nothing to hide. Unlike Bretteau's comedic smuggler, she may be trustworthy. She represents the old, reliable past. By contrast, the officers slouch and their apparatus appears as a clunky imbalanced modern oddity, an imaginative departure from Freytag's sophisticated blueprints.

Finally, the illustration presents a compelling portrait of new power relations between individual persons and the United States government. It serves as an early visual example of how Americans complied with X-ray surveillance, but at the same time also performed resistance. The woman's sizable, dense mass visually counteracts the awkwardly assembled X-ray contraption,

challenging the X-ray method's exposure as if reading and also intimidating the officers. The crosses in her dress's rectilinear grid pattern function as a biometric matrix, but also visibly distract and guard against the X-ray's penetration. She grasps a walking cane, which both supports her and has the potential for use as a weapon. Standing in front of her parcels, she functions as a human shield to protect what belongs to her. The illustrator places the phantasmagorias of the X-ray machine and the human body in a competitive staring contest, in which each projects a piercing searching glare through their well-covered exteriors. Since this illustration is not a filmed narrative, it fails to proclaim the winner and loser, just an everlasting rivalry between the body and the surveying X-ray machine.

Contrary to the illustration, actual tests of the X-ray method initially appeared successful, but the installation of the equipment may not have been a national sweep. Estimates for the cost initially sounded reasonable, yet reports emerged that rooms containing an X-ray apparatus needed special lead lining to contain and prevent the radiation from passing through walls into nearby buildings.⁴⁶ During World War I, passenger screening was not in the public discussion. The press praised the screening of only parcels and packages to detect contraband items of war, and even to catch enemy spies hiding in boxes or trunks.⁴⁷

After the War, the screening of passengers by the Customs Service and other ports of entry experienced a revival of interest due to the influx of

⁴⁶ "X-Ray Trap for Smugglers," *Philadelphia Enquirer* 156, no. 2 (April 14, 1907): 4. "X-Ray-Proof," *Time* 2, no. 17 (December 24, 1923): 23.

⁴⁷ "Spies Exposed By X-Ray," *Washington Post*, January 19, 1915, 2. "Examine Bales by X-Ray," *New York Times*, January 22, 1915, 2. "Agents of Germany Indicted for Fraud," *New York Times*, May 28, 1915, 4.

immigrants that entered the country. According to historian Amy Fairchild, Ellis Island's immigration station reported on the use of X-rays starting in 1920.⁴⁸ The Public Health Service implemented X-rays in their medical exam of "the steerage," or third class passengers, maintaining that this test was "the most important feature of the medical sieve spread to sift out the physically and mentally defective."⁴⁹ Customs officers at Ellis Island likewise screened suspicious passengers for smuggled goods.

However, Freytag's invention of the X-ray elevator for such screening was already old-fashioned. The War encouraged the production of portable X-ray apparatuses, so that the machine in the Customs House upgraded to a lighter and easier to operate version. Figure 64a shows the new apparatus, which contains an X-ray tube inside of a maneuverable metal casing, directing its rays upon an immigrant woman sitting on a table. A Customs inspector uses a handheld fluoroscope to see if she has any undeclared items hidden "in a false sole."

Corresponding to this setting is a photograph of what the inspector sees on the fluoroscope (Fig. 64b). Represented as an X-ray positive, the woman's foot and ankle bones appear in darkly shaded tones. The bones are important for locating the corporeal topography for the inspector's orientation. The nudity of the exterior has vanished, dispelling any immediate concern that the imaging was an affront to modesty. In addition to the bones, the X-ray captures with dark opacity

⁴⁸ Amy L. Fairchild, *Science at the Borders: Immigrant Medical Inspection and the Shaping of the Modern Industrial Labor Force* (Baltimore: Johns Hopkins University Press, 2003), 104.

⁴⁹ Ibid, 5.

some abstractions that read as “two undeclared diamond rings” as well as “the steel arch and the shoe nails.” After this exposition, the inspector removed the shoe and personally examined the materials seen through the fluoroscope, establishing the indexical relationship between the abstract shapes and the physical objects. The inspector ultimately discerns the legality of the foreign bodies.

X-raying bodies has remained part of the U.S. Custom Service’s evaluation for admitting foreigners into the country through a variety of changing technologies and smuggling targets. Before World War II, the government sought the use of X-rays to detect rum runners.⁵⁰ Since glass contained traces of lead, bottles of liquor appeared as light shadows on the fluoroscope’s screen. During the War, a new apparatus was in development in the West Coast Navy Yard that would become the next important screening machine for Customs: the Inspectoscope.

THE DIAMOND UNDER THE INSPECTOSCOPE

After the Second World War, the Department of the Treasury reported a rapid increase in seizures, from 10,215 in 1944 to 17,009 in 1945, underscoring the prevalence of smuggled diamonds, furs, and watches.⁵¹ Post-War international air travel aided in this proliferation of smuggling. Although airports emerged in the United States during the 1920s, and began offering international

⁵⁰ “X-Ray to Foil Rum-Runner,” *Los Angeles Times*, April 29, 1930, 3.

⁵¹ “Counterfeiting, Moonshining Wane As Smuggling Increases,” *Washington Post*, February 7, 1946, 12.

flights in the 1930s, there is no evidence that airports used X-ray machines prior to the 1950s. Airport customs had conducted their searches and seizures physically. An important impetus for installing an X-ray machine was the diamond trade. The old machines at the Custom House barely detected true non-synthetic diamonds—as seen in the previous example of Figure 63b, in which the diamond ring only materialized on the hand-held screen by its metal shanks, shoulders, and prongs. The diamonds themselves appeared translucent. More sophisticated smugglers made incisions in their bodies, inserted loose diamonds, and let the wounds heal over before entering the country.⁵² These expert disguises intensified the need to have an X-ray apparatus with the capacity to capture more acute visual information at the international airports. So, until a new apparatus could offer enhanced viewing, Customs postponed installations.

Towards the end of the War, Henry Sicular of San Francisco designed the Inspectoscope to detect the souvenirs inside the millions of packages sent home by the GIs and potential contraband items smuggled into military bases by spies.⁵³ After that was a success, in 1947, San Quentin State Prison in California notably installed one to screen not only the bodies of inmates but also the prison's visitors. The machine promised unsurpassed accuracy: "the image shows up from three different angles which gives the effect of rotating whatever is being examined."⁵⁴

⁵² "Top British Counter Spy Enlisted Against Diamond Smuggling Ring," *New York Times*, August 15, 1954, F1.

⁵³ Frank Cameron, "Mr. Sicular's Magic Eye," *Los Angeles Times*, May 2, 1954, L10.

⁵⁴ *Ibid.*

During the early 1950s, U.S. airports and seaports handling international travelers set up the Inspectoscope in their Customs area to screen both passengers and parcels. The machine looked like “two telephone booths” put together; on one side the inspector-operator had the technological controls and the fluoroscopic screen, on the other stood the subject.⁵⁵ Customs attempted to employ female inspectors for the job so that women would not feel violated by men searching them.⁵⁶ In between the two compartments was a passageway, loaded with the technological components.

The Inspectoscope divided the body into three parts: the first gave the view of the head and shoulders, the second offered the torso, and the third presented the lower extremities.⁵⁷ This imaging enabled the inspector to direct a focused look at each anatomical segment for indexical comparison against his or her archival knowledge of the body’s normal. Each view lasted for six seconds, to prevent potential injury related to long exposures.⁵⁸ According to the press, “the Inspectoscope has acted like a good police officer. Just the knowledge that it is there makes most visitors cautious about what they carry...”⁵⁹ After it served the penitentiary, and illustrated Foucault’s argument about panopticism’s ability to cause the subject of surveillance to internalize the disciplinary regime, U.S. Customs installed the Inspectoscope at different ports of entry to reveal the most deviant and sophisticated smugglers of diamonds.

⁵⁵ Ibid.

⁵⁶ “X-Ray Eyes for Borderline Cases,” *Reader’s Digest* 51 (1973): 73.

⁵⁷ Ibid.

⁵⁸ A Special Correspondent, “Electric Eye on Smugglers,” *Sydney Morning Herald*, July 10, 1947, 9.

⁵⁹ Frank Cameron, “Mr. Sicular’s Magic Eye,” *Los Angeles Times*, May 2, 1954, L10.

Figure 65 is the press photograph released displaying the Inspectoscope imaging that stitched the irradiated body together in the darkroom to make a composite whole instead of showing the different views separately. Three lines divide the irradiated Fraudeuse—at the shoulders, in the pelvic region, and above the knees—signaling the locations scrutinized by the inspectors. The lower arms and hands appear more skeletal than the rest of the body in order to focus attention on the area where the passenger has carried foreign bodies. On one wrist she wears a bracelet and on the other a stick of dynamite, signaling her shifting identity from fashionable woman to femme fatale. Her hips buttress some contraband depicted as shaded circles, while her jewelry helps to distract the inspector with similar shapes such as a beaded bracelet and ring in the same Inspectoscope frame. With what might be a knife hidden inside of her thigh, the Fraudeuse has turned more lethal in comparison to her previous manifestations.

The press photo also depicts the irradiated body on the Inspectoscope screen with much irregularity. Her solid arms dissolve into bone and abstract shapes. The phantasmagorical transition from shadow to bone suggests that the passenger pressed her hands firmly against the screen, while the rest of her body was not as close. Although an expanse of shadow could potentially cover more foreign bodies, the design of the Inspectoscope aimed to look only at one portion of the body at a time for comparison to the normal and the categorization of foreign bodies. Thus, the press photo demonstrates how the limitation of revelation in some areas of corporeal space could become an asset for the faster sorting of bodies.

Contrary to the previous versions of the X-ray screening machine, the Inspectoscope also could be disguised “so that the subject doesn’t know that he is being examined. In some instances, the device is worked into the design of a reception counter or security office where, for example, passes are issued.”⁶⁰ So while smugglers concocted more sophisticated methods to disguise their objects, the government constructed the Inspectoscope to compete with those disguises—building the phantasmagoria of the apparatus into a more furtive and practically indiscernible apparatus for the many to see. Even Ian Fleming’s character of James Bond, British secret agent and international traveler, educated himself on the Inspectoscope in Fleming’s *Moonraker* (1955), and later reflected on its influence in *Diamonds Are Forever* (1956): “Let’s hope the whole job doesn’t blow up in my face in the customs shed at Idlewild. I shall look pretty silly if the Inspectoscope picks me up.”⁶¹

Detecting diamonds remained difficult because they appeared as light smudges or blurs on the fluoroscope screen. So, if inspectors suspected a diamond smuggler, they looked for slight variations amidst the layers of organs, bones, and tissue, which naturally disguised the foreign body of the diamond. Despite the challenge, the Inspectoscope made the process more efficient because the imaging enabled an enhanced close-up examination of each corporeal fragment to find disruptions in light and form.

Similar to the previous X-ray methods, inspectors did not screen every passenger. At this time, Europeans and Africans were the primary targets of

⁶⁰ Frank Cameron, “Mr. Sicular’s Magic Eye,” *Los Angeles Times*, May 2, 1954, L10.

⁶¹ The website Flemingsbond.com was the first to find Fleming’s references to the Inspectoscope in the Bond Series. <http://flemingsbond.com/the-inspectoscope/>.

government profiling. Most of the diamond trade began in South Africa, trafficked to London, and then to the United States—where three-fourths of the world’s diamond market thrived.⁶² However, the method to identify prospects for an Inspectoscope screening expanded the definition of deviant, such as individuals who were “overly friendly and too talkative..., [or] act reluctant to talk at all...”⁶³ Moreover, the method taught inspectors to look for seemingly harmless “incongruities in a person’s appearance” that were known to carry deviance, such as “When tall girls wear high heels or thick soles, for instance, the customs men have found they often deserve close scrutiny. One such lass arrived with \$200,000 worth of diamonds in her shoes.”⁶⁴

In addition to Inspectoscope imaging, Customs surveyors referred to their “rogues gallery” containing thousands of pictures of persons suspected or convicted of smuggling attempts, together with fingerprints and other identification data.⁶⁵ With the rogues gallery, inspectors policed a group of established criminals and prescribed an X-ray if a passenger matched a profile. Alternatively, if the Inspectoscope detected contraband, the Customs surveyor photographed the fluoroscope screen and would add the X-ray image to the index file of the criminal. The Inspectoscope was so successful that Latin American countries such as the Dominican Republic and Argentina installed

⁶² Ibid. Also see “Top British Counter Spy Enlisted Against Diamond Smuggling Ring,” *New York Times*, August 15, 1954, F1.

⁶³ Wesley Griswold, “How Science Is Making It Tougher for Smugglers,” *Popular Science*, June 1959, 61–63, 200.

⁶⁴ Ibid.

⁶⁵ “A Few Customs Men Do a Big Job Here,” *New York Times*, July 13, 1952, 62.

machines at their Customs “to filter out would-be assassins from inner sanctums of Dictators Trujillo and Peron.”⁶⁶

Sicular’s Inspectoscope seemed to be the most efficient solution for sorting out the deviant criminal from the morally normative individual. Nevertheless, the press revived an alternative, but familiar, anecdote: after a woman visitor with a large girth entered the booth for a fluoroscope screening, the inspector misinterpreted her “old-fashioned steel-stay corset” as weaponry “for a mass break!”⁶⁷ In this case, the stout suspicious woman alerted authorities not only by her exterior shape but also by the inner foreign body of her steel-corset—an object of moral appropriateness, antiquated physical constriction, and anti-progress. As a sardonic opponent to X-ray policing, she represented an archaic temperament, scorning and resisting the perspective of technology’s progress narrative.

However, the Fraudeuse had her supporters in the medical field. During the 1950s in the first Cold War, fears about radiation after the atom bomb pervaded public consciousness, putting health workers on the spot. In 1959, Dr. Hardin B. Jones, of Donner Laboratory at the University of California-Berkeley, responded to a question on the increased rate of leukemia cases with a criticism of the “new sources of radiation exposure that are not recognized or properly respected.”⁶⁸ Singling out the Inspectoscope, Jones “calculated that the use of this device in San Quentin [Penitentiary] alone involves an average exposure

⁶⁶ Ibid.

⁶⁷ Frank Cameron, “Mr. Sicular’s Magic Eye,” *Los Angeles Times*, May 2, 1954, L10.

⁶⁸ “Summation and Free Discussion,” in *Radiobiology at the Intra-Cellular Level* (New York: Pergamon Press, 1959), 181.

increase for the population of the State of California greater than the average additional exposure due to fall-out at the present time.”⁶⁹ The release of more radiation in the environment first affected those who spent the most time with the machine. So, during the 1960s, Inspectoscope workers began to experience adverse health consequences such as cataracts.⁷⁰ By the end of the decade, the machine developed a negative reputation.

Although diamond smuggling continued into the early 1970s, the diamond was no longer the most important foreign body to track at Customs due to an increase in airplane hijackings.⁷¹ On September 11, 1970, President Richard Nixon announced the Anti-Hijacking Program of the Federal Aviation Administration (FAA), which “ordered air carriers to deploy ‘surveillance equipment and techniques to all appropriate airports in the United States.’”⁷² However, the Program was not fully functional until December 5, 1972, when the FAA made the surveillance of all passengers and carry-on parcels mandatory on all passenger aircraft. To comply with the new guidelines, the FAA quietly removed the remaining Inspectoscope technology and replaced it with new X-ray machines for only surveying carry-on baggage, and magnetometer metal detectors for passenger bodies. After the concerns over the transmission of the

⁶⁹ Ibid.

⁷⁰ United States Dept. of Labor and U. S. Atomic Energy Commission, *Studies in Workmen's Compensation and Radiation Injury* (Washington, DC: U.S. Government Printing Office, 1969), 33-34.

⁷¹ “The first recorded hijacking of a U.S. air carrier occurred in 1961. Hijacking was a rare event until 1968, when 17 hijackings, mostly to Cuba, were attempted in the United States.” Committee on Commercial Aviation Security, Panel on Passenger Screening, Commission on Engineering and Technical Systems, National Research Council, *Airline Passenger Security Screening: New Technologies and Implementation Issues* (Washington, DC: National Academy of Sciences, National Academies Press, 1996), 9, accessed on 3/8/2015 www.nap.edu.

⁷²Ibid, 6.

Inspectoscope's radiation, X-ray screenings of the body under this new FAA program were rare "unless [passengers] hold onto their baggage during inspection."⁷³ Between the 1970s and 1990s, passengers suspected of concealing drugs internally, "the drug mules," would be driven to a nearby hospital for medical screenings using the X-ray.⁷⁴ With these new devices and procedures, the FAA Anti-Hijacking program concentrated on locating any hidden metallic foreign bodies by a rogue passenger who could use them to force the crew into changing the path of an aircraft.

Although a minority of passengers received an X-ray screening at a nearby hospital, consumer advocate Ralph Nader launched a fight against the use of any X-ray machine at the airports, criticizing the FAA's failure "to consider the environmental impact of the devices and did not allow adequate time for public comment on their possible use...[He] charged that the F.A.A. had set no minimum Federal standards governing the use of the machines."⁷⁵ Citing the airport inspectors and passengers who were at-risk for receiving secondary radiation, Nader was unsuccessful at removing X-ray machines for checking luggage, but his advocacy may have delayed considerations of re-implementing passenger X-ray inspections. After the Inspectoscope and Nader's outspoken criticism, Customs reverted back to the physical searches of passengers until the late 1990s.

⁷³ John Brannon Albright, "Airport Inspection of Passengers, Bags: Frisk or X-Ray?" *Chicago Tribune*, March 24, 1974, C5.

⁷⁴ Lee E. Ross and Simon Adetona Akindes, "In Search of Probable Cause: U.S. Customs, Racial Profiling, and the Fourth Amendment," in *Crime Control and Social Justice: The Delicate Balance* (Westport, CT: Greenwood Publishing Group, 2003), 251.

⁷⁵ Ralph Nader, "X-Ray Exposures," *New Republic*, September 2, 1967, 11–12. "Nader Group Sues to Halt X-Ray Use By Major Airports," *New York Times*, October 27, 1973, 63.

THE NUDE SPECTACLE IN THE BODY SCANNER

After nearly two decades of the same program, the FAA recognized the need to modify and upgrade their methods for screening passengers suspected of carrying illegal drugs or explosive materials for aircraft terrorism. In 1998, airport Customs in New York and Miami offered passengers the choice between a strip search or an X-ray photograph if inspectors suspected them of smuggling illegal drugs.⁷⁶ The Customs Service proposed this option for the comfort of the passenger because strip searches were invasive and unwelcoming to travelers coming to the U.S.

However, the *New York Times* reported that between the two airports, no one accepted the X-ray and preferred the strip search.⁷⁷ Sophisticated drug smugglers, like drug mules, carried their items by “swallowing condoms containing heroin” so that a strip-search would not detect their foreign bodies like the X-ray could. Although this may have accounted for passengers’ preference for the strip search over the X-ray, authorities thought the issue was more circumstantial. Since there were no longer X-ray machines on-site at the airport, the X-ray option required a suspected passenger to ride handcuffed with inspectors to a local hospital for irradiation with regulated medical apparatuses. The popular selection of a strip search may have reflected the inconvenience of the X-ray screening process. Despite the unanimous rejection of the X-ray, Customs did not abandon hope that they could provide an alternative method to the strip search. They referred to a new type of X-ray apparatus that the U.S.

⁷⁶ “X-Rays Offered As Alternative to Strip-Searches,” *Washington Post*, November 27, 1998, 7.

⁷⁷ Alan Finder, “No Takers for the X-Ray Option,” *New York Times*, January 24, 1999, WK3.

penitentiaries had installed during the 1990s to screen visitors and prisoners.⁷⁸

Following the trials in the prison system, Miami and New York airports were the first to install the backscatter X-ray body scanner in 1999, though as an option to the strip-search.

Contrary to traditional X-ray machines, backscatter X-ray body scanners did not detect the absorption pattern of different materials. Instead, the body scanner transmitted a stream of X-rays and measured the reflections of that beam onto a computer monitor:

The key difference is that organic materials do not absorb much of the X-ray, allow[ing] the beam to mostly pass through, thus making traditional X-rays—which measure absorption characteristics—a poor system for differentiating organic material. X-ray backscatter systems, on the other hand, do a much better job of differentiating organic materials, because different chemical elements in the material deflect these beams quite differently. This makes backscatter a well suited technology for detecting organic explosives in either solid or liquid form as well as drugs.⁷⁹

Although the government initially claimed the machines did not save and store individual pictures, independent tests later showed that some machines had that capacity, primarily to record visual evidence of smuggling contraband that would hold up in court.⁸⁰

The backscatter X-ray technology rendered the human body differently from previous methods. Figure 66 depicts one example of a full-body scan. Contrary to the fluoroscope's positive imagery, the reflection, or "scatter,"

⁷⁸ Steven W. Smith invented the technology in 1992.

⁷⁹ Bart Elias, *Airport Passenger Screening: Background and Issues for Congress* (Washington, DC: Congressional Research Service, 2010), 32.

⁸⁰ "Feds Admit Storing Checkpoint Body Scan Images," *CNET*, accessed June 3, 2016, <http://www.cnet.com/news/feds-admit-storing-checkpoint-body-scan-images/>.

captures the body in shades of milky-white against a black background. Metallic foreign bodies, like the gun, buttons, and zipper, appear in opaque black. Backscatter imaging does not reveal much bone beneath the skin, only faint traces of osseous forms appear in gray shades, usually in the lower legs and ribcages if the individual is less than robust in the mid-section. The backscatter X-ray scanner uses Advanced Imaging Technology software to enhance the detail of the human figure and any appended foreign bodies. It effectively undresses the clothes from an individual, revealing a hairless nude spectacle of the surface with the forms of the extremities clearly defined.

With this new imaging technology, the spectacle of deviance took on a new meaning within the context of the archive. Turning the clothed subject into a nude body fully realized the magic trick that the X-ray Specs glasses promised to scopophiles in the early twentieth century. The nudity itself exhibited moral and social deviance in relation to the archive containing un-screened, properly clothed individuals. Every screened person assumed the pose of a stop-and-frisk, raising arms and hands up in the performance of a criminal suspect. The performance signified criminality even before the inspector determined the legality of foreign bodies. Thus, by the association of the archive's double system of representation, which reinforced the desirable normal and subverted the deviant, the picture of the irradiated body in the body scanner raised the specter of deviance, regardless of the foreign bodies. This new irradiated body was an image of humiliation and, later, conveyed the suspicion of terrorism.

In 1999, Norman Siegel, executive director of the New York Civil Liberties Union, raised objections that were both aesthetic and legal. Siegel said “he was concerned that, because an X-ray or body scan seems less intrusive than a strip search, it might one day become routine, in the process ‘transforming entrance into the United States into a general search.’”⁸¹ In other words, the body scanner would denigrate the iconic symbolism of the Statue of Liberty, which had been a sign of welcome for immigrants and a powerful emblem of freedom. His trepidation about its routine use echoed earlier concerns of radiation experts who consulted with the Food and Drug Administration (FDA). They argued that installing backscatter X-ray machines “violated a longstanding principle in radiation safety—that humans shouldn’t be X-rayed unless there is a medical benefit.”⁸² Even with the low dose of radiation, which some scientists compared to the radiation one received from eating a banana, the apparatus was a blackbox concerning the consequences of its expanded use. The group further maintained, “The device was already deployed in prisons; what was next...others asked—courthouses, schools, airports?”⁸³ However, the FDA was not responsible for the widespread installation of the backscatter X-ray machines.

After the terrorist attacks on September 11, 2001, President George W. Bush established the Transportation Security Administration (TSA). As *ProPublica/PBS News Hour* has discovered, “the final call to deploy the X-ray

⁸¹ Alan Finder, “No Takers for the X-Ray Option,” *New York Times*, January 24, 1999, WK3.

⁸² Michael Grabell, “U.S. Government Glossed Over Cancer Concerns As It Rolled Out Airport X-Ray Scanners,” *ProPublica*, November 1, 2011, accessed on 3/21/2015, <http://www.propublica.org/article/u.s.-government-glossed-over-cancer-concerns-as-it-rolled-out-airport-x-ray>.

⁸³ Ibid.

machines was not made by the FDA, which regulates drugs and medical devices, but by the TSA, an agency whose primary mission is to prevent terrorist attacks.⁸⁴ In America, post-9/11 paranoia and patriotism overturned the beliefs from the first Cold War that X-ray exposures should decrease not only in intensity but also in numbers and, furthermore, should be employed only for medical benefit.

Just months after 9/11, the *New York Times* reported a surge in demand for new security machinery that captured biometric data such as fingerprints, as well as voice and facial recognition that machines stored as encrypted files.⁸⁵ Backscatter X-ray machines continued to be in a testing phase at different airports, without a full deployment by the TSA.⁸⁶ At the same time, the TSA also tested millimeter wave machines, which used electromagnetic imaging to strip the body down to its skin—although the nudity was slightly less detailed.⁸⁷ In this testing phase from 2001 to 2009, both full body scanners were optional to physical searches at only some airports and only affected individuals whom the TSA deemed suspicious. After 2007 the scanners slowly began to replace the

⁸⁴ Ibid. “In a regulatory Catch-22, the airport X-ray scanners have escaped the oversight required for X-ray machines used in doctors’ offices and hospitals. The reason is that the scanners do not have a medical purpose, so the FDA cannot subject them to the rigorous evaluation it applies to medical devices.”

⁸⁵ Warren Strugatch, “For Some Countries, a Post-Sept. 11 Surge,” *New York Times*, November 11, 2001, L16. Barnaby Feder, “Surge in Demand to Use Biometrics,” *New York Times*, December 17, 2001, C21.

⁸⁶ When the TSA entered the airports and other transportation venues, TSA agents were responsible for checking individuals boarding domestic and international transportation vessels. Alternatively, the site for Customs was situated on the arrival side of only international terminals. They were frequently at different locations in the airports.

⁸⁷ The press used the term “full body scanner” to mean both the millimeter wave technology and the back-scatter X-ray imaging.

metal detectors at some Security checkpoints.⁸⁸ Muslims with long loose-fitting clothing, and head scarfs were likely targets for the technology that could see through the layers of fabric covering their modesty. After 2007, all people with “bulky clothing,” including Muslim women and Sikh men, experienced pat-downs as secondary screenings.⁸⁹

In this era, the trope of the Fraudeuse returns as what Susan Stryker calls the “transvestite terrorist.” On September 4, 2003, the Department of Homeland Security released an advisory stating, “Terrorists will employ novel methods to artfully conceal suicide devices. Male bombers may dress as females in order to discourage scrutiny.”⁹⁰ Toby Beauchamp has shown that U.S. surveillance policies are “deeply rooted in the maintenance and enforcement of normatively gendered bodies, behaviors and identities;” however, the imaging technology was equally able to detect gender deviance in order to expose the transvestite terrorist.⁹¹ In the process of trying to catch the transvestite terrorist, the body scanner uncovered the transgender population, as scholar Susan Stryker personally witnessed, detecting “wigs, ‘packing,’ ‘gaffing,’ ‘binding,’ and ‘stuffing’:

⁸⁸ For information about this testing phase, see “Airports Seek Hi-Tech Security,” April 3, 2002, accessed on 3/30/2015 http://www.nbcnews.com/id/3071573/ns/us_news-only/t/airports-seek-hi-tech-security/#.VQ-BYUHrlF “A New Security Screening Technology,” *Popular Science* 262, 2003, 40. Joe Sharkey, “Airport Screeners Could Get X-Rated X-Ray Views,” *New York Times*, May 24, 2005, C5. Mentioning the testing of the backscatter X-ray scan in 2002 at the Orlando International Airport: Austin Considine, “Will New Airport X-Rays Invade Privacy?” *New York Times*, October 9, 2005, D3.

⁸⁹ Tara Bahrampour, “TSA Scanners, Pat-Downs, Particularly Vexing for Muslims, Other Religious Groups,” *Washington Post*, December 23, 2010, accessed on 3/29/2015, <http://www.washingtonpost.com/wp-dyn/content/article/2010/12/22/AR2010122202919.html>.

⁹⁰ Department of Homeland Security, *DHS Advisory to Security Personnel, No Change in Threat Level*, 2003, http://www.dhs.gov/xnews/releases/press_release_0238.shtm, accessed on 7/28/2007 by Toby Beauchamp for the 2009 article “Artful Concealment and Strategic Visibility: Transgender Bodies and the U.S. State Surveillance After 9/11,” *Surveillance & Society* 6 (4).

⁹¹ Toby Beauchamp, “Artful Concealment and Strategic Visibility: Transgender Bodies and U.S. State Surveillance After 9/11,” *Surveillance & Society* 6, no. 4 (2009): 1, accessed on 3/29/2015, <http://www.surveillance-and-society.org>

i.e., wearing a strap-on phallus or taping one's penis back between the legs to present a smoother contour, or flattening one's breasts or wearing a padded bra.⁹² Other non-normative bodies experienced the same invasiveness. The backscatter X-ray scanner captured the scars of mastectomies or vasectomies as well as the foreign bodies used to rebuild the outer frame to normativity, including additional padding, silicone implants, or prosthetics. In both cases, the revelations of foreign bodies belonging to non-normative gendered people frequently led to the pat-down to physically determine the legality of the carried objects.

Despite the new spectacle of the irradiated body, its artistic varieties frequently depicted the human form with traditional X-ray photography. For example in Figure 67, Internet cartoonist, Tandor, depicts a man walking through the airport "X-ray scanner," and on its screen becomes an irradiated skeleton. The man emerges from the machine as a regular skeleton, suggesting the scanner has committed theft of the individual's identity by removing the external and internal information of the body. In a political twist, the skeleton directs attention to this governmentally authorized theft as a criminal performance, and does not represent the suspicion of the passenger's deviance. As the skeleton walks to "Departures," it has nothing left to hide.

The preference of the irradiated skeleton over the nude body in such examples indicates creative liberties, but also may suggest that conceptual artists still associate new X-ray imaging with the old. Sturken and Cartwright

⁹² Susan Stryker, "Multiple Anomalies: Transgender Terror, Ethological Probes, and the Queer Politics of Whole-Body-Image Security Screening," *The Cultural Impact of New Medical Imaging Technologies*, University of Queensland, Brisbane, Aug 30, 2011.

have explained, "People often see an image differently from how it is intended to be seen, either because they bring experiences and associations to a particular image that were not anticipated by its producer, or because the meanings they derive are informed by the context (or setting), in which an image is seen."⁹³ Furthermore, such examples re-establish the irradiated skeleton as an aesthetic spectacle with communicative potential in different art forms. With the new surveillance technologies increasing the transparency of the body, making it legible as data and information, the irradiated body in popular imagery maintained its most naked state, without skin.

Another pertinent example of visual culture during the first body scanning decade is the Walt Disney Pictures film, *Pirates of the Caribbean: The Curse of the Black Pearl* (2003). The film tells the story of rogue pirates who stole Aztec gold coins from a treasure chest, learning later that the coins cursed each body with immortality to live with unfulfilled corporeal desires. At first the pirates look like normal flesh and blood; however, the moonlight reveals their sin of pocketing the contraband coins by turning their flesh into bone (Fig. 68). Until someone returns the last stolen gold coin, the materiality of the pirate crew remains in a wavering phantasmagorical state between surface and skeleton. In this condition, the pirates effectively appear vicious and more than capable of violent actions without mortal consequences. As long as they resist the surveillance of moonlight, they pretend to be human and perishable when confronting

⁹³ Marita Sturken and Lisa Cartwright, *Practices of Looking: An Introduction to Visual Culture* (New York: Oxford University Press, 2001), 46.

adversaries. In the daylight they conceal the deadly secret of their indestructibility, luring Commodore Norrington's naval crew to its demise.

The film's post-9/11 narrative positions the cursed pirate crew in the role of the terrorists, threatening the peace and safety of maritime borders, monitored by the white European local government. The Commodore's men, serving under the British territories, police the transference of goods, imprisoning smugglers and intimidating pirates with the noose. Towards the end of the film, the cursed pirates try to hijack the Commodore's ship to expand their reign of terror on the high seas. However, the moon becomes an unlikely ally to the Commodore. In place of the body scanner, it exposes the spectacle of the cursed pirates' deviance and criminality, becoming a disciplining mechanism that affects their behavior under the watchful governmental eye.

In the pivotal night scene, the Commodore's crew plans to ambush the pirates when they emerge from the cave. Through a telescope, the Commodore's men see two women in a rowboat float in open water. A cinematic close-up reveals that the women are two transvestite pirates holding parasols to shield the moonlight from uncovering their skeletal immortality (Fig 69a-b). The two Fraudeuses remark how they perform the role of the Trojan Horse in their sweetly feminine disguises. The transvestite pirates continue to hold the attention of the Commodore's men, distracting them from the surprise ambush of the skeletonized pirates. However, the gendered masquerade disintegrates when the Fraudeuses begin to fight each other on the boat. Without the parasols as a safeguard, the moon reveals their delinquency. Under this exposure, one of the

cursed pirates draws a gun that was hidden inside his dress and points it directly at the Commodore's telescope before shooting (Fig. 69c). Thus, the illusion of safety is broken for the naval crew and the final battle ensues.

The pirates adopt the historical role of the Fraudeuse because the old-fashioned feminine appearance can be a form of resistance in a policed space. To successfully perform as the Fraudeuse is to distract the policing authority with the sensation of safety and moral goodness, while concealing deviant intentions or contraband. Both the Fraudeuse and the transvestite share in deceptive exhibitionism, a characteristic that post-9/11 policing inscribes on terrorists who disguise themselves for the purpose of committing crimes. Without a home of representation, the terrorist is an *invisible enemy*, working covertly in an ordinary and presumably safe environment where the most damage can be done.

Furthermore, the invisible enemy is, as Carlos Sabino explains:

an enemy that cannot be defined or isolated in any way: there are powerful terrorist organizations, such as Al Qaeda or the Columbian FARC, but there are also small and medium-sized autonomous groups that can organize or dissolve with extreme ease. Even one lone individual, without any logistical support and using over the counter materials, can carry out unpredictable, terribly destructive attacks.⁹⁴

As a technological aid to see the unseen, the X-ray became one of the most important tools to expose this invisible enemy, by authenticating the suspicious body and the objects that it carries.

An important work of art that explores this authentication is *The Composite Man (I was eating pizza, 2006)* by Boston artist Diane Covert (Fig.

⁹⁴ Carlos Sabino, "The War against Terrorism: Invisible but Permanent 'Collateral Damage,'" *PanAm Post*, October 10, 2013, accessed on 6/7/2016, <https://panampost.com/carlos-sabino/2013/10/10/the-war-against-terrorism-invisible-but-permanent-collateral-damage/>.

70). *The Composite Man* appropriates ten X-ray negatives, discarded from two hospitals in Jerusalem. Each individual negative represents a corporeal injury to compose a life-size human form. Foreign bodies such as nails, pieces of watches, screws, scissors, nuts and bolts appear in opaque white throughout *The Composite Man*. However, these items were neither smuggled, nor would they necessarily be contraband if properly stowed on the body or in its pockets. These foreign bodies are the shrapnel blasted from suicide bombers' bodies.

Although these injuries were atypical in the United States in the first decade of the twenty-first century, Covert's work foreshadows the Boston Marathon attack in the spring of 2013, during which bystanders of the Marathon received shrapnel injuries from two exploded backpacks. Since terrorism is an invisible enemy, it has no borders to define itself. Thus, *The Composite Man* asserts a transnational identity inclusive of the United States. Covert's human figure, then, is not only an aggregate of different pictures but also identities.

The X-ray's vision of *The Composite Man* removes the distractions of surface gore to reveal a clean luminous anatomy that is both aesthetically beautiful and grotesque in content. In the absence of carnage, the X-ray authenticates the physical constitution of the terrorist victim with its material discrimination, recording the normal healthy parts of anatomy and its deviance of shattered bones and lethal objects. The observer can also socially discriminate which parts are indicative of the criminal and which ones are innocent. With these distinctions, the X-ray can capture a union that no traditionally-made photograph could. Highlighting the foreign bodies blasted from the body of the

terrorist into the body of the victim, Covert's portrait of the terrorist victim exhibits a spectacle of deviance that is the composite of both victim and terrorist. Even though the social discrimination manages to persist through the material discrimination, *The Composite Man* certainly challenges the archive's double system of representation.

The Composite Man, mounted life-size on a shiny glowing Durafilm panel, also reflects the observer in this composite terrorist-victim. Its surface visually integrates the observer, who is phenomenologically inseparable from the spectacle and becomes part of it. Despite this union, the observer still makes distinctions between his or her own body, which is whole, and *The Composite Man*'s broken irradiated body. As a spectacle of shared bodies, *The Composite Man* prefigured the next development in the history of body scanning.

On December 25, 2009, Umar Farouk Abdulmutallab, a Nigerian man, tried unsuccessfully to detonate explosives hidden in his undergarments, after having passed through the airport metal detector without suspicion and boarded a Northwest Airlines aircraft. Over the next two years, the TSA purchased several hundred more full body scanners for counterterrorism, installing them at most major airports to replace the standard metal detectors; thus, full body scanners became the primary screening method. Tighter airport security measures mandated that every individual had to choose either a physical pat-down search or a body scanner screening, regardless of any sign to suspect criminality. Despite the inconvenience, rumored nudity, and unconfirmed health risks, more individuals chose the body scanner over the pat-down, which would

have been more time-consuming and sensually invasive. In addition, the cultural climate had changed from previous screening methodologies, in that post-9/11 patriotism reflected not only a love of one's country but also asked individuals to become like soldiers, to sacrifice some individual freedoms for the security and safety of others. Reifying the fears of scientists in the 1990s, body scanning became routine.

After 2010, the body scanner partially collapsed the archive's double system of representation. Ordinary passengers—not just those profiled for criminality or considered outwardly suspicious or entering the U.S. from abroad—received a screening. With terrorism as the invisible enemy, anyone could potentially be a terrorist, so everyone became a suspect. Since most people chose the body scanner, every kind of person submitted to the stop and frisk pose and was exposed into a nude spectacle for the sight of TSA officers. However, some people, including some Muslims and individuals with non-normative bodies, were more likely subjected to secondary screenings, which consisted of the physical pat-downs. So in restructuring the X-ray archive of the criminal, the question was not if an individual would be screened, but how much and how invasively. The X-ray's spectacle of deviance became a subversive shared performance that stoked public outrage.

Additionally, civil liberties advocates and scientists argued that the health consequences were still ambiguous. Ralph Nader, who had voiced his concerns about airport X-ray machines at the end of the Inspectoscope era, challenged that the TSA was “delivering naked insecurity” with the backscatter X-ray

scanners and cited the Columbia University Center for Radiological Research's estimation that "with up to 1 billion whole-body X-ray scans per year in the U.S.—'may profoundly change the potential public health consequences to the population."⁹⁵

The TSA, however, pressured the manufacturer of the backscatter X-ray scanner, Rapiscan, to adjust its imaging settings to be less explicit. When they failed the request, the TSA announced in January 2013 that they were quietly pulling the backscatter X-ray scanners from airport security and replacing them with millimeter wave scanners, with a built-in software called Automatic Target Recognition (ATR), which reduced the nude spectacle to generic outlines of either man or woman, creating deviant androgyny. After the TSA officer discriminated the gender of an individual and selected either the male or female option on the scanner, the ATR discriminated the material of the scanned human using yellow boxes to highlight the locations of foreign bodies. Although the millimeter wave scanners detected deviance, with much of the same problems of attention and distraction brought by different kinds of foreign bodies, the new software eliminated the irradiated body spectacle.

⁹⁵ Ralph Nader, "TSA Is Delivering Naked Insecurity," *Common Dreams*, November 20, 2010, accessed 3/31/2015, <http://www.commondreams.org/views/2010/11/20/tsa-delivering-naked-insecurity>.

CONCLUSION

This history of policing by X-ray has shown that the deviant body achieves its spectacle from its relation to the normal. As a desirable aesthetic conception, the normative body is a disciplining entity that positions the deviant one to suspicion and punishment. In discussing the work of George Canguilhem, Michel Foucault explained:

the norm is not at all defined as a natural law but rather by the exacting and coercive role it can perform in the domains in which it is applied. The norm consequently lays claim to power. The norm is not simply and not even a principle of intelligibility; it is an element on the basis of which a certain exercise of power is founded and legitimized.⁹⁶

Contrary to other forms of photo-documentation, the X-ray detects and reveals deviance as a spectacle through its attention to foreign bodies. However, history has demonstrated that the material revelation itself is fraught with distractions, in which its legality and appropriateness requires further social discrimination.

Ever since Röntgen's discovery, the concept of policing bodies with X-rays has preoccupied public discussion and has inspired numerous inventions for use by the State. Visual culture has produced examples of the perpetual showdown between the phantasmagoria of the X-ray apparatus and the phantasmagoria of the policed body, which frequently depicted the Fraudeuse as the visage for the latter and a symbol of resistance. Although technology for X-ray imaging has changed, the traditional X-ray spectacle has maintained a prominent position in the imagination to convey the body biometrically policed and probed.

⁹⁶ Michel Foucault, *Abnormal: Lectures at the Collège de France, 1974-1975* (New York, NY: Picador, 2007), 49.

As of 2015, there is no more X-ray imaging of human bodies at airports by the TSA, but the backscatter X-ray scanners did not disappear entirely. U.S. state and local governments inherited hundreds of these scanners for their sheriff's offices, court houses, and penitentiaries.⁹⁷ The 2015 Super Bowl employed large scale versions of the backscatter X-ray scanner to check cargo for explosives. Border control along the U.S.-Mexico boundary has used similar apparatuses to detect any contraband in tractor trailers entering the United States. However, from time to time, the scanners detect the ghostly white shapes of people who come from countries like Guatemala, India, El Salvador, China, and Ecuador (Fig. 71). They are tightly smuggled in the cargo, in which they become contraband, the people themselves become actual, illegal foreign bodies. As long as these devices are still in use, the X-ray spectacle of deviance can continue, and this history is far from over.

⁹⁷ Eric Wustrow and Hovav Shacham, "Security Analysis of a Full-Body X-ray Scanner," (2014), accessed on 3/30/2015, https://www.youtube.com/watch?v=x_f4HUrN-NA.

CHAPTER 5

INSIDE/OUT: THE ART OF RESISTANCE

The representation of the human skeleton has held many meanings over the course of history. In Western art, the skeleton had been an ancient motif associated with the Christian idea of the *Vanitas*. *Vanitas*, as I described in Chapter 2, featured skeletons or skulls that cautioned against holding onto luxuries of earthly life under the scrutiny of the Last Judgement. Right before Röntgen's discovery in 1895, the skeleton was a popular motif in the visual arts, as seen in European Symbolist paintings, George Méliès trick films, and macabre attractions. During the fin de siècle, it signified a fetish with death—an enthusiasm for the end of the century and the beginning of another. Skeletons in the graphic art of the American press suspended the sense of order, hierarchy, and actuality, which conveyed a liberating sense of the carnivalesque in the vein of Rabelais (as theorized by Bakhtin). Röntgen's discovery intensified the demand for skeletons, and the irradiated body soon became associated with representations of the skeleton.¹

With the confluence of interest in X-rays, the perception of the skeleton changed. Skeletons were no longer subjects separate from the observer. In the

¹ In 1896, the University of Rochester's Juniors and Seniors convened around a physical skeleton for the oration to the "Bone Man," on the one hand, to give testament to the responsibility of Man for the ordering of the natural and animal kingdoms, and on the other, to pass on the skeleton from the graduating Senior class to the Junior class. Despite the purpose of this event, the association of the X-ray with the skeleton was so strong that the first speaker needed to explain, "In the first place, this is not a gathering for the purpose of experimenting with X-rays, as an object on the platform here would naturally lead you to suppose." "Class Day at the Music Hall," Clipping, 1896, Robert B. Pattison (UR Class of 1899) Student Scrapbook, University Archives, Department of Rare Books, Special Collections, and Preservation, River Campus Libraries, University of Rochester. See also "Mr. Pulitzer," *Town Topics*, April 23, 1896, 10-11, for the conversation regarding the increase of skeletons in the press during the X-ray craze.

era of X-rays, the fluoroscope enabled the observer to view and interact in real time with his or her own living skeleton. As the skeleton surfaced on the fluoroscope screen, the observer entered the osseous shadow through embodied perception. Thus, simulated skeletons in visual culture invited the observer to perceptually enter their topsy-turvy world, in which actuality could be turned upside-down and the body, inside-out.

One such simulation is the engraving, *Gran Calavera Eléctrica*, Figure 72, by Mexican graphic artist José Guadalupe Posada (1852-1913). The picture provides an allegorical narrative informed by the X-rayed body in which skeletons that rest underground and out of sight spectacularly rise to the surface with the aid of electricity. According to Patrick Frank, Posada made the engraving in 1903, a year that corresponded to Mexico City's new electric trolley that would pass through the Panteón Civil de Dolores, the city's largest cemetery.² The picture represents the interior of the cemetery, with a large skeleton deploying a magical X-ray vision to reveal the skeletons beneath the ground, causing those interred to stir and return its gaze. Within the cemetery's gates in the background is the new electric trolley full of skeletal tourists. Below Posada's picture is the announcement: "El primero de Noviembre, como diablos correran. Los eléctricos vagones que a Dolores llegarán," which states that on the Day of the Dead, "how the devils will run. The electric cars will arrive to Dolores."

Posada's publisher in Mexico City, Antonio Vanegas Arroyo, produced his broadside series of the Calaveras, or skeletons, between 1900 and 1919.

² Patrick Frank, *Posada's Broadsheets: Mexican Popular Imagery, 1890-1910* (Albuquerque: University of New Mexico Press, 1998), 190.

Jacques Lafaye and other scholars have contended that Posada's Calaveras were products of syncretism, an amalgamation of the Aztec tzompantli (a display of war captives' skulls) with the European Danse Macabre. Calaveras were visible in Mexican mourning rituals. Neither bones of the future nor reminders of impending death, Calaveras spoke to the bones of the past that were invigorated with life in the contemporaneous present on the Days of the Dead.³ Pictured as life in death, and death in life, the Calaveras resonated with the change of perception about the skeleton that the discovery of X-rays fueled. Therefore the skeleton had a recent history of representation that exposed the misdeeds of the government and those in power, and signified Mexico's social practices of mourning that rejected the disposability of the deceased, and instead empowered them with visibility. On track with the cities in the United States with prominent universities, Mexico City produced university lectures and distributed publications regarding X-ray research as early as 1896, so X-rays further compounded Mexico's rich significance of the skeleton.⁴

³ The Days of the Dead usually take place on November 1 and 2 of each year. November 1st is the day during which Mexicans mourn deceased children, the "Day of Little Angels," and the 2nd is when Mexicans mourn deceased adults-- the "Day of the Dead." These dates correspond to Christianity's All Saints Day (November 1st), during which Christians offer respect to those who have gone to heaven, and All Soul's Day—the day in which Christians pray for the souls who have not reached heaven. Those souls who have not yet reached heaven are most like and relatable to the living. Thus, the spiritual connection between the living and these less innocent souls is strong and is celebrated on the Day of the Dead, so that the path to heaven for them will be more palatable and joyous. In the twentieth and twenty-first century many Mexican families have celebrated the Day of the Dead for more than just one of two days. Some families choose to have individual rituals lasting as long as the whole week.

⁴ Gilberto Crespo y Martínez first delivered his paper on the discovery of X-rays and experimentation in 1896. He was a scientist and the eventual Mexican Ambassador to the United States. Gilberto Crespo Martínez and Agustín Barroso, *Datos para varios estudios, recogidos. Oficina tip. de la Secretaría de fomento*, 1899. On November 17, 1896, Dr. William Pepper of Philadelphia delivered his paper on medical X-rays to the University of Mexico City. William Pepper, "Skiagraphy in the Diagnosis of Aortic Aneurism," in *University Medical Magazine* (Gandy, NB: A.L. Hummel, 1897), 237. Later, E.R.N. Grigg has noted "in 1899, some demonstrations of X-rays were made to the students of physics in the University of Mexico City.

The indigenous poor made up the majority of Mexico's population, but they received little attention from their governing officials.⁵ Legislation passed under President Porfirio Díaz, who subjected the poor to modernization priorities that departed from cultural tradition, encouraged capitalism and trade with the United States, and brought in foreign ideas and tourists that fueled anxieties about these changes. Science and technology attracted Díaz's attention to expand the mining, transportation, and manufacturing capacities of Mexico.⁶

Posada's subject matter reflects indigenous anxiety about the Mexican government's modernizing efforts, misuse of the land, and a disregard for the familial bones of the past.⁷ From Posada's perspective, the construction and use of the trolley line disturbed those interred in Dolores, which included the graves of military and civic heroes as well as many paupers. The speed, electricity, size, and weight of the modern trolley were powerful sensual forces that distracted and disrupted the mourning rituals in the cemetery. So Posada rendered his "Electric Skeleton," "Great" in size, and bestowed upon it the powers of X-ray vision and vitalism, summoning the assistance of the deceased to become visible as an even greater spectacle than the trolley: *electrified* living skeletons. The electricity

The first Mexican physician known to have regularly utilized roentgen rays in medical practice was a certain Joffre (in 1900)...” E.R. N. Grigg, *The Trail of the Invisible Light, from X-Strahlen to Radio(bio)logy* (Springfield, Ill.: Thomas, 1965), 600.

⁵ In 1895, the urban poor comprised approximately 91% of the country of Mexico's population. Statistic provided in Patrick Frank, 168.

⁶ With Díaz's leadership, Mexico's capital developed from a “provincial city to a metropolitan center with many of the problems that we now associate with big-city life—crime, sanitation, corrupt officials, ghetto mentality”—which left many of the indigenous performing unskilled labor, in an urban climate with a currency devaluation and living costs rising. Ronnie C.Tyler, Library of Congress, Amon Carter Museum of Western Art, and Colorado Springs Fine Arts Center, *Posada's Mexico* (Washington, DC: Library of Congress, 1979), 22, 24.

⁷See Patrick Frank, Chapter Six, in *Posada's Broadsheets* (1998).

differentiated them from the usual figures of the Days of the Dead, which, until that broadside, had no association with electricity.

Posada's poetical text below the broadside's illustration explains that electricity will revive and invigorate the remains of the deceased in Dolores, although it does not explicitly identify the source of this electrical power. The trolley brings electricity to the cemetery, electrifying the grounds, but the image equally suggests the existence of an "aesthetic electricity" that passes between the eyes of the Great Electric Skeleton and those of its minions. Paul Gilmore has explained that early nineteenth-century understandings of electricity received aesthetic metaphors based upon how scientists and writers

simultaneously and variously conceived of [electricity] as a material fluid, as a spiritual medium, as a disembodied force, and these various conceptions supported considerations about the relationship between physical vitality and electricity, as it came to be seen as identical to or analogous with both the nervous fluid and life itself.⁸

Posada, expressing the perspective of the urban indigenous poor, captures a transition of perceptual engagement with electricity. On the one hand, electricity was still a foreign medium greeted with mistrust and resistance by the lower classes who did not fully understand how it worked, and therefore Posada gave it aesthetic treatment that exaggerated its operation. On the other, the broadside also calls upon observers to defiantly consume, embody, and empower themselves with electricity in response to Díaz's modernizing efforts. Posada's argument suggests that for the indigenous to get the attention of the

⁸ Paul Gilmore, *Aesthetic Materialism: Electricity and American Romanticism* (Stanford, CA: Stanford University Press, 2009), 6.

government, they must become electrical beings themselves. The reciprocating gazes between the Calaveras seem to engage in the dialogue, “the electricity in me recognizes the electricity in you.” Under the picture, Posada describes how the Calaveras will perform carnivalesque displays of lawlessness that prey upon the electricity on the Days of the Dead, citing well-known deceased bandits who will join the festivities at Dolores along with musicians playing electric music under electric lights.

Skeletons in visual media had moved before with the aid of optical toys and magic lantern slides, but not electrically until X-rays. Electricity was a sensual part of the early X-ray experience. It projected the flicker of light in the darkroom, crackling and popping, while it fueled the X-ray tube behind the fluoroscope and emitted the scent of ozone. After Posada’s engraving, the electrified skeleton appropriated the look of the X-rayed body in forms of graphic art such as hand-drawn animated cartoons and comic books where characters were electrocuted or near bolts of lightning.

Signifying the rituals and bones of the past, as well as the indigenous, people neglected by the Díaz presidency, the surfacing skeletons sought attention in the midst of an electrified and increasingly capitalistic Mexico. Their popularity garnered attention for revolutionary mischief, and in return, Posada’s Calaveras received political scrutiny though perhaps not enough to arrest their maker. Patrick Frank has noted, “some sheets by Posada probably stoked opposition to the Díaz regime, chiefly through glorification of outlaws and

criticism of the Europeanized elites.”⁹ He politicized such figurations to bring social legitimacy to the marginalized—which was an approach that became important for future American artists engaged with the politics of X-ray vision upon the body.

The X-ray, as in the case of *Gran Calavera Eléctrica*, can re-direct observers’ attention to culturally invisible bodies. Ever since Röntgen’s discovery, X-rays have reminded observers of the fallibility and limitations of human vision, which, when creatively appropriated in artistic simulations, have brought attention to the injustices of social minorities and the governing eyes upon their bodies.

Bryan Turner has contended, “what is ‘inside’ and ‘outside’ the body provides a language for discussing what is inside and outside the social.”¹⁰ X-rays can facilitate human vision’s seeing inside of the body, but they also pass through a space of disciplinary and ideological forces that shape knowledge and social normativity. Like X-rays, these forces are also invisible and, as many poststructuralist scholars have argued, have constructed the invisibility of the marginalized under the eyes of power. Artists have not only worked to expose the outside forces, but also to capture their effect on the psychological terrain through X-ray simulations of the interior body. As tools to capture what lies beyond human vision, X-ray vision, when appropriated artistically, can reveal cultural blind spots—so that what has resided outside of consciousness in social

⁹ Patrick Frank, *Posada’s Broadsheets: Mexican Popular Imagery, 1890-1910* (Albuquerque: University of New Mexico Press, 1998), 203.

¹⁰ Bryan S. Turner, *Regulating Bodies: Essays in Medical Sociology* (New York: Routledge, 2002), 165.

invisibility, can be brought to light as spectacle. This chapter presents an art-historical genealogy of the X-rayed body in the American imagination and the different ways X-rays have exposed the disciplinary forces at work upon social bodies as resistance to the construction of the normative.

The core of this artistic genealogy examines the phenomenology of the surface of different works made by specific minority artists who engaged with X-rays and the human figure. The histories of twentieth-century art have demonstrated that Modern and Postmodern artists experimented with the bringing of the insides of structures-- of dreams, modern civilization, the social body--out onto the surfaces of canvas and paper to different degrees of visibility. Some of these structures were overtly political, as seen in the works of José Guadalupe Posada, Diego Rivera, David Hammons, and David Wojnarowicz; whereas others were more subtle and cryptic, like Pavel Tchelitchew, Jasper Johns, and Jean-Michel Basquiat. I will show that simulations of X-ray vision of the body are congruous with the development of artistic interests in not just making the invisible visible, but bringing the inside-out as a means of political and social resistance.

At present, the scholarly discussions of X-rays and art have been limited to the early twentieth-century movements of Cubism, Dadaism, and Futurism. For example, the art historian Linda Dalrymple Henderson, in discussing the Fourth Dimension's influence on the artists of these movements, rightfully includes X-rays as one of the many manifestations of such influence, particularly as it relates to cultural preoccupations with the technologies of the

invisible.⁶ However, early modernist artists did not engage with the revelation of the body's interior; they were interested in the X-ray's ability to pass-through material rather than the vision of seeing-inside it. Passing or seeing-through is not a political act; it does not imply the crossing from a public to private space as a means to gather information of that concealed space. Therefore, this chapter engages with a new set of constraints through which to examine the influence of X-rays in art history by focusing specifically on artists that politicized the human skeleton in simulated form.

Artistic simulations vary in meaning and method, presenting a challenge in terms of making appropriate attributions to X-rays. Many artists do not simply make a direct copy of an X-ray image in paint or ink. Rather, the resulting works visually re-interpret X-rayed bodies and fortify them with a variety of stylistic and social influences. Sometimes the influences mute or neutralize the skeleton's frequent association with death, whereas at other times, such influences augment the skeleton with many meanings, among them an engagement with X-rays and references to fears of mortality. This chapter reaffirms one of the important assertions from my introduction: that after the discovery of X-rays, the visual representations of the skeleton grew profoundly more complex in meaning beyond a direct or conventional metaphorical association with death.

My approach considers works of artistic simulation of the X-rayed body with the contextualization of movements in art history and American history to help frame artistic intent and the means through which art becomes a form of resistance. The seeds of this narrative begin with early twentieth-century Latin

American artists who engaged in global politics and critiques of capitalism. These ideas and concepts transfer into the United States in the early 1930s. Moving through Surrealism and into Modern and Postmodern art, the narrative increasingly becomes situated within the United States, where African-American artists and Queer artists engage with the aesthetics and simulations of X-rays to respond to their cultural invisibility.

THE “SUPERIOR REVOLT OF THE MIND”

Posada’s surfacing skeletons would not capture attention in America until decades later, in the 1930s, when André Breton praised his work as a precursor for and demonstration of Surrealist “black humor.”¹¹ In the 1930s, the X-rayed body appeared more strongly as a subject for artistic inquiry through international art exhibits that featured both Posada’s work and the integration of scientific images that included X-ray photographs. The Harvard Society of Contemporary Art offered two significant exhibitions in 1930: *Modern Mexican Art* (March-April 1930) and the *Memorial Show* (November-December 1930), which travelled from Cambridge to the Wadsworth Atheneum. According to Eugene R. Gaddis, “Mexico was becoming a haunt of adventurous Americans for its radical political climate and creative forces—a volatile mix of Mayan, Toltec, Aztec, Spanish, and nationalistic traditions.”¹² The *Mexican* exhibit represented Posada and

¹¹ In 1937, André Breton, writer of the *First Surrealist Manifesto* (1924), praised Posada’s engravings of the Calaveras as examples that influenced Surrealist “black humor.” Ilan Stavans, *The Riddle of Cantinflas: Essays on Hispanic Popular Culture* (Albuquerque: University of New Mexico Press, 2012), 145.

¹² Eugene R. Gaddis, *Magician of the Modern: Chick Austin and the Transformation of the Arts in America* (New York: Knopf Doubleday Publishing Group, 2011), 140.

contemporary painters who were influenced by him, including Diego Rivera and José Clemente Orozco. This section will introduce Surrealist aesthetics and later explore the work of Rivera and his appropriation of the X-rayed body as a visual trope of Marxist critique and political revolution.

The *Memorial Show* explored photography as a fine art form and featured works by sixteen international photographers, including Eugène Atget (in only his third U.S. exhibit), Edward Weston, Margaret Bourke-White, Alfred Stieglitz, Paul Strand, and Tina Modotti, with the addition of imaging made for scientific purposes, such as X-ray, astronomical, and serial photographs. The presentation of X-ray photographs received the attention of the press, with titles such as “A Bony Tumor Within the Frontal Sinus” and “Skull Fractured by Baseball,” and functioned not to contrast the works made in the service of art, but rather to engage them in a discussion of aesthetics. A. Everett Austin Jr., director of the Wadsworth Atheneum, argued, “...the X-ray photographs of portions of the frame of the human body can yield abstract designs of great sensitivity and delicate modulation.”¹³ This photography exhibit expanded the terrain of the “super-realist,” also known as “Surrealist,” art movement, and Austin’s words verified a new interest in looking within the human body for aesthetic investigation into the design of the skeletal form.

Making the invisible visible preoccupied the art movements of Cubism and Futurism, but with Surrealism, this visibility emerged with a new view of the human form. Contrary to reducing the figure to line, shapes, and planes, as a subject for the X-ray to pass through, Surrealists began to explore the spectacle

¹³ “Fine Art Quality In Photographs,” *Hartford Daily Times*, December 13, 1930, 3.

of seeing-inside the body as a psychological revelation by bringing to the surface figments of dreams, visualizations of the unseen in science, and suppressed ideas of the mind. This turning of the invisible inside-out was a form of “black humor,” according to André Breton, who, using Freudian terms, explained it as the ego’s rebellion against the parental watch of the mind’s *super-ego*, which kept the ego in-check with cultural rules. In his *Anthology of Black Humor* (1940), Breton quoted Sigmund Freud’s *Jokes and Their Relation to the Unconscious* (1905):

The sublime is obviously related to the triumph of narcissism, with the invulnerability of the ego victoriously asserting itself. The ego refuses to be undermined, to let external reality impose suffering on it... The hostility of the hypermoral superego toward the ego is thus transferred to the utterly amoral id and gives its destructive tendencies free rein.¹⁴

Synthesizing Freud, Breton postulated that black humor was the “superior revolt of the mind” that countered the effects of the policing moral center of the individual. Recently introduced to Posada’s work in the 1930s, Breton positioned Posada as a significant artist of black humor, so that his woodcuts of skeletons became representations of the victorious ego of the body politic.¹⁵

The Surrealist art movement embraced black humor as a component of its emphasis on “pure psychic automatism, by which it is intended to express, either verbally or in writing, the true function of thought. Thought dictated in the absence of all control exerted by reason, and outside all aesthetic or moral

¹⁴ André Breton and Mark Polizzotti, *Anthology of Black Humor* (San Francisco: City Lights Books, 1997), xviii.

¹⁵ Ibid.

preoccupations.”¹⁶ Looking beneath the surface, Surrealists constructed visualizations that could not be detected by human perception, entering into the mental terrain of dreams and repressed desires. Scientific technologies of the invisible, including X-rays and microscopy, inspired anatomical forms in a variety of works as an emancipation from the restrictions of human perception and the human body itself.

In the 1930s, X-ray simulations began to appear in the work of Diego Rivera (1886-1957) with his Detroit Industry murals (1932-1933), when he incorporated an X-ray image of a brain in a human skull in the Surgery section on the South Wall at the Detroit Institute of Art. Born in Mexico, many years after Posada, Rivera worked on commissions in the United States in the 1930s. Modern medicine achieved through technological innovation figured prominently in his pictures, in the form of enlarged microscopic cells, surgical procedures, exaggerated anatomical figures, and medical apparatuses.¹⁷

Rivera’s politics were complex because he was a member of the Communist Party of Mexico but nonetheless accepted commissions in the industrial centers of the United States, including Detroit and New York City. By the 1930s, the Communist Party had ex-communicated him for being opportunistic. In analyzing Rivera’s paintings, David Lomas captured this complexity by arguing, on the one hand, the technological innovations linked to the scientific management of the industrial workplace and subjugated the worker.

¹⁶ Breton’s definition of Surrealism “The First Surrealist Manifesto” (1924). André Breton *Manifestoes of Surrealism* (University of Michigan Press, 1969), 26.

¹⁷ See Amy Pastan, *Diego Rivera: The Detroit Industry Murals* (London: Scala, 2006). David Lomas, “Remedy or Poison? Diego Rivera, Medicine and Technology,” *Oxford Art Journal* 30, no. 3 (2007): 456–83.

On the other, Rivera followed the rhetoric of Marxist theorist Leon Trotsky, who asserted that technology could be “the fundamental condition for the emancipation of the exploited.”¹⁸ Furthermore, according to Lomas, Rivera’s work expressed the “dual nature of technology in its proclivity for either good or evil.”¹⁹ Rivera integrated optics like microscopy, X-rays, and the phantasmagorical revelation of the workers behind capitalist production in his work. By offering a glimpse at the realms unseen by unaided human vision in his *Detroit Industry* murals, Rivera positioned the observer to also look beneath the phantasmagoria of corporate industry, not unlike a living human organism, to reveal its circuitry and the proletarian workers who make the products that a capitalist culture cloaks in invisibility.

Rivera did not publicly identify as a Surrealist, but became associated with the movement through his close association with Breton in their co-signed *Manifesto for an Independent Revolutionary Art* (1938), believed to have been co-authored by Trotsky, and Rivera’s participation in the Fourth International Surrealist Exhibition in Mexico (1940).²⁰ The *Manifesto* argued that the role of art should free the mind and display autonomous formations as a revolution against growing fascism around the world. It criticized Hitler’s and Stalin’s policing regimes, which deprived artists of their liberty and controlled their intellectual

¹⁸ Cited in David Lomas, “Remedy or Poison? Diego Rivera, Medicine and Technology,” *Oxford Art Journal* 30, no. 3 (2007): 462.

¹⁹ Lomas, *Ibid.*

²⁰ Scholars believe that Leon Trotsky and André Breton wrote the *Manifesto for an Independent Revolutionary Art* but, because of Trotsky’s vulnerable position in exile, Diego Rivera signed in Trotsky’s place. In addition to signing the document, audio recordings captured Rivera reading the *Manifesto*. Juan Coronel Rivera, Fausto Ramirez, William H. Robinson, Dawn Ades, and Paul Karlstrom, *Diego Rivera: Art & Revolution* (Mexico: Conaculta, 1999), 315.

pursuits.²¹ “True art,” the *Manifesto* proclaimed, should not conform to standards set in place by totalitarian leaders. As the principle signees on the *Manifesto*, Breton and Rivera called upon artists to begin the “process of sublimation,” or the recovering of civility, through artistic and spiritual value in creativity, which:

tries to restore the broken equilibrium between the integral ‘ego’ and the outside elements it rejects. This restoration works to the advantage of the ‘ideal of self’, which marshals against the unbearable present reality all those powers of the interior world, of the ‘id’, which are common to all men and which are constantly flowering and developing. The need for emancipation felt by the individual spirit has only to follow its natural course to be led to mingle its stream with this primeval necessity –the need for the emancipation of man.²²

In other words, true art must express the interior needs at the core of mankind without external restrictions curtailing content and style. The Surrealist preoccupations with psychoanalysis and revolution integrated well with the Marxist optical metaphors, and I suggest that these factors can aid in the readings of Rivera’s X-ray simulations and his scientific imagery.

One critical example is Rivera’s *Man, Controller of the Universe* (1933-1934), which began as a mural in Rockefeller Center’s Radio Corporation of America (RCA) for Nelson Rockefeller’s commissioned theme “New Frontiers” (Fig. 73a). Rockefeller’s conditions for the work included the requirement that it be painted on canvas in black, gray, and white hues.²³ Rivera gained approval for installing a mural, instead of a canvas, and successfully advocated for the use of a full color palette. However, due to the highly-charged political depictions

²¹ André Breton and Diego Rivera, “Manifesto: Towards a Free Revolutionary Art,” *Partisan Review* 6, no. 1 (Fall 1938): 50-51.

²² Ibid.

²³ Lucienne Bloch, “On Location With Diego Rivera,” *Art in America*, February 1986, 106.

within the fresco, such as a representation of Lenin, Rockefeller destroyed the mural before its completion. The unfinished painting only contained what would become the central section: *Man at the Crossroads*. Following its destruction in New York, Rivera re-painted it in a smaller scale at the Palacio de Bellas Artes in Mexico City, where it remains today. Its completion extended the Rockefeller version's composition on both sides of the central section and fully realized the ideas conceived by Rivera about America's present and future, during a time of capitalist innovation, economic depression, and the proletarian Popular Front.

The painting consists of a human figure, a workman of the proletariat, at the center of a vast pictorial landscape working industrial controls. Extending from the workman are two "elongated ellipses," as Rivera called them, intersecting behind him in an X-shape, sectioning the space of the landscape. Each ellipse contains scientific imagery: microscopy of cells and tissues, telescropy of the sun, moon, and star galaxies. These views both reach into the depths of an organism, the microcosm, and extend far past it into astronomical space, the macrocosm. Drawing from Surrealism's black humor, Rivera configured some forms in the ellipses as revolutionary symbols, such as a hammer and sickle in the macrocosm, and diseased cells in the microcosm intentionally near the face of Rockefeller.

On each side of the worker is a convex lens, which bears an association to the magnified scientific images behind the worker that result from the glass. Rivera described the rest as follows:

Above the germinating soil at the bottom, I projected two visions of civilization, On the left of the crossed ellipses, I showed a night-club

scene of the debauched rich, a battlefield with men in the holocaust of war, and unemployed workers in a demonstration being clubbed by the police. On the right, I painted corresponding scenes of life in a socialist country: a May Day demonstration of marching, singing workers; an athletic stadium filled with girls exercising their bodies; and a figure of Lenin, symbolically clasping the hands of a black American and a white Russian soldier and workers, as allies of the future.²⁴

Beyond the lenses are divided planes, with the top two sections on each side at war with one another. On each side, a colossus stands below the wall of each warring party, the left side contains the Roman god Jupiter wearing a Christian crucifix, with his hands missing and thereby not gripping his thunderbolt, and the right side contains a decapitated Julius Caesar bearing a swastika. Each leader has suffered defeat, leaving two more planes of people below them who do not make war but rather sit quietly in contemplation, directing their attention to the lens in their respective territory. Rivera planned to call the left side *The Frontier of Ethical Evolution*, and the right side *The Frontier of Material Development*, with *Man at the Crossroads* in the center.²⁵

Scholars have attributed the left side to the representation of capitalism, and the right side, communism, with *Man at the Crossroads* navigating through forces of capitalism and communism in the topography's restless social fabric. Robert Linsley contends that the right side of the mural communicates the positive messages of communism, containing Rivera's warm sentiments toward Marxist leaders and his friendship with Trotsky, and the left--negative, with

²⁴ Brian Greenberg, Linda S. Watts, Richard A. Greenwald, Gordon Reavley, Alice L. George, Scott Beekman, Cecelia Bucki, et al. *Social History of the United States* (Santa Barbara, CA: ABC-CLIO, 2008), 325.

²⁵ Dario Gamboni, *The Destruction of Art: Iconoclasm and Vandalism Since the French Revolution* (London: Reaktion Books, 1997), 142.

signifiers of a capitalist society.²⁶ However, interpreting the painting as favorable versus unfavorable ignores the lower left corner, which has indicators of an ethnically diverse educated audience and more visual allusions to science, including Charles Darwin next to a man of color behind the X-ray fluoroscope and a woman of color having a mammogram.

Published just before Rivera's work on the mural, a letter written by Russian socialist Pavel Axelrod, collected by Trotsky during Rivera's mural project, resonates with this scene:

If there is no god, creator of the universe—and praise be to him, that he does not exist, for at least we can cut off the heads of Tsars, but wouldn't be able to do anything against a despotic Jehovah---then let us prepare the way for the appearance of a breed of earthly gods, beings with all-powerful reason and will, who enjoy both consciousness and self-consciousness, and are capable of embracing the world and ruling it by means of thought—here in the psychological basis of all my spiritual and social yearnings, designs, and actions...At the beginning of the seventies I drew nourishment for this, my 'faith' in Darwinism.²⁷

The excerpt specifically mentions “Tsar,” a term applied to former Russian emperors and corresponds to the Latin form of “Caesar,” and “Jehovah,” a Christian form of the Roman god Jupiter—who the Bible also portrays with arrows made of lightning. Below the destruction of the ancient dictator and God, Rivera's people in both capitalistic and socialistic societies represent the “earthly gods” of a new enlightenment, who are educated in science, nature, and industry, and rule by intellect. In particular, capitalist and the proposed

²⁶ Robert Linsley, “Utopia Will Not Be Televised: Rivera at Rockefeller Center,” *Oxford Art Journal* 17, no. 2 (1994): 59-60.

²⁷ Philip Pomper, *Trotsky's Notebooks, 1933-1935: Writings of Lenin, Dialectics and Evolutionism* (New York: Columbia University Press, 1998), 47. The original clipping was written by Pavel Axelrod in a letter dated February 16, 1898. According to Pomper: “Trotsky also often kept excerpts from other writers among his own notes.”

communist education systems shared the freedom to pursue knowledge without the state policing content. Individuals from both societies look into the lenses like engaged viewers of the cinema, and in the future, television.

Rivera depicts knowledge as a method of resistance (Fig. 73b). Compositionally, on each side, the leaders of the “earthly gods” stand in relation to emblems that represent the fruits of their intellect. The capitalist vision depicts young students listening to a lecture by their professor, who, according to Bloch, Rivera modeled after his future biographer Bertram Wolfe.²⁸ Just past the students, Darwin points to a monkey that grasps the hand of a naked child. Symbols of eighteenth-century anthropologist Petrus Camper’s work also appear in this corner, with the child, parrot, cat, and fish aquarium—all of which resonate with his 1778 lecture: “On the Points of Similarity between the Human Species, Quadrupeds, Birds, and Fish; with Rules for Drawing, founded on this Similarity.” According to Rivera, “Below [Jupiter], the Man of Science presents the scale of Natural Evolution, the understanding of which replaces the Superstitions of the past.”²⁹ Philip Pomper has revealed that Darwin’s theory of natural selection played a positive role in Trotsky’s Marxist dialectics, the study of life and its structural order as fluid, moving, and in perpetual change. Trotsky asserted, “Darwin stood for me like a mighty doorkeeper at the entrance to the temple of the universe.”³⁰

²⁸ Lucienne Bloch, “On Location With Diego Rivera,” *Art in America*, February 1986, 115.

²⁹ Bertram David Wolfe, *Diego Rivera, His Life and Times* (New York: Alfred A. Knopf, 1943), 358.

³⁰ Philip Pomper, *Trotsky’s Notebooks, 1933-1935: Writings of Lenin, Dialectics and Evolutionism* (New York: Columbia University Press, 1998), 46.

Rivera positions Darwin next to the X-ray fluoroscope machine, an elaborate technological gateway at the foot of the defeated colossus that significantly opens up a new frontier of corporeal knowledge—the spectacle of the body's inside. Despite the observers gazing into the large lenses, the fluoroscope depicts the only actual screen in the entire mural. According to Susana Pliego Quijano, Rivera researched X-ray technology at a laboratory in New York and photographed X-ray apparatuses as a guide for this work as well as his future mural entitled *Modern Medicine* (1935) for the University of California San Francisco Medical School.³¹ The fluoroscope focuses specifically on the head of the individual, likely in reference to the thematic guideline: "Today our frontiers are of a different kind... Man cannot move on. He has to solve them on his own lot. The development of civilization is no longer lateral—it is inward and upward. It is the cultivation of Man's soul and mind, the coming into a fuller comprehension of the meaning and mystery of life."³² The inwardness and upwardness speaks to the central cross-section of the mural, whereas the "cultivation of Man's soul and mind" is located in the bottom left and right corners.

Importantly, in the midst of the capitalist terrain, the X-ray fluoroscope screen directs the observer's attention towards an optical metaphor. As Tom Gunning has noted, Marxist theorists frequently used optical metaphors for demonstrating "false consciousness," or the inability to recognize the oppressive

³¹ Susana Pliego Quijano and Hilda Trujillo Soto, *Man at the Crossroads: Diego Rivera's Mural at Rockefeller Center* (Mexico City: Trilce Ediciones, 2015), 82.

³² Lucienne Bloch, "On Location With Diego Rivera," *Art in America*, February 1986, 107.

forces under capitalism.³³ The superstructures of cultural and governing institutions encourage ideologies that perpetuate this false consciousness, covering up the real means of production, the base structure, including the worker and raw materials. In 1932, Trotsky uses the metaphor of the X-ray to expose the blindspots caused by false consciousness, and as a means to correct it:

...he will no longer be dependent on the laws of the market, that is, on the blind and obscure forces which work behind his back. He will build his economy freely, according to plan, with compass in hand. This time it is a question of subjecting the anatomy of society to the X-ray through and through, of disclosing all its secrets and subjecting all its functions to the reason and will of collective humanity.³⁴

Following Trotsky's logic, Rivera's incorporation of the X-ray fluoroscope should be read as an optical metaphor for the Marxist uncovering of the base structure behind the superstructure in its most authentic and purest form, down to the bone. Contrary to Rivera's lenses that magnify the hopes and diseases of two different social terrains, the X-ray authenticates as a means to reveal for the educated audience the trueness of social structures. In the midst of the left side's terrain of "ethical evolution," Rivera positions the X-ray image next to Darwin, above the educated audience and the animals in the bottom left corner of the picture. The irradiated skull represents the importance of true, authentic intellect belonging to the new "earthly gods."

³³ Tom Gunning, "Illusions of the Past and Future: The Phantasmagoria and Its Specters," *Media History*, 2004, 8, Accessed 6/4/2016,

<http://www.mediaarthistory.org/refresh/Programmatic%20key%20texts/pdfs/Gunning.pdf>.

³⁴ Leon Trotsky, "In Defense of October," Copenhagen, Denmark, November 1932, accessed on 6/28/2015, <https://www.marxists.org/archive/trotsky/1932/11/oct.htm>.

On the side of “ethical evolution,” Rivera portrays the sitting students and monkey in profile, not only mirroring the profile in the X-ray fluoroscope, but also the profiles of diverse ethnic figures that Petrus Camper rendered through “facial angles.” Camper designed a scale of human facial angles between 70 and 80 degrees to identify ideal beauty and its deviations, based upon Greco-Roman sculpture, with Europeans measuring closest to the ideal followed by Asians and Africans. Rivera disorders the digression set by Camper by rearranging different ethnicities in their seated positions. Emulating the profiles of the student audience, the X-ray image bears the message that evolutionary life bonds in skeletal form, uniting the diverse audience into one collective mind. Furthermore, the man standing behind the fluoroscope screen is not of European descent, but a man of color, a man of a socially marginalized group. Rivera chooses a person of color to stand behind the fluoroscope screen to perform a universalizing function by revealing an essential humanity beneath the surface traits of race.

The left corner’s composition correlates to the right side of the painting. Rivera positioned the X-ray image framed with Darwin and mammography in front of “a violent demonstration [that] took place on Wall Street in desperate response to the conditions of the Depression,” showing the proletariat engaged in civil disobedience and under police brutality.³⁵ The right side also shows civil unrest, but behind the scene are figures of Engels, Trotsky, and Marx holding a red banner that reads “Workers of the World Unite in the IV International!,” translated into Russian and Spanish. During the time of Rivera’s mural production, the Fourth International was only in process and would be officially

³⁵ Lucienne Bloch, “On Location With Diego Rivera,” *Art in America*, February 1986, 115.

declared in 1938. Spearheaded under Trotsky, the Fourth International argued that capitalist structures had deteriorated, and as a consequence had led the proletariat to “pauperism,” demanding “employment and decent living conditions for all.”³⁶ Within the terrain of “Material Development,” a companion to the immateriality of education on the left side, Rivera positions workers in the foreground in front of the banner to signify their importance for the Marxist theorists standing behind it.

The relationship between the X-ray image and the banner is not one of contrast, but congruity to an assertion of liberty. The liberties of the mind and the worker are the hopeful support points in civilization’s unrest, bringing a sense of equilibrium. The composition of the ellipses visually constructs the cross, the X, which does not represent concrete warring sides but rather a dialectical fluidity of influences in balance—directly pointing between the old oppressive gods and the new earthly-educated ones of civilization’s forthcoming frontier.

Although the *Manifesto for an Independent Revolutionary Art* had not yet been drafted, Rivera demonstrated from the beginning that “art should not conform” to social rules and, like the central figure in his mural, needed emancipation from the outside forces that aimed to govern his process. *Man, Controller of the Universe* was Rivera’s own declaration of independence, ignoring restrictions to his art and integrating what he envisioned as the confluence of global social and political ideas confronting the future of the middle-class American worker. At the same time, he designed the mural to

³⁶ Leon Trotsky, “The Death Agony of Capitalism and the Tasks of the Fourth International,” 1938, accessed on 6/27/2015, <https://www.marxists.org/archive/trotsky/1938/tp/tp-text.htm#op>.

meet the inspection of the capitalist guardians of culture. His portrayal of scientific imagery exercises no restraint in demonstrating the revolt of the mind, especially in the terrain of capitalism with the simulated X-rayed head.

X-RAY PARANOIA

As Surrealism progressed through the 1930s and 1940s, simulating the X-rayed body spectacle continued as a subject in painting as the spectacle of looking inside consciousness itself. Argentinian painter, Juan Batlle Planas created a series entitled *Radiografía paranoica (Paranoid X-rays)* (1930s-1940s). His paintings displayed skeletons framed inside of a psychological terrain, often tangled with lines and symbols that linked the human figure to submissiveness and victims of violence. Other Surrealist artists, who sought visually to portray the surfacing and transitioning of consciousness, sometimes appropriated the X-ray's phantasmagorical aesthetic that depicted corporeal fading and materialization. Salvador Dalí painted *The Horseman of Death* (1935) drawing from the X-ray's aesthetic (Fig. 74). The painting features the transition of the Horseman figure and his horse into bone, set in a fantastical landscape. The rider and the horse share flesh and bone through Dalí's duality of lights and shadows, in which the uncovered ribcage of the rider corresponds to the flesh-covered one of the horse, the rider maintains flesh on his leg whereas the horse primarily walks on skeletal columns. Dalí's treatment of light and shadow creates visual confusion over the materiality, dimension, and weight of his two figures seemingly transformed by the observer's X-ray vision, in which the skeletons surface and fade.

During this time, Dalí developed his Surrealist methodology of “paranoia-criticism,” which expanded upon his idea that images could exhibit a duality of associations, or double-image, through the perception of the observer, who would see one representation become another. Dalí understood “paranoia” to be “reasoning madness” rather than fears of persecution, and conceived of his method as “systematized confusion.”³⁷ He described paranoia-criticism as a “spontaneous method of irrational knowledge based on the interpretative-critical association of delirious phenomena.”³⁸ With this method, the visibility of forms corresponded to the surfacing of consciousness, in which one perceived subject became another through psychological mediation of one conscious form being repressed so that another will surface in consciousness.

As a result, Surrealist works that employed this methodology generated multiple interpretations that depended upon the sequencing of the observer’s consciousness. Paranoia-criticism continued the Surrealist preoccupation with political revolution through its perceptual configuration of irrationality, which overturned order and logic, disempowering the observer to identify the contents of the pictured landscape. André Breton praised Dalí’s method, saying that it was an instrument of primary importance and that it “has shown itself capable of being applied to painting, poetry, the cinema, the construction of Surrealist

³⁷ R. Bruce Elder, *DADA, Surrealism, and the Cinematic Effect* (Waterloo, Ontario: Wilfrid Laurier University Press, 2013), 352-353, 360.

³⁸ Ibid, 351.

objects, fashion, sculpture, the history of art, and even, if necessary, all manner of exegesis.”³⁹

This section explores Russian-American artist Pavel Tchelitchew, who, as R. Bruce Elder has argued, engaged with paranoia-criticism in his paintings and incorporated the X-rayed body in his figurative compositions.⁴⁰ Tchelitchew fled Russia around 1918, at the commencement of the Russian civil war, and traveled to different European cities, where he painted canvases and designed theatrical stages for ballet productions. In 1930, he exhibited his drawings at the new Museum of Modern Art, and by 1934, he immigrated to New York City. His work appeared in *The View*, an art journal that encouraged experimental Surrealism in America unauthorized by Breton. During this time, Tchelitchew formed what would become a long-lasting romantic partnership with the *View*’s co-editor Charles Henri Ford. With sodomy laws in place that criminalized homosexual relations, Tchelitchew was a member of an under-recognized group of American and European gay artists, and was progressively ostracized during the 1940s.⁴¹ This underexposure may have resulted from André Breton’s lack of support, who abhorred male flamboyance and homosexual behavior, excluding Tchelitchew from his immediate circle of Surrealists.⁴²

Over the course of his life, Tchelitchew had a number of repetitive medical conditions, such as pneumonia and heart disease, which required him to be X-

³⁹ Andre Breton, “What Is Surrealism?,” June 1, 1934, accessed on 6/4/2016, <http://home.wlv.ac.uk/~fa1871/whatsurr.html>

⁴⁰ R. Bruce Elder, *DADA, Surrealism, and the Cinematic Effect* (Waterloo, Ontario: Wilfrid Laurier Univ. Press, 2013), 350.

⁴¹ Michael Duncan, *Pavel Tchelitchew: The Landscape of the Body* (Katonah, New York: Katonah Museum of Art, 1998), 14.

⁴² Ibid, 12.

rayed on a routine basis. According to his biographer and former associate, Parker Tyler, Tchelitchew suffered from actual paranoia when he posed for X-ray images because they could reveal serious pathological illnesses inside him.⁴³ While the medical X-ray image recorded what was wrong and abnormal with his health, the irradiated body in his paintings frequently took on the role of the surveyor of social deviances and marginalized bodies. Drawing from his anxieties regarding what the medical X-ray exposed, his approach to paranoia-criticism expanded upon Dalí's visual confusion and doubling to evoke the senses of fear and dread of revelation. X-ray imagery began to appear in Tchelitchew's work towards the end of the 1930s, in which the irradiated body belonged to the surveyor, policing the social deviants in his paintings' landscapes.

Phenomena (1936-1938) depicts a landscape with deformed, disabled, unclothed, and poor people in a carnivalesque display out in the open on a beach (Fig. 75). These people with non-normative bodies leisurely unwind and socialize in this liminal space, isolated and secluded from an unchiseled rocky terrain on the left and a finished polished capitalist city on the right. Tchelitchew represents them under the warm glow of a rainbow lens, as he once told his art dealer, "My dear friends are freaks... And freaks are beautiful people."⁴⁴ The beautiful colors lure the observer into the landscape of anatomical grotesques. Above them all, peering from the capitalist side, is an X-rayed human skull in the clouds. Here, Tchelitchew locates the paranoia-criticism in the irradiated skull-cloud that watches over the marginalized, creating a maddening fear that persecution will

⁴³ Parker Tyler, *The Divine Comedy of Pavel Tchelitchew: A Biography*, London: Weidenfeld & Nicolson, 1969), 71-72, 74, 82-83.

⁴⁴ Ibid, 387.

follow their hedonist activities. Unlike the irradiated skull in Rivera's work, which I argued represented a positive device to reveal the structures of capitalism and the revolt of the mind, Tchelitchew's version is menacing with ambiguous moody clouds that camouflage its presence. He integrates the X-rayed skull as a disciplinary symbol—which could be read as a *Vanitas*' critique of capitalism, or even as a skeletal policeman who watches over those reveling in marginality.

Tchelitchew continued to integrate the irradiated body and paranoia-criticism in his subsequent paintings. In Vermont during 1942, Tchelitchew produced *Hide-and-Seek*, which became his “most popular painting” at MOMA (Fig. 76).⁴⁵ The painting depicts the children’s game of hide-and-seek with a tree shaped, in the style of the *Rubin vase*, by large children’s heads that characterize a metamorphosis of time and space, with the left profile manifesting birth and Summer, and the right, death and Winter.⁴⁶ Like the irradiated skull in *Phenomena* that surveyed social deviancy, Winter’s irradiated child is one of the primary watchers in this game. Tchelitchew renders Winter with X-ray translucency, his left hand showing the revelation of bones that mirror the extensions of fingers, his vertebrae has the X-ray’s phantasmagorical softness, and his right arm outlines an interior skeletal structure. The blue hues in Winter’s face that suggest the osseous eye socket and cheek bone become, through paranoia-criticism, another child wearing a blindfold playing a game with a child hiding in Winter’s ear. Yet the paranoia-criticism extends into the more

⁴⁵ According to MOMA’s caption on the museum wall text: “Although Tchelitchew is an unfamiliar name to many today, in 1970 a critic described *Hide-and-Seek* as ‘by far’ the Museum’s ‘most popular painting,’” June 2015.

⁴⁶ The Rubin Vase is an optical illusion of figure ground reversals. The positive space may look like a vase, whereas the negative space will reverse the image to show two facial profiles.

subversive sexual elements in the painting, through which the tree contains both male and female genitalia, so that the tree's erect phallus penetrates the girl with her legs widespread and her dress doubles as a reddened and exposed rear.⁴⁷ Framed by the skeletal rendering of Winter, watching and gaping at this act of sodomy, Tchelitchew's *Hide-and-Seek* is a game of policing socially-constructed conditions of unnatural sexuality that the shifting perceptual landscape of paranoia-criticism complicates. Contrary to *Phenomena*'s policing skull-cloud, Winter's interior anatomy becomes the subject for the observer's scrutiny, containing the revelation of a grossly-exaggerated humerous bone as an elusive homoerotic pun that augments Tchelitchew's resistance toward watchful governing authorities.

Following *Hide-and-Seek*, Tchelitchew's art explored more exclusively the aesthetics of the irradiated body. In his series of "Interior Landscapes," Tchelitchew returned his attention to the X-rayed skull and continued with the method of paranoia-criticism by conceiving of the inner dimensions of the body as topography, in which veins and hair doubled as roots and trees, cavities doubled as cavernous places filled with water and air. Each and every head held a pair of eyes without their lids, wide-open, full, and glaring outward, while the observer saw inward to an often glowing radiant anatomy. *Interior Landscape* (1949) (Fig. 75) presents a translucent male head rendered on blue paper with

⁴⁷ Parker Tyler was the first to acknowledge the phallic references in Tchelitchew's work. Jonathan Katz has recently elaborated on these in his recent exhibition catalog *Hide/ Seek*. Jonathan D. Katz, *Hide/Seek: Difference and Desire in American Portraiture* (Washington, DC: Smithsonian Books, 2010).

the outer flesh indicated in peach pastel and the caverns of bone and tissue drawn in shimmering clouds and plumage of light blue.

The plumage within the skull is significant. The idiom of placing a feather in one's cap signified a battle won or a matter of distinction, and importantly, this feather would be worn on the outside. However, this feather is not straight and narrow as in a tribal headdress from Native or Latin American cultures to represent merit or decorous honor. This curled foppish feather was characteristic of macaroni fashion, as in the revolutionary song of *Yankee Doodle* that lampooned colonial-era Americans. Macaroni fashion was an eighteenth-century style of outlandish and extravagant clothing, wigs, and hats for men, later associated with male effeminacy and queer fashion.⁴⁸ Wearing the plumage on the inside signified the male figure's ambivalence towards his marginality, and Tchelitchew's X-ray vision of this feather exposed the vulnerability of his masculinity.

Departing from *Phenomena* and *Hide-and-Seek*'s presentation of the irradiated body spectacle as surveyor, Tchelitchew's "Interior Landscapes" are not overseers. In fact, they are themselves the surveyed, the marginalized, opened up and exposed through X-ray simulation. Their opened eyes that cannot shut are always on alert, and have the anxiety of being exposed. At first glance, the anatomy in Figure 77 looks almost crystalline in appearance. Teeth and their roots, the eyes, and the curve of the jaw are recognizable as human, but not clearly discernible due to Tchelitchew's layering of color and line that the skull wears like a camouflage to obscure certain details and create other forms

⁴⁸ Adam Geczy and Vicki Karaminas, *Queer Style* (London: Bloomsbury Publishing, 2013), 49-51.

for the mind to interpret. When penetrating the interior landscape of the body, the observer gets lost in the distractions of a labyrinthine haze that surrounds and distorts the anatomical information.

This phenomenon is at the core of Tchelitchew's art of resistance in his most well-known works. He draws the observer into his work, either through beautiful vibrant color or the temptation of surface penetration, but then suspends perception, arresting the observer in a state of visual confusion. Parker Tyler explains this further:

If artists live the way they create (as I have asserted) rather than create the way they live, they must fall the way they create rather than create the way they fall. The net in Tchelitchew's art was to become conspicuous in myriad ways, both plastic and symbolic: it is the net which catches the falling acrobat, and in the form of the spider's web is verily the architecture of home, which likewise, as a "prison," can trap one's enemies.⁴⁹

Tchelitchew's simulation of irradiated bodies exposed the interior landscapes, but unlike a vast terrain for free exploration, these landscapes entangled and "trapped" the observer's perception within the space. While the work catches the observer in a state of paranoia-critical bewilderment, the anatomical figure's eyes stare without blinking, removing the scopic power from the observer to the pictured surveyed figure.

After producing his "Interior Landscapes," Tchelitchew worked geometrically with the body, but by that time, Surrealism as envisioned by Breton and Dalí had dissolved. Avant-garde artists turned to Abstract Expressionism to explore further the unconscious and the free-autonomous nature of creative

⁴⁹ Parker Tyler, *The Divine Comedy of Pavel Tchelitchew: A Biography* (London: Weidenfeld & Nicolson, 1969), 131.

construction, and, with the exception of Willem deKooning's work, representations of the body usually were not subjects. Pop Art developed almost simultaneously and, instead of exploring the psychology of the mind, it centered upon commonplace objects and symbols, the surface of appearances as the subject matter, and the appropriation and reproduction of those surfaces. With the development of Pop, the artistic inquiries of the surface prompted new ways of conceptualizing the corporeal interior and its meanings. The X-ray aesthetic endured another artistic revision.

POP FROM BENEATH THE SURFACE

American modern artist Jasper Johns drew from both Pop and a later generation of Abstract Expressionism, and engaged in methods to communicate about the self of the artist caught in a tension between self-containment and the surface's own suppression of life beneath it. In some of his work from the 1960s, Johns encoded his imagery with complicated meanings that resisted museum surveillance and scholarly interpretation. Johns appropriated the X-ray effect to bring the hidden skeletons in his art to the surface as a means to confront the surveillance of the art arena.

Jonathan Katz considers Johns a post-Abstract Expressionist, interested in commodities and symbols but with a gestural painterly approach, along with fellow gay contemporaries Robert Rauschenberg and Larry Rivers. Rauschenberg, Johns' lover and studio partner during the 1950s, had engaged with the transparency of the human figure in his cyanotypes of contact-printed

bodies, color washes over collaged photographs, and had even appropriated on numerous occasions a full-scale X-ray image of his own body—which I discussed in Chapter 3. Johns' works held an apprehension of the surface, and sometimes explored transparency of the corporeal self.

Acclaimed for his paintings recognizable as American flags, Johns was neither interested in representation nor “patriotism,” but rather “looking and seeing,” specifically how some designs, like the flag, came to carry the weight of meaning.⁵⁰ As he appropriated this visual information and reinterpreted it with different colors and shapes, his work challenged the popular association of patriotism that the observer made with design. Later, he explored looking and seeing through a variety of surface constructions, including dripping, scraping, hinging, oiling, fragmenting, stenciling, and collaging in layers. Johns constructed his art surfaces, even when visibly opaque, with a porous and permeable character that suggested some secret truth lurked beneath it.

Scholars Moira Roth, Jonathan Katz, Marjorie Perloff, and Fred Orton agree to different extents that Johns engaged with a kind of hidden language within the context of the Cold War and McCarthy era. According to Moira Roth, Modern art exhibited the “aesthetic of indifference” through artists’ lack of political voice; however, Johns, she claims, incorporated “a dense concentration of metaphors dealing with spying, conspiracy, secrecy and concealment,

⁵⁰ Marjorie Perloff, “Watchman, Spy, and Dead Man: Johns, O’Hara, Cage and the ‘Aesthetic of Indifference,’” *Modernism/ Modernity* 8, no. 2 (2001): 197–223, accessed on 6/5/2016, <http://marjorieperloff.com/essays/watchman-spy/>

misleading information coded messages and clues.”⁵¹ While Johns outwardly asserted that his work was not about his feelings, Katz has argued that the presence of his feelings persisted “covertly” in codes understood by his inner circle but that evaded the comprehension of the common observer.⁵² Katz further contextualizes Johns during the Lavender Scare, which associated homosexuality with social degeneracy and Communism, making Johns himself a target for surveillance and disdain. As a result, Katz has argued that Johns’ work did not exhibit a political “indifference,” but rather the “politics of negation” through a “double duty” of “camouflage and contestation... as an active resistance to hegemonic constructions of meaning as natural or inherent in the work.”⁵³ Framing her analysis largely from Katz’s context, Perloff contends that Johns associates the common observer with a kind of “Watchman,” which Johns described in his sketchbook and visually interpreted in a mixed media painting (1964), so that his “resistance” is towards the observer—the Watchman, quoting Johns’ notebook, who “fall[s] ‘into’ the ‘trap’ of looking” but cannot “[take] away... information.”⁵⁴

Meaning and information cannot accurately be retrieved from Johns’ work because, according to Orton, the artist employs metonymy:

[Metonymy] represents not the object or thing or event or feeling which is its reference but that which is tied to it by contingent or associative transfers of meaning, and in this way it permits the utterer the power to bypass obstacles of social censure including

⁵¹ Moira Roth, “The Aesthetic of Indifference.” In *Difference/Indifference: Musings on Postmodernism, Marcel Duchamp and John Cage*. Amsterdam: G+B Arts International, 1998, 43.

⁵² Cited in Marjorie Perloff, “Watchman, Spy, and Dead Man: Johns, O’Hara, Cage and the ‘Aesthetic of Indifference,’” *Modernism/ Modernity* 8, no. 2 (2001): 197–223, accessed on 6/5/2016. <http://marjorieperloff.com/essays/watchman-spy/>

⁵³ Ibid.

⁵⁴ Ibid.

those which are consciously or unconsciously self-imposed. Metonymy accords a kind of privacy to language...Each pattern, object, imprint is tied by the association of ideas and values to something else, reflexively in Johns' own work, to events and objects in New York, and...to the work of other artists and other ideas and associations, and so on.⁵⁵

Therefore, the metonymic approach makes interpretation based upon the artist's intent difficult because his appropriated objects and words refer to similar manifestations in other works by Johns and his inner circle. In the inner circle, the objects and words can acquire new meanings, so that perhaps the intended meaning of Johns' work would only be legible to his trusted colleagues or Johns himself. Metonymy divides the observers of Johns' work into those who see and know, and those who view blindly but attempt to assign meaning without Johns' personal coding. Therefore, as an art of resistance, this metonymy succeeded in concealing meanings from the surveyors who scrutinized artists during the Cold War and revealed them only to the few that Johns intended.

In an attempt to facilitate the decoding of meaning, the aforementioned scholars have referred to Johns' sketchbook and have projected actual X-rays onto his art. Historically, museums and galleries began using X-rays on artifacts and art in the 1890s—primarily for seeing inside Egyptian sarcophagi or wrapped mummies without physically opening them, and for evaluating the authenticity of painting and sculpture. When X-rayed, Johns' art did not divulge old discarded ideas that he had painted over with something new. In one specific example, X-rays exposed significant components of his original ideas, as documented in his

⁵⁵ Fred Orton, *Figuring Jasper Johns* (London: Reaktion Books, 1994), 92.

sketchbooks, that he had purposefully concealed from the common observer but that he, and likely his inner circle, knew were there.

In a work of 1961 entitled *In Memory of My Feelings*—Frank O’Hara (Fig. 78a), Johns painted a washed out composition of his American flag canvas in a neutral color palette reminiscent of the cool hues of winter. The work comprises two canvas panels, hinged together, openly presented to the observer as if a visible subject should be accessible. However, the layers of grays, blues, and whites, some dripping, others applied with quick gestural strikes—cover the expectation of the visible subject. From the top left quadrant, an actual fork and spoon—objects used for consumption and penetration—hang at eye level to the observer. Along the bottom, barely recognizable, Johns stenciled in the title of the painting, and O’Hara’s and Johns’ names abbreviated. The radiograph (Fig. 78b) reveals the words “DEAD MAN” and a skull beneath, which Orton first connected with the plans for the work in Johns’ sketchbook.

The title cites the autobiographical poem of the same title, written in 1956 by Frank O’Hara, who was the Associate Curator of Painting and Sculpture at MOMA. Although Johns’ art frequently referred to O’Hara’s poetry, appropriating objects and words that O’Hara incorporated, Johns did not illustrate his friend’s poems, but rather used some of the ingredients to create new poetry in visual form.

My quietness has a man in it, he is transparent
And he carries me quietly, like a gondola, through the streets.
He has several likenesses, like stars and years, like numerals.
My quietness has a number of naked selves,
So many pistols I have borrowed to protect ourselves
From creatures who too readily recognize my weapons

And have murder in their heart!⁵⁶

O'Hara later continues "so many of my transparencies could not resist the race!" The "transparent selves" writhe about like unruly "serpents," yet by the end of the poem, the author realizes that he must kill them in order to let his true artistic self emerge —to which the poem is ultimately a memoriam. Grace Hartigan, the woman to whom O'Hara dedicated his poem, broadly understood its thematic assertions as "inner containment"—"how to be *open* but not violated, how not to panic."⁵⁷

Although Johns did not illustrate this poem, the concept that Hartigan identified does ring true to O'Hara's words, as well as Johns' painting, and metonymically in Johns' later artworks that incorporated the skull. The painting encompasses a physiology, like a human organism because it does contain the representation of a skeleton beneath it. However, Johns' thick application of paint prevented access to that information with the naked eye. The suspicion of the hidden skull's presence, the crucial piece that relates to the "inner containment" in O'Hara's poem, may only have been comprehensible to Johns' close colleagues who had the knowledge of his metonymical associations. The skull receives the descriptor of transparency because it requires an actual or imagined vision of X-ray transparency to know its presence contained under the opaque surface.

"DEAD MAN," stenciled over the paint concealing the skull, is significant to both the poem and to Johns' other work. Orton rightfully suggests that the

⁵⁶ Cited in Fred Orton, *Figuring Jasper Johns* (London: Reaktion Books, 1994, 62-63).

⁵⁷ Marjorie Perloff, *Frank O'Hara: Poet Among Painters* (Chicago: University of Chicago Press, 1977), 141. Note: from personal correspondence between the Perloff and Hartigan.

transparent self in O'Hara's poem is fractured, broken up into multiple uncontrollable selves and feelings that the author must destroy and bury in the end.⁵⁸ However, Johns' appropriation and re-interpretation appears to reverse the conclusion. In the painting, the singular transparent man is "dead" and buried underneath opaque layers of expressionistic and dimly colored "feelings." The hanging cutlery could be interpreted as the tools for burial, as Orton suggests using metonymical references to other O'Hara works. This interpretation speaks to the informed-observer who understands the coding and knows the transparent man is beneath, but to the uninformed outside of Johns' circle, the cutlery could be read as an invitational pun to penetrate and consume the surface, which is impossible without X-rays or knowledge of metonymy.

The skull, associated with "DEAD MAN," is not a symbol of Death. Johns placed little importance on images or their cultural meaning, as demonstrated by his indifferent response to the question of patriotism in his flag paintings, and more on "looking and seeing." He explained, "I am not so much interested in dealing with images as working for form."⁵⁹ During the time of *In Memory*, Johns' ideas explored the hiding and finding of form inside of the surface, and making form rise to the surface. He rendered the skull as weightless and transparent by mediating its revelation's density. All of these components confirm that Johns artistically engaged with the X-ray's phantasmagorical aesthetic by his clever

⁵⁸ Fred Orton, *Figuring Jasper Johns* (London: Reaktion Books, 1994), 64.

⁵⁹ Interview Quoted in Marjorie Perloff, "Watchman, Spy, and Dead Man: Johns, O'Hara, Cage and the 'Aesthetic of Indifference,'" *Modernism/ Modernity* 8, no. 2 (2001): 197–223, accessed on 6/5/2016, <http://marjorieperloff.com/essays/watchman-spy/>.

means of concealing the skeletal form from the eyes of the gallery observer and anticipating his inner circle's revelation of it.

Seemingly expanding the concept from *In Memory*, Johns included in his other works the transparent man who was caught behind the "inner containment" of the surface. John Cage located the original reference in Johns' sketchbook: "A Dead Man. Take a skull. Cover it with paint. Rub it against canvas. Skull against canvas."⁶⁰ "DEAD MAN" therefore refers to an artistic method that generates a particular form, as opposed to a straightforward symbol of meaning. The note metonymically refers to a number of Johns' works, in which he experimented with contact printing skulls and occasionally simulated the look of the print in paint. Orton recognized the emblem in *Arrival/Depart* (1963-1964), *Skin with Frank O'Hara Poem* (1963-1965), the screenprint of a skull *Untitled* (1973), and Johns' *Tantric Detail* paintings of 1980-1981.⁶¹ In the aforementioned examples, Johns positions the skull not beneath the surface, but within it, in the process of surfacing—conveying the X-ray's phantasmagorical aesthetic, and alternatively in the *Tantric Detail* series, woven into the surface like a tapestry.

Among those works, *Skin* was the most referential to the art of resistance (Fig. 79). Johns greased his face with oil to make an imperceptible corporeal impression on a sheet of engineering paper. Then he dusted the paper with a fine mist of graphite and gently brushed the surface to let the graphite adhere to the invisible forms he created, making the transparent man visible. The effect represents epidermal indicators of the human surface, often in shapes of broken

⁶⁰ Jasper Johns and Kirk Varnedoe, *Jasper Johns: Writings, Sketchbook Notes, Interviews* (New York: Museum of Modern Art, 1996), 50. Note: S-6. Book A, p18, c.1960-61.

⁶¹ Fred Orton, *Figuring Jasper Johns* (London: Reaktion Books, 1994), 65.

osseous forms. Marjorie Perloff has noted that the hands appear X-rayed—although I think the face shows more bone structure, and draws attention to the chart in the upper right corner, which she asserts to be a chart found on “the standard x-ray.”⁶² Even though twentieth-century radiology did use such charts to file their X-ray negatives, the chart was not exclusive to radiology. Some engineering blueprints also depicted these charts. Whether the chart is simply an artifact of the paper, or a signifier of an X-ray image, the chart frames the image with a scientific eye scrutinizing materiality and construction of form. However, Johns’ image dematerializes and deconstructs form, corresponding to O’Hara’s deconstruction of the imagery in his poem: “The clouds go soft/ change color and so many kinds/ puff up, disperse/ sink into the sea...”

Johns inscribes the forensics of his corporeal individuality on the surface of the paper, but the brushing obscures his fingerprints and face. The effect is two-fold. On the one hand, it causes these forms to phantasmagorically dissolve in and out of materiality, suggesting the X-ray aesthetic. On the other, it acts as an art of resistance because his identity resists facial and dermatoglyphical recognition. Yet the resistance is not one of liberation. Johns’ method depicts the “inner containment” of the transparent man; here, he appears in the process of trying to escape the surface. Despite the visible aggressive force of his attempts, Johns’ skull maintains a silence and is caught in a field of isolation.

⁶² Marjorie Perloff, “Watchman, Spy, and Dead Man: Johns, O’Hara, Cage and the ‘Aesthetic of Indifference,’” *Modernism/ Modernity* 8, no. 2 (2001): 197–223, accessed 6/5/2016.
<http://marjorieperloff.com/essays/watchman-spy/>.

His sketchbook articulated the dematerialization of the body as a means of obscuring and distorting the observer's knowledge of his representation. In what begins as a series of artistic questions, he digresses into the politics of aesthetics, writing:

Can a rubber face be stretched in such a way that some mirror will reorganize it into normal proportion?
Find Scientific American with information dealing with mirror that will reverse normal [mirror] image.
The overthrow of parity.
IN-OUT.
Anti-matter.⁶³

Johns' final three statements resonate with the artistic ideas of Posada, Rivera, and Tchelitchew and their politically-charged engagement with X-ray aesthetics. Using the human skeleton, Johns expressed an interest in blocking, disrupting, and reconfiguring normative vision, on which social normativity, discrimination, and policing is based. As the 1960s Cold War and Lavender Scare extinguished the social and political content of art, Johns skillfully applied his own aesthetic language to avoid the cultural oversight of art. Despite the transparent man's endless struggle with the surface, Johns' X-ray vision shows that he does succeed in having a visible, but confined, presence after *In Memory*.

THE PRISON OF THE BODY

In his analysis of modern and postmodern artists' treatment of the surface, David Joselit has argued that prevailing art critical theories of flatness (espoused by Clement Greenberg and Michael Fried in the 1950s and 60s) lacked the

⁶³ Jasper Johns and Kirk Varnedoe, *Jasper Johns: Writings, Sketchbook Notes, Interviews* (New York: Museum of Modern Art, 1996), 50. Note: S-4. Book A, p10, c.1960.

understanding of how “modernist opticality was mortgaged to psychological depth.” Joselit counter-demonstrates that surface tension results from a perceptual interchange among “the psychological, the optical, and the political.”⁶⁴ Social and perceptual factors shaped the conditions of flatness and depth on the surface. Jasper Johns’ work that contains and restrains the transparent man engages with these factors. Joselit has also shown that the work of African American artist David Hammons (b. 1943) treated the surface with this sensitivity as well. Hammons employed an X-ray aesthetic in his body prints as a crucial perceptual feature to frame the social oppression of his depicted African American figures.

In this section, I explore the simulation of the irradiated African American body artistically-constructed by Hammons and Jean-Michel Basquiat. Both artists draw attention to the X-ray as a disciplinary force directed upon Black men. Hammons’ work conveys a deafening silence and produces new visions of the DuBoisian Veil, whereas Basquiat’s loudly prompts his Black men to return the stare of the disciplinary gaze.

Hammons’ body printing was similar to the process used by Jasper Johns for *Skin*, but the artist has denied the latter as an influence upon his technique.⁶⁵ According to Hammons, the body printing process was popular among his peers at CAL Arts in the mid-1960s, where he began experimenting with oil, margarine, pigment, and paper. He coated his paper supports with margarine or oil and then pressed his clothing and body against the surface to make the impression. After

⁶⁴ David Joselit, “Notes on a Surface: Toward a Genealogy of Flatness,” *Art History* 23, no. 1 (March 2000): 11.

⁶⁵ From personal correspondence with Hammons dated June 22, 2015.

carefully removing himself from the paper, he “sifted powdered pigments through a strainer to make a fine mist that completely covered the work still in process. As the fine pigment slowly descended like a cloud of dust, the color is captured more intensely on those areas of the paper that had absorbed the ‘printed’ margarine film.”⁶⁶ Contrary to Johns’ transparent man, Hammons’ figures, fashioned from his own, contained indexical signifiers of his Black body.

First entering the public art scene in Los Angeles during the 1960s, Hammons began his explorations during a racially charged decade within the same setting as the Watts Rebellion race riots and the Black Arts Movement on the West Coast. During this time, art produced by African Americans was not divorced from their experiences and social realities under White patriarchy. According to Kellie Jones, the Black Arts Movement encouraged “social and political engagement; a view that art had the ability to encourage change in the world and in the viewer; separatism, a belief in a self-contained ‘black aesthetic’ walled off from white culture; forms that were populist, that could be easily distributed and understood by audiences.”⁶⁷ At the time, many theorists reflected on the “black aesthetic” with no singular congruous definition.⁶⁸ Hoyt W. Fuller argued that Black art should be a “war against the [American] society” and should speak to “brothers” rather than to “whites.”⁶⁹ Melvin Dixon notably wrote:

⁶⁶ Los Angeles County Museum of Art Catalog, clipping from 1973, reference p8. David Hammons File, National Gallery of Art Library.

⁶⁷ Kellie Jones, “Black Art West,” in *L.A. Object & David Hammons Body Prints*, ed. Connie Rogers Tilton and Lindsay Charlwood, (New York: Tilton Gallery, 2011), 20.

⁶⁸ Campbell Tatham wrote about the divergent theories of black aesthetics in the mode of a spectrum. Kellie Jones, “Black Art West,” in *L.A. Object & David Hammons Body Prints*, ed. Connie Rogers Tilton and Lindsay Charlwood, (New York: Tilton Gallery, 2011), 20-62.

⁶⁹ Hoyt Fuller, “Introduction: Towards a Black Aesthetic,” in *The Black Aesthetic*, ed. Addison Gayle, (Garden City, NY: Doubleday, 1971), xviii-xxi.

In search of a black aesthetics we need only to look to ourselves. We must probe the depth of the black soul and unleash the wild things of the black spirit...The aesthetics of black art come from within. It is the internal made external. For within the creative psyche of the black artist, who must be deep into the reality of his own existence, is born the essence of black aesthetics from its union with community...[The true black aesthetics] is the essence of black existence. It is the SOUL!"⁷⁰

During this time, Black art focused on the exhibition of the Black soul as a mode of creating community, understanding, and resistance to White hegemony in the arts and law. However, as Joselit suggests, the exposition of the Black soul did not depict the release of an unconscious free spirit of a theological origin.⁷¹ Rather, drawing from Michel Foucault, the "soul" composes the "prison" of the body—being both the power that animates the corpus, and that also contains it through socially constructed disciplinary mechanisms.⁷² The soul works through the body as a means of controlling it. In respect to Hammons' body prints, his representations often revealed Black bodies under forms of persecution, shaped by stereotypes in ethnographic profiles. Hammons presented his human figures as imprisoned in the surface of these stereotypes, so that the bodies themselves become the victims under the disciplinary forces that form and inhabit them.

Boy with Flag (1968) displays a silkscreened American flag on the left, vertically turned, and Hammons' impression of a Black man on the right (Fig. 80). Grasping the flag with his skeletal hand, the Black man draws the flag like a curtain to conceal part of his body, while the revealed corporeal portion

⁷⁰ Campbell Tatham, "Double Order: The Spectrum of Black Aesthetics," *Midcontinent American Studies Journal: Perceptions of Black America* 11, no. 2 (Fall 1970): 88–100.

⁷¹ David Joselit, "Notes on a Surface: Toward a Genealogy of Flatness," *Art History* 23, no. 1 (March 2000): 19–34.

⁷² Cited in David Joselit, "Notes on a Surface: Toward a Genealogy of Flatness," *Art History* 23, no. 1 (March 2000): 29–30.

phantasmagorically fades in and out of materiality—from sinews to bone. Hammons composes the work with the African American male in contrast with the flag, where the flag communicates with an opacity that attracts the attention of the observer first, while the boy's liminal optical state receives the second glance.

The sheer optical effects in this work speak to what W.E.B. DuBois called the “Veil” in his *Souls of Black Folk* (1903): “He grew slowly to feel almost for the first time the Veil that lay between him and the white world; he first noticed now the oppression that had not seemed oppression before, differences that erstwhile seemed natural, restraints and slights that in his boyhood days had gone unnoticed or been greeted with a laugh.”⁷³ In visual culture, the Veil reinforces the humanity and dignity of the governing white majority, while distorting and suppressing those traits in black individuals. The Veil enables the appearance of cultural blind spots as attention becomes misdirected. The surface of Hammons work filters the Black identity through an optically Veil-like screen. However, unlike the Veil that suppresses blackness, Hammons work re-directs attention to that suppression by re-inscribing the Veil with delicate, emotionally-rich human figures that maintain an unstable presence.

Gender theorist, Judith Butler, has asserted that power regimes regulate which bodies materialize, or “matter,” and which ones do not. Bodies that materialize are compatible with “regulatory norms that are in part of those of

⁷³ W. E. B. DuBois, *The Souls of Black Folk* (Rockville, MD: Arc Manor LLC, 2008), 152.

heterosexual hegemony.”⁷⁴ Beyond this, the bodies that fail to materialize fall outside of the normal and are more likely to be the targets of policing. The bodies that matter rely on the support of the immaterial to indicate their borders, surfaces, and outlines—their very materiality. In Hammons’ work, the African American-boy does not maintain a body that “matters” when up against the solid American flag. Rather, the boy’s immateriality reinforces the flag’s opacity and materiality. Hammons seems to argue that the African American male suffers from the neglect of the American system of democracy, a disregard of the humanity and value of Black life, which, as suggested by Ralph Ellison, is culturally “invisible.” The division between opacity and transparency also positions the boy in melancholic segregation, as unwoven from the fabric of American statehood, stepping out from behind it like a specter without physical presence. Bringing visibility to both the neglect of African Americans by White patriarchy and the social isolation of the Black male, Hammons captures how the soul is indeed the prison of the body, in which disciplinary forces act upon and through the Black anatomy.

Two years after the aforementioned piece, Hammons created *Injustice Case* (1970) as a reflection upon the state’s persecution of Bobby Seale for speaking out in court during the Chicago Eight trial (Fig. 81).⁷⁵ In 1969, a federal judge prosecuted Seale, co-founder of the Black Panthers, and seven anti-Vietnam war demonstrators for allegedly conspiring and provoking riots outside

⁷⁴ Judith Butler, *Bodies That Matter: On the Discursive Limits of “Sex”* (New York: Routledge, 2014), 15.

⁷⁵ Hammons confirmed the Bobby Seale association. Personal correspondence with the artist. June 22, 2015.

the 1968 Democratic National Convention in Chicago. Seale wanted to postpone the trial so that his own attorney—who underwent a medical procedure—could represent him, but the judge denied the request for postponement and blocked Seale’s right to represent his own defense. In response, Seale hurled pointed slurs at the judge. To silence Seale, and control his disruptive behavior, the judge ordered him bound, gagged, and chained to his chair. Prosecuted separately—recounting the case to the “Chicago Seven,” Seale received a sentence of four years in prison for contempt of court, but a judge later ruled this as a mistrial and released him two years early. While incarcerated, Seale told *The Black Panther* journal, “To be a revolutionary is to be an enemy of the state. To be arrested for this struggle is to be a political prisoner.”⁷⁶

Deeply affected by Seale’s story, Hammons composed *Injustice Case* with a real American flag framing a body print of the artist performing the role of prisoner, uncomfortably stretched and pictured in profile. Similar to *Boy with Flag*, Hammons’ process represents the African American body as immaterial and physically liminal, with the opacity of the flag in stark contrast. However, in this example, the flag is more than a subject of material discrimination and racial segregation; it becomes an enclosure, optically reinforcing the containment of the central figure like a prison of the state. Originally, Hammons conceived of *Injustice Case* as an installation, with the flag and body print, as well as a gavel, inside of an illuminated display case.⁷⁷ This version played-on a literal translation of the title and visually presented another dimension of the enclosure, a framing

⁷⁶ “Bobby-Seale--Political Prisoner,” *The Black Panther*, January 10, 1970, 1.

⁷⁷ Kellie Jones, “Black Art West,” in *L.A. Object & David Hammons Body Prints*, ed. Connie Rogers Tilton and Lindsay Charlwood, (New York: Tilton Gallery, 2011), 39.

device that suggested a broader systemic injustice beyond the physical restraint of the central figure. Framing devices visually imply a never-ending cascade of space that frame and enclose not only the work, but encapsulate and include the observers of the work.

The disciplinary forces of the judicial and social system worked through Hammons' exposed tortured soul in print. Furthermore, with the framing that he conceived, these forces suffuse the space of the observer, joining the observer and subject in the space of persecution. Contrary to Hammons' interpretation of Seale, the observer is unrestrained in a viewing position of privilege, able to freely move toward and from the subject. While the subject's eyes are bound, the observer becomes implicated with a scientific policing vision that, from a distance, sees the subject with X-ray translucency, revealing the interior dimensions of Hammons' body like bones, sinews, and veins pressed onto the paper. The shadows of physicality beneath the clothing and the binding are also visible. As the distance decreases between the observer and the work, the interiority of Hammons' figure reverses into external features. His skin, hair, and fabric appear in detail, and the body effectively flattens into the surface. While the former X-ray vision searches the private dimensions of corporeality for any hidden contraband, the latter vision detects exterior signifiers of Black identity sourced for racial discrimination.

Within the passage of distance, observer's perceptual engagement with Hammons' work expands the effect of the prison. The prison traverses the interior to the exterior of the pictured body, goes beyond the body print's surface,

transcends the frame of the opaque flag and the once-present display case. The prison is in space itself. The Black experience that Hammons' work makes visible proposes that American disciplinary forces are neither restricted to the bricks and mortar of a courtroom nor jail, but rather they manifest inside the space of social life and shape the soul of the African American.

According to Hoyt Fuller, the Black aesthetic detached artists from the “invisible censor, white power, [that] hovered over [the black artist] in the sanctuary of his private room” and, without the White eye of power, “he debated about what he could say to the world without bringing censure upon himself. The mannerisms he had used to survive in the society outside, he now brought to his art; and, to paraphrase Richard Wright, he was forced to figure out how to sound each note and how to write down each word.”⁷⁸ Hammons’ work and the work of his later contemporary Jean-Michel Basquiat are emotionally powerful because they ambivalently spoke to this freedom of Black expression, using their liberties to visualize the space of the soul as the prison of the body under the White eye of power. While the silence of that prison hovers within and around Hammons’ body prints, loud color palettes and electrical rhythms pulsate through the African Diasporic bodies depicted in Basquiat’s work.

Born in Brooklyn, from a Haitian father and a mother of Puerto Rican descent, Basquiat (1960-1988) began as a graffiti-poet and urban public artist. He collaborated with one of his fellow students, Al Diaz, under the tag “Samo”—short for “Same Old Shit.” Samo developed as a humorous anti-art project that

⁷⁸ Hoyt Fuller, “Introduction: Towards a Black Aesthetic,” in *The Black Aesthetic*, ed. Addison Gayle (Garden City, NY: Doubleday, 1971), xxi.

earned Basquiat street-credibility in Manhattan. In these early years, his art demonstrated a resistance to the spatial prison of Black experience by re-claiming a variety of regulated spaces as his own through poetic meditations using the Samo tag. The practice of graffiti-writing and other non-permissible public art destabilized what Hille Koskela has called the “urban panopticon,” where space was organized, categorized, policed, and conformed to legislation.⁷⁹ Basquiat’s contemporary graffiti-writer and hip-hop artist, Fred Brathwaite, reiterated, “The whole objective of doing graffiti is fame...like I’m going to take control of that space and people are going to know me.”⁸⁰ Samo’s projects certainly took over space and boosted Basquiat’s recognition among artists, but the relationship between seeing and knowing in his work became more incongruous as time progressed.

In the latter life of the Samo project, Basquiat turned to making public imagery on paper. A 1978 collage, entitled *SamoVision*, is among the earliest examples of his engagement with X-rays (Fig. 82). Composed of a variety of advertisement clippings, the central figure wears X-ray Specs, with the top of his head cut in the shape of a three-point crown—which Basquiat would re-appropriate in his later images. Clippings of Captain America, a werewolf mask, and a switch-blade comb surround the central figure, positioning him as the authoritative surveyor—able to detect false appearances. He holds a long knife with the blade disguised, but revealed through “X-ray vision,” as a nursery rhyme:

⁷⁹ See Hille Koskela, “‘Cam Era’--the Contemporary Urban Panopticon,” *Surveillance & Society* 1, no. 3 (2003), accessed on 8/15/2015, <http://www.surveillance-and-society.org>.

⁸⁰ Brathwaite is also known as “Fab 5 Freddy.” Tamra Davis, *Jean-Michel Basquiat: Radiant Child* (Arthouse Films), 2010.

"Hickory, dickory, dock, the mouse ran up..." he then depicts the visual referent of the text—a mouse running up. The rhyme is about counting time with predictability, and the detection of the mouse at specific hours on the clock. All of these components factor into a compelling narrative of seeing and knowing.

The observers of Samo's work were urban street flâneurs, but when Basquiat emerged from anonymity and had gallery exhibitions in the New York art arena, the majority of his new observers and colleagues were affluent and White. Consequently, Basquiat and his work encountered a new set of disciplinary forces within the Manhattan gallery scene—such as clean, sanitized environments, regulated by White art curators and critics, monitored with security cameras, and the media attention that came with his fame. The documentary film *The Radiant Child* purports that Basquiat's bearing of his blackness became a spectacle for this new audience as well as a burden for him. A White interviewer dubbed him "the Black Picasso," which he found unflattering, and pushed back against the media: "I am not a black artist, I am an artist."⁸¹ This assertion went beyond neutralizing his blackness, it addressed Basquiat's multicultural heritage and the many styles that influenced him. As his fame increased under these conditions, his imagery responded to the "invisible censor" of Whiteness that largely observed and regulated his work.

Like Jasper Johns, who used artistic metonymy to withhold information from observers outside of his circle, Basquiat re-appropriated motifs, symbols, and words over the course of practicing art. His work developed into dizzying assortments of arrows, symbols, words, often set without spatial points of

⁸¹ Ibid.

reference. But he further complicated the metonymy of re-appropriation with a visual language of calculated error-making. With his lists of words and pictures, some of which he deliberately misspelled and crossed-out, he drew the observer's attention to these failures of his oversight. As a result, Basquiat's work shaped the role of the observer to be an overseer, a detective, a cryptographer—who had to sort through the distractions of his intentional errors, decode his private language, and uncover the truth. A recent discovery by Sotheby's confirms this point, as the auction house found that Basquiat signed one of his paintings with invisible ink that glowed under inspection.⁸²

If Basquiat primed his observers to be overseers and detectives as I have suggested, then the figures become exposed skeletons under that observation. His history with skeletons deserves some context. When he was a boy, a car hit Basquiat causing him to be hospitalized. At this time, he received X-rays of his body and became interested in human anatomy, so much so, that his mother gave him a copy of *Grey's Anatomy*.⁸³ Symbols related to this traumatic experience appeared in his work, showing cars, X-ray machines, and irradiated bodies. He explicitly referred to X-rays in a number of his works including *Untitled (Figure X-ray)* (1980), *Carbon Dating System Versus Scratchproof Tape* (1982), *Untitled (Charles Darwin)* (1983), and *Untitled* (1986). Apart from these examples, many of his works depicting skeletons do not contain literal references to X-rays. Rather, they often visibly suggest the irradiated body with Basquiat's Neo-Expressionist lines and color brush strokes that pulsate with electricity,

⁸² Dan Duray, "Sotheby's Finds Hidden Basquiat Signature," *The Observer*, February 14, 2012, accessed on 8/18/2015, <http://observer.com/2012/02/sothebys-finds-hidden-basquiat-signature/>.

⁸³ Ibid.

outlining and uncovering the skeleton. In Figure 83, *Boy and Dog in a Johnnypump* (1982), the skeletal frame appears at the skull--showing two rows of teeth, moving through the ribcage, and progresses down to the right leg and foot. Basquiat enhances the white gestural lines with a black background behind the figure to bring out the internal structure like an X-ray negative. The black background of the body equally can be read as a signifier of ethnicity.

Basquiat once explained, “the black person is the protagonist in most of my paintings. I realized that I didn’t see many paintings with black people in them.”⁸⁴ By racializing his skeletons, Basquiat offered more than just simulations of X-rayed bodies rendered in Neo-Expressionist style. Like Posada, Basquiat drew from multicultural influences that informed and configured the skeleton with more meaning. Although many of his human figures have indicators of the human skull and ribcage, those same forms can, at times, partially take on the appearance of native masks, dress, and sculpture of the African Diaspora. Indeed, some of his figures’ skulls seemed to double as masks, and this was no accident. Basquiat, while alive, credited the Yoruba traditions of material culture as influences.⁸⁵ According to Robert Farris Thompson’s study of Yoruba performance traditions, the mask signified a “flash of the spirit.” When a Yoruba deity would take possession of an individual’s interior spirit, and “capture [the] numinous flowing force within one’s body,” “the face of the devotee usually

⁸⁴ Wall text from the Brooklyn Museum’s exhibit *Basquiat: The Unknown Notebooks* (April 3–August 23, 2015).

⁸⁵ Tamra Davis, *Jean-Michel Basquiat: Radiant Child* (Arthouse Films, 2010). Also see Robert Farris Thompson, “In Search of the Essence of Meaning: Translating Basquiat’s Art,” in *Jean-Michel Basquiat*, ed. Larry Gagosian, (New York, NY: Gagosian Gallery, 2013).

freezes into a mask.”⁸⁶ The indigenous mask signified a vibrant spiritual life force from the interior that merged with the physical surface of the face. Exhibiting the flash of the spirit with the interior skeleton and mask becoming one, Basquiat’s Black figures are empowered, possessing intense eyes that stare back at the observer.

Figure 84, entitled *The Irony of the Negro Policeman* (1981), depicts the policeman with the familiar black background of the body strung together with white lines signifying the corporeal structure. With the triangle shape for the nose and two rows of teeth, his face is suggestive of a skull. Yet the X-ray vision of his interior moves to the exterior, capturing the presence of the police badge in the top left corner. Basquiat bisects the policeman with the white background, so that he is no longer whole. The fragmentation of Black identity has long been a subject of scholarly discourse, including W.E.B. DuBois’s theory of “double consciousness”—which was “the sense of always *looking at one’s self through the eyes of others*.⁸⁷ Basquiat’s art, including this example of the “Negro policeman,” more likely demonstrates a “multiconsciousness,” as argued by Jordana Moore Saggese, drawing from Henry Drewal’s concept.⁸⁸ Multiconsciousness accounts for Basquiat’s diasporic lineage and his navigation through “multiple evolving personas in social terrains where others attempt to impose identities (and therefore possibilities) in struggles of self-assertion.”⁸⁹ Not

⁸⁶ Robert Farris Thompson, *Flash of the Spirit: African & Afro-American Art & Philosophy* (Knopf Doubleday Publishing Group, 2010, 9.

⁸⁷ W. E. B. DuBois, *The Souls of Black Folk* (Chicago: A.C. McClurg & Company, 1904), 3.

⁸⁸ Jordana Moore Saggese, *Reading Basquiat: Exploring Ambivalence in American Art* (Berkeley: University of California Press, 2014), 49.

⁸⁹ Ibid.

only is the “Negro policeman” bisected and skeletonized, but he also wears the hat of a Gringo. He exhibits the both identity signifiers of blackness and the position of law and order. So the “irony” stems from the presentation that the “Negro policeman,” as a man of color, receives the impositions of identity and the disciplinary inspections from the social system, the same as the men he patrols. Basquiat’s X-ray vision reveals this fragmented identity and the irony of the policed policeman.

The gaze of Basquiat’s irradiated policeman, as well as his other human figures, confronts the scrutiny of the disciplinary forces that shape and survey the African American body. At the core of Basquiat’s art of resistance, he not only reveals the prison of the African American body through his work, but also his figures’ ability to see their multi-faceted selves through the eyes of others, and return their stare. Their opened eyes, sometimes portrayed in solid color, other times blood-red, hold the attention of the observer like a Medusa effect. What do they see in the observer? The reciprocation of scrutiny may indicate that the figures, like *SamoVision*, possess the special power to see the trueness and falseness of the social system—seeing past the disguises into its inner structures—so that the observers themselves comprise of an X-ray of civilization.

THE X-RAYS OF CIVILIZATION

The 1980s was a decade that began with the glow of neon in the rave scene, and ended with deaths resulting from the AIDS epidemic. Phosphorescent cosmetics, transparent toys and household appliances--notably telephones--

showed the inner workings of physical structures. This decade resonated with the same fascinations as the 1890s' interests in the visuality of X-rays and radium. Further prompted by Basquiat's renderings of irradiated skeletons, the art arena experienced an X-ray craze. Appropriations from actual X-ray imagery appeared in the art of Barbara Kruger (1982), Kiki Smith (1982-ca.1985), David Wojnarowicz (1982-90), Andy Warhol (1983), Barbara Hammer (1985, 1990), and Nan Goldin (1990). Simultaneously, the skeleton reappeared as a popular motif in this decade in the works of Lucas Samaras, who had previously appropriated X-ray images of his skull, and Keith Haring. Even in the 1990s, more artists turned to X-rays, including Lorna Simpson, Helmut Newton, and Robert Rauschenberg—who re-integrated his X-ray image from *Booster* (1967) in *Mirthday Man* (1997). The confluence of X-ray-integrated art varied in content, but Wojnarowicz offered the most evocative interpretation of simulation and resistance in relation to the AIDS movement. Wojnarowicz, sometimes through text and image, brought together the X-ray's spatial aesthetic to draw attention to the absence of cultural support for AIDS research and victims, and the corporeal absence of his lovers and friends who had passed on from the disease. He presents these absences as components of a broader cultural disease of intolerance that leads to death, which his art attempts to heal.

Born in New Jersey, Wojnarowicz (1954-1992) credited Pavel Tchelitchew's *Hide and Seek*, on exhibit at MOMA, as his inspiration to become an artist.⁹⁰ Aside from the painting's transparent leaf children that mesmerized

⁹⁰ Lucy Lippard, "Passenger on the Shadows," in *David Wojnarowicz: Brush Fires in the Social Landscape* (New York, NY: Aperture, 1994), 18.

him, he shared with Tchelitchew the orientation of being a queer artist. When he began making art work in the early 1980s, he befriended fellow American artist Kiki Smith. Together, they collaborated on one of her projects entitled *Life Wants to Live* (1982), which was a multimedia installation that incorporated a variety of medical images and recording devices to document the visual impact of domestic violence on the body. An X-ray technician X-rayed Smith and Wojnarowicz, who pretended to “beat each other up” so that the radiographs were components of the installation.⁹¹ This project was personal for Wojnarowicz, as his father violently abused his mother and, when Wojnarowicz was a minor, he fell prey to sexual molestation as well as hustling. The idea of Smith’s work, as Lisa Coulthard has argued, was to address “the public secret of domestic violence” and to engross the observer with “the particular problems of documentation, intimacy and invisibility associated with this form of violence.”⁹² The method, appropriating an invisible medium to make an invisible social problem visible, offered a wealth of creative possibilities and influenced Wojnarowicz as, in 1987, he tested positive for HIV.

In the 1980s, the governing authorities responded to the AIDS epidemic with silence and indifference towards those suffering from the disease, thereby shrouding the victims with invisibility. To the public, AIDS signified sex—in particular, the culturally determined non-normative kind. Richard Meyer has argued, “the ‘irreversible’ association between gay men and AIDS was often

⁹¹ C. Carr, *Fire in the Belly: The Life and Times of David Wojnarowicz* (New York: Bloomsbury Publishing USA, 2012), 245.

⁹² Lisa Coulthard, “Visible Violence in Kiki Smith’s *Life Wants to Live*,” *Journal of Medical Humanities* 25, no. 1 (Spring 2004), 23.

used to position homosexuality itself as a form of sickness and public threat.”⁹³ Treated as invisible, with their lives disposable in the eyes of the government, HIV-positive and AIDS victims struggled to receive basic medical treatment while their fatalities increased. Many other American artists suffered with HIV/ AIDS and sought to re-inscribe cultural understanding by making the disease and their lifestyle more visible in art galleries and public art projects. Meyer has shown that the consequences of their efforts frequently lead to censorship, defacement, and denigration, and that these hindrances also aroused the cultural battle for attention and visibility.⁹⁴ Reflecting upon the course of this inflammation, Lippard observed, “the queer’s X-ray vision reveals the strata of love and desire, hatred and rage, that lie below the blowing dust of a millennial culture.”⁹⁵

For Wojnarowicz and his friends, X-rays were part of the HIV/ AIDS experience, diagnosis, and treatment. According to Carr, Wojnarowicz’s lover-mentor-photographer, Peter Hujar, had a chest X-ray that “revealed a lesion.”⁹⁶ There were several different kinds of infections that required chest radiography to properly diagnose and track how the body responded to treatment. A common infection resulting from the disease was Pneumocystis pneumonia (PCP), and it still remains “the leading AIDS-defining opportunistic infection in the USA” and one of the primary causes of HIV/ AIDS mortality.⁹⁷ In addition to PCP, HIV-

⁹³ Richard Meyer, *Outlaw Representation: Censorship & Homosexuality in Twentieth-Century American Art* (New York: Oxford University Press, 2002), 226.

⁹⁴ Ibid. See chapter “Vanishing Points.”

⁹⁵ Lucy Lippard, “Passenger On the Shadows,” in *David Wojnarowicz: Brush Fires in the Social Landscape*. (New York: Aperture, 1994), 14.

⁹⁶ C. Carr, *Fire in the Belly: The Life and Times of David Wojnarowicz* (New York: Bloomsbury Publishing USA, 2012), 346.

⁹⁷ Paul Volberding, *Global HIV/AIDS Medicine* (Philadelphia: Elsevier Health Sciences, 2008), 309.

associated tuberculosis required chest radiography and HIV-caused cancers had the option of radiation therapy. The results of the X-ray image of Hujar's lungs confirmed that he had PCP—which meant that he had AIDS. Hujar died of AIDS the same year that Wojnarowicz tested positive for HIV. Reflecting on his diagnosis Wojnarowicz wrote:

When I found out I felt this abstract sensation, something like pulling off your skin and turning it inside out and then rearranging it so that when you pull it back on it feels like what it felt like before, only it isn't and only you know it...the first minute after being diagnosed you are forever separated from what you had come to view as your life or living, the world outside the eyes...⁹⁸

While his friends and colleagues began to die, Wojnarowicz's interpretations of death and mortality drew heavily from Latin American traditions. In the mid-1980s, he traveled to Mexico City for the Days of the Dead festivities where he encountered carnivalesque performances, costumed versions of Posada's Calaveras, and rituals that invited the deceased back into the realm of the living. The visibility and vitalism of the dead in Mexico contrasted with the invisibility and silence of the dead in the United States. This invisibility prompted Wojnarowicz to contemplate the systemic social problems that caused it. After his diagnosis he associated his ailing body with the body politic, writing, "When I was told that I'd contracted this virus, it didn't take me long to realize that I'd contracted a diseased society as well."⁹⁹ The disease effectively was the government's complex system to maintain the invisibility of the disease by turning

⁹⁸ Cited in Lucy Lippard, "Passenger on the Shadows," *David Wojnarowicz: Brush Fires in the Social Landscape* (New York: Aperture, 1994), 24 and 26. Lippard cited Wojnarowicz's words from "interviews with the author and from books *Tongues of Flame*, edited by Barry Blinderman (1990), *Close to the Knives* (1991), and *Memories that Smell Like Gasoline* (1992)."

⁹⁹ C. Carr, *Fire in the Belly: The Life and Times of David Wojnarowicz* (New York: Bloomsbury Publishing USA, 2012), 421.

a blind eye towards those suffering, and to extinguish the attempts to make the disease more visible, thereby spreading cultural blindness.

In 1989, Wojnarowicz reflected upon the body politic for Nan Goldin's curatorial project *Witness: To Stop Our Vanishing*. *Witness* was an exhibition devoted to the artists who lived with AIDS themselves, or their loved ones. It boldly criticized the government, religious right, and news media who construed AIDS as "a powerful tool for sexual repression," and, to show resistance to this social construction, *Witness* served as an artistic outlet to express sexuality and the "sense of powerlessness in the face of this plague."¹⁰⁰ *Witness*, like other exhibitions that included political and sexually explicit material, faced suppression by the National Endowment for the Arts, which, at one point, threatened to remove funding.¹⁰¹ The rage and passion that emblazoned the art of AIDS reacted against apolitical art, construing it as passive and complicit while casualties of art colleagues increased.

For the exhibition catalog, Wojnarowicz notably wrote "Post Cards from America, X Rays from Hell," in which he railed against "those post card perfect [mountain] slopes and clouds."¹⁰² He argued that the American governors of culture projected images of strength and stability to distract from the reality that a health pandemic ravaged the population. "I didn't trust that fucking mountain's serenity," he protested, "I mean it was just bullshit. I couldn't buy the con of

¹⁰⁰ Nan Goldin, "In the Valley of the Shadow," in *To Stop Our Vanishing* (New York, NY: Artists Space, 1989), 4-5.

¹⁰¹ For information on the NEA's censoring of *Witness*, see Peter Spooner, "David Wojnarowicz: A Portrait of the Artist as X-Ray Technician," in *Suspended License: Censorship and the Visual Arts*, ed. Elizabeth C. Childs, (Seattle: University of Washington Press, 1998), 335-336.

¹⁰² David Wojnarowicz, "Postcards from America: X Rays from Hell," in *Close to the Knives: A Memoir of Disintegration* (New York, NY: Vintage Books, 1991), 113.

nature's beauty; all I could see was death."¹⁰³ In this passage, he described a kind of vision that was not death itself, but a vision that, like Basquiat's *SamoVision*, detected deception and cultural blindness. He continued:

To make the private into something public is an action that has terrific repercussions in the pre-invented world. The government has the job of maintaining the day to day illusion of the ONE TRIBE NATION. Each public disclosure of a private reality becomes something of a magnet that can attract others with a similar frame of reference; thus each public disclosure of a private reality serves as a dismantling tool against the illusion of ONE TRIBE NATION; it lifts the curtains for a brief peek and reveals the possible existence of literally millions of tribes, the term GENERAL PUBLIC disintegrates...¹⁰⁴

After the illusion's disintegration, he contended that there will be an "X-RAY OF CIVILIZATION, an examination of its foundations."¹⁰⁵ According to Wojnarowicz, the disintegration of illusion was the first step to treat systemic social maladies—like the cultural indifference and blindness towards AIDS. As a man suffering from AIDS, he was able to see the diseased body politic that the majority of the population could not see, the virtue and burden of the "X-Ray of Civilization."

Although the U.S. government inhibited the visibility of queer art and the arts of the AIDS movement, the core malady of cultural blindness that Wojnarowicz identified in his argument about the "post card" image is the problem of attention. The superficial image distracts from, and may even subdue, the authentic, the private, and the individual diverse "tribes" that make up the body politic. Bringing the private out into the public may have referred to the graphic images that *Witness* exhibited to dismantle the widespread notion that

¹⁰³ Ibid.

¹⁰⁴ Ibid, 121.

¹⁰⁵ Ibid.

the “virus ha[d] a sexual orientation.”¹⁰⁶ However, since Wojnarowicz considered the diseased body politic in relation to the diseased body, making the private public involved exposing its interior anatomy. So, as metaphors, he let the skeletons, and even microscopic cells, surface in his work.

The skeletons served both as symbols of mortality and as products of his imaginary X-ray vision, which could see inside of the body politic. Wojnarowicz alludes to this in the following passage: “The edge of death and dying is around everything like a warm halo of light sometimes dim sometimes irradiated.”¹⁰⁷ In a number of his works, including *Science Lesson* (1981-82), *Peter Hujar Dreaming/Yukio Mishima: St. Sebastian* (1982), and *Water* (1987), he outlines the human figure in glowing light as a visual interpretation of his vision.

Wojnarowicz does the same with the skeletons in *When I Put My Hands on Your Body* (1990), where they lay strewn about in a dark forgotten grave and he illuminates them in a white radiance (Fig. 85). In this work, Wojnarowicz composes the photograph and the text silkscreened over it as his art of X-ray simulation. Within the prose, he talks to the body of a lover: “When I put my hands on your body on your flesh I feel the history of that body. Not just the beginning of its forming in that distant lake but all the way beyond its ending.” The lover is warm and alive, but in the process of physically separating from him. Wojnarowicz describes his X-ray vision of the lover phantasmagorically:

¹⁰⁶ Nan Goldin, “In the Valley of the Shadow,” in *To Stop Our Vanishing* (New York, NY: Artists Space, 1989), 4-5.

¹⁰⁷ Cited in Lucy Lippard, “Passenger on the Shadows,” in *David Wojnarowicz: Brush Fires in the Social Landscape*, (New York: Aperture, 1994), 24 and 26. Lippard cited Wojnarowicz’s words from “interviews with the author and from books *Tongues of Flame*, edited by Barry Blinderman (1990), *Close to the Knives* (1991), and *Memories that Smell Like Gasoline* (1992).”

I see the flesh unwrap from the layers of fat and disappear. I see the fat disappear from the muscle. I see the muscle disappearing from around the organs and detaching itself from the bones. I see the organs gradually fade into transparency leaving a gleaming skeleton gleaming like ivory that slowly resolves until it becomes dust.

The deep personal pain in his words is the outward expression of the private—the exposition of the clandestine places of his lover's body before it fades, as well as the agony he feels towards his lover's temporality and the time he has left. The emotional core that he discloses is part of the dismantling tool he described in "Post Cards from America, X-rays from Hell," through which he aimed to bring attention to the cultural distortion, blindness, and insensitivity to AIDS sufferers. Thus, he not only is speaking to his lover, but also to the body politic itself—attempting to treat its disease by restoring vision. As the quintessential spectacle of Wojnarowicz's X-ray of Civilization, this work exposes both the irradiated skeletons as a crime of injustice and the toxins that plague the body politic.

One of Wojnarowicz's arguments in "Post Cards from America, X Rays from Hell" is that one must see the interior anatomy of a system in order to treat it. His own marque of X-ray vision could effectively diagnose systemic social diseases like attention and cultural blindness, but by bringing X-ray of Civilization to the body politic (through the private becoming public), he offered a treatment for its ailments. He made a variation of this method in *I Feel A Vague Nausea* (1990) (Fig. 86). In this work, Wojnarowicz tests the observer's attention by laying small text blocks of his written criticisms about American injustice over a vibrantly colorful painting. The background depicts a blood-red Etlingera flower,

the torch ginger lily, against a bright blue sky. Wojnarowicz magnifies the torch lily in comparison to his minuscule words. As the observer comes closer to admire its form, Wojnarowicz's text appears. Excerpting from his book, *Close to the Knives*, he tells the story of a narrator touring a capitalist city that has a significant income gap ignored by newspapers. In this city, "the images of poverty would lift and float and recede quickly like the gray shades of memory," whereas the news media covered stories of military industrial projects, the wealthy, and "patriotic hard-ons." The narrator asserts, "It was yet another city dying of a disease whose anatomy was just beyond the inhabitants' grasp." Unless the observer of the art carried a magnifying glass, the text would be practically illegible. He presents a contrast between the magnified beauty of the torch lily, and his own microscopic words as a means to display an imbalance of attention. The American attention span gravitated towards the "post card" view as opposed to Wojnoarwicz's critical writings that subvert it. These two components make up the base of his diagnosis that the attention span is one of America's great social diseases.

I Feel A Vague Nausea is not only about diagnosing, but also healing. After all, the work's title addresses a symptom of illness, which the torch lily—a species of ginger—can actually treat. Below the text, along the bottom of the painting, are five small black and white photographs of vital organs, cut into perfect squares that Wojnarowicz has sewn into the board. The central image shows an irradiated heart with an arrow through it; he renders the other body parts as photographic negatives to simulate the X-ray look—including a ribcage,

a spleen, a brain, and a metallic skull re-appropriated from Wojnarowicz's *Childhood* (1988). The practice of sewing small emblems of corporeal fragments onto material derives from the Mexican arts of devotion.¹⁰⁸ Traditionally, Mexicans attached Milagros, which were tiny silver carvings of vital organs and body parts, to holy saints or the Blessed Virgin Mary as votive offerings. The Milagros represented prayers for health, knowledge, and prosperity. According to Gloria Fraser Giffords, some Mexicans used X-ray images of the body in place of the tin carvings.¹⁰⁹ The X-ray simulations of the robotic skull, ribs, heart, spleen, and brain all may signify qualities that Wojnarowicz felt American civilization had lost during the AIDS epidemic, which, in turn, required prayers in order to be restored.

As stated above, within the context of the AIDS movement, medical offices used X-rays to diagnose the disease and to treat it. Correspondingly, Wojnarowicz imagined a simulation of X-ray vision in his writings and art to diagnose and treat the body politic as a form of resistance. In his narrative of Wojnarowicz's battle against censorship, Peter Spooner refers to the artist as an "X-ray Technician," and observes that "if art were medicine and society a free clinic, he [Wojnarowicz] would be the head of radiology."¹¹⁰ However, his analogy conflates the X-ray technician and the radiologist, which are two entirely

¹⁰⁸ Kiki Smith used similar body parts in her work, *How I Know I'm Here* (1985-2000) arranged in a long sequence that was inspired by her trip to Mexico

¹⁰⁹ Gloria Fraser Giffords, *Mexican Folk Retablos* (Albuquerque: University of New Mexico Press, 1992), 147.

¹¹⁰ Peter Spooner, "David Wojnarowicz: A Portrait of the Artist as X-Ray Technician," in *Suspended License: Censorship and the Visual Arts*, ed. Elizabeth C. Childs, (Seattle: University of Washington Press, 1998), 333-335.

different positions. In his own writings, Wojnarowicz describes himself like a machine that processes the world around him:

What do these eyes have to do with surveillance cameras? What do these veins running through my wrists have in common with electric wiring? I'm the robotic kid looking through digital eyes past the windshield into the pre-invented world. [...] I'm the robotic kid lost from the blind eye of government and wandering the edges of a computerized landscape; all civilization is turning like one huge gear in my head.¹¹¹

Yet, no analogy or metaphor can capture what Wojnarowicz and the other artists in this chapter did individually as they engaged with simulations of the X-rayed body in complicated and provocative ways to reflect the cultural time and their place within it.

CONCLUSION

None of the artists in this chapter are synonymous with X-ray technicians, radiologists, X-ray machines, or reified manifestations of X-rays. All conceptually engage with the X-rayed body and its interpretation within the worlds of art, politics, and American history. I have shown that, throughout the twentieth century, American artists have simulated X-ray vision as a reaction to varying degrees of cultural blindness with respect to disciplinary forces upon the bodies of social minorities.

The narrative I have created speaks to not only art history, but also to the social factors and engagements with the invisible. Each one of these artists has recognized that the limits of human perception are not just psychological but

¹¹¹ David Wojnarowicz, *Close to the Knives: A Memoir of Disintegration* (New York: Open Road Media, 2014), 63.

social, that blind spots reside not only outside the periphery of vision but also the culturally-constructed view of social normativity. These blind spots result from disciplinary forces that enforce them. Just as X-rays can facilitate in seeing beyond human vision, artists have creatively simulated X-ray vision to respond to, expose, and subvert the cultural blindness tethered to normative vision. Continuously, these twentieth century artists engaged with the inversion of the normative, turning the inside-out, and making the culturally invisible-visible.

This chapter has served as a roadmap for representing how to articulate simulations of the X-rayed body within the American imagination—beyond the “looks-like an X-ray” or the “X-ray like” associations. Art historians, visual culture scholars, and medical historians should not depend upon such idle descriptors because they trivialize the work they investigate. The invisible is a terrain that is deeply complex, and so is art, therefore scholarship that attempts to address X-rays should devote the time to express the densities of their subjects. Furthermore, I have unified my narrative of X-ray simulations in art around the issue of the body with respect to traditional X-ray imaging; however, there are many other ways artists and filmmakers have simulated X-rays in visual culture-- drawing from X-ray diffraction, Xeroradiography, and CT scans among other techniques. Some of their focuses are not about spectacle or the body but rather about visually simulating how the X-ray passes through material. Each one of these genres should have its own narrative. Importantly, scholarship should not just cite visual examples, but unpack them analytically to reveal their

complexities. The results will enrich understandings of both the art and artists and prompt more discussions of work that has not yet been explored.

CONCLUSION

LOVE HAS NO LABELS

On Valentine's Day 2015, the Ad Council filmed a public service video for a campaign entitled "Love Has No Labels."¹ The producers installed a giant screen on the Third Street Promenade in Santa Monica, California, with non-actors participating in a message about prejudice. This screen functioned as a large X-ray fluoroscope machine that transformed human bodies into skeletons, through which they moved and interacted in real-time. The short video begins with a crowd encircling the giant screen onto which two glowing skeletons appear against a black background. The skeletons embrace and kiss (Fig. 87a). Then they part from one another and venture towards the opposite sides of the screen. As each skeleton reaches the edge of the screen, the illusion ends and the physical reality of their flesh reveals two women gleefully peeking out at the crowd (Fig. 87b). The video shows the crowd with expressions of astonishment at the revelation. Then the two women meet at the front of the screen and embrace and kiss. Behind them, the screen has a dotted square with the phrase "Love has no gender."

The rest of the video continues with more avatar skeletons embracing and dancing, but the revelations in the flesh show different kinds of diversity—representing the interracial, disabled, elderly, and the divergent religions. Each sequence ends with messages inside a dotted square arguing that love has no biases or "labels." In this context, the squares become self-renouncing labels that

¹ Ad Council, *Love Has No Labels*, 2015, accessed on 6/5/2016,
<https://www.youtube.com/watch?v=PnDqZuGIhHs>.

give the promotional power to the human forms. The simulated X-ray skeletons, enacted by the individuals behind the screens wearing motion-capture sensors, represent the authenticity of human love. The Ad Council narrator, in a related video covering the campaign, explains, “if we dare to peek behind the screen of our bias we’ll find that with love we are all the same. We are all human.”² The video to date has over 56 million views on You Tube and is “the second most viewed community activism campaign of all time.”³

The video presented two spectacles of revelation. The first revelation was the X-rayed body spectacle, displayed in negative format—which departed from a practical fluoroscope rendering in the positive. Indeed, the negative format enabled the skeleton to glow radiantly, drawing attention to the humanity that the Ad Council wanted to address. The body spectacle highlighted the anatomical construction underneath so as to unite different kinds of people around the universally shared human form. Furthermore, the campaign anticipated observers’ embodied seeing to make a powerful connection between their own anatomy and the anatomy on the screen.

The second revelation—of the flesh—caused more reactions from the audience because the skeletons appeared first and the observers did not know that real people were behind the boney avatars. In addition, the flesh unexpectedly demonstrated non-normative sexualities, families, body types, and

² Ad Council., *Love Has No Labels: One Year Anniversary | Diversity & Inclusion | Ad Council*, 2016, accessed on 6/5/2016

<https://www.youtube.com/watch?v=oWDZCVejcZQ&nohtml5=False>.

³ Tim Baysinger, “How the Ad Council and R/GA Created the Powerful ‘Love Has No Labels’ PSA,” *AdWeek*, accessed on April 12, 2016, <http://www.adweek.com/news/advertising-branding/how-ad-council-and-rga-created-powerful-love-has-no-labels-psa-166412>.

friendships. The surprise and delight of the flesh erased the skeletons like a magic trick. At the same time, the flesh revelation carried the social signifiers that the skeleton evaded in its anonymity. The exposure of the flesh shattered the anonymity and broke the embodied connection with the observers. However, the embraces and kisses in front of the screen re-established a human connection with the observers. Between the two spectacles, the video suggests that X-rays are a way of seeing with non-discriminating love. The campaign truly resets the historical precedent that professionals have used the X-ray to help discriminate between normal and non-normative bodies.

Importantly, the Ad Council's video demonstrates my contention throughout *Radiant Exposure* that the X-ray spectacle of the body has continued long past the first years after Röntgen's discovery. The meaning behind the irradiated body has changed over time in different contexts. In 1895, the X-rayed body maintained a close association with the macabre entertainment of the Cabaret du Néant. However, 120 years later, with technological inventiveness and social sensitivity, the glowing skeleton has taken on the meaning of human connection and love. At the same time, this commodified spectacle of love masks a new impulse of surveillance. Instead of directing attention at gender or ethnic categories, in the twenty-first century, the new focus of surveillance probes individual bodies and behaviors. Individuals, not categorical body types, capture the attention of government and corporate entities for tracking as either units of potential threat or opportunity.

Currently, producing X-ray simulations of the body spectacle look aesthetically accurate with the aid of computer software, which accounts for the increase in commercials, graphic design, studio art, and motion picture sequences that include such imagery. These spectacular simulations have offered an idealized escape from the actuality of X-rays and the effects of its radiation.

Why has the body spectacle persisted so long after Röntgen? First, I have shown that the optical appearance of the X-rayed anatomy has a connection to the cinematic phantasmagoria, as the body is in a liminal state of presence with the anticipation of revelation. Spectacle is inherent to the photography of radiographic anatomy and its creative simulations throughout history. Second, X-rays are still mysterious. Their invisible light still creates pictures that cannot be seen with unaided vision. They continue to reveal what is hidden from view, turning the inside-out without any physical manipulation. Despite the advances in technology, the lowering of radiation per dose, and the digital immediacy of X-ray production, there are still debates over the safety of routine screenings and the frequency of doses. Every new invention and image of the body spectacle projects a sense of newness and progress in the midst of the X-ray's vanishing history—thus perpetuating excitement and interest around X-rays. Third, I have demonstrated that the commodification of X-rays throughout the twentieth century contributed to the persistence of spectacle through the female body in particular. Fourth, ideas about the “progress of civilization” have been bound up in the revelation of men’s fitness for duty through the male body’s spectacle.

Fifth, X-rays have aided in uncovering social deviances—detecting the criminal, the smuggler, and the terrorist as they concealed foreign bodies. Finally, artists have creatively driven the spectacle by incorporating in their works X-ray simulations of the body in their attempts to reveal cultural blind spots, prejudices and inequities. Through all these narratives and visual examples, the body spectacle has continued to stimulate the senses with the yearning to see what cannot be seen, to invade the body without consequence, and to master the body as a terrain of knowledge.

Through these 120 years, creative and scientific minds have perceived the X-rayed body in ways ranging from prejudicial to democratic. Historically, when a radiograph has an identity and its story attached, that image is generally considered more culturally valuable because the hypothetical elbow would be more than just an elbow. However, the "Love has no labels" campaign demonstrates a contemporary perspective that embraces the power of anonymity. Exterior signifiers of ethnicity, sexuality, religion, age and disabilities dissolve behind the video's X-ray screen. The X-rayed body does not need to have an identity attached in order to receive the projections of subjectivity and to be revered for attention. Simulating the body spectacle, this campaign draws attention to the power of the anonymous skeleton—its liberation from social discrimination, commodification, and other societal burdens. Although the body spectacle is not disciplinary in terms of punishment or creating anxiety in this case, it is disciplinary because it commands attention and teaches a lesson about socially formed perceptions.

“Before anything else, we are all human” argues the campaign’s printed advertisement in Figure 88. An X-ray negative, asymmetrical design shows two child-sized skeletons holding hands. A dotted square in the center surrounds the hands and acts as the mediator between the observer and the terrain inside the advertisement. The square reverses the X-ray effect, returning the exteriors of their bodies. It reveals that the two hands belong to people of different ethnicities. The two components in the advertisement comprise the common humanity revealed in the X-rayed bodies, and the diversity represented in the square.

Radiant Exposure has explored the historical transformations of the X-rayed body in *American* visual culture. While the anonymous skeletal body is a shared human form beyond the borders of the United States, the argument of the “Love has no labels” advertisement fits within a socially liberal American interest in acceptance and inclusion of diverse individuals. Indeed, demonstrators in Manhattan appropriated the “Love has no labels” imagery of the skeletons for a victory march after the 2015 Supreme Court decision that legalized gay marriage in the United States. So, although the anatomical pictures produced from the X-ray can reflect a human universality, the application of the context shapes the imagery into products of the American imagination. *Radiant Exposure*’s focus in America not only has captured the body spectacle’s perpetuation as a commodity within a capitalist society, but also has indicated that the body spectacle has been ripe with American subjectivities of diversity—gender, class, ethnicity, sexuality, and disability. As much as the X-rayed body has endured a long past of American subjectivity, the “Love has no labels” campaign demonstrates its

continuity in the present. Importantly, the campaign sets up a new perspective of the X-ray as a tool of seeing with non-discrimination for the future, and foreshadows a new regime of surveillance focused on individuals.

FIGURES

INTRODUCTION



Figure 1. Andy Warhol, *Marilyn Diptych*, 1962, Acrylic on Canvas, 205.44cm x 289.56cm, Collection of the Tate Modern, London.



Figure 2. William John Kennedy, Warhol Holding Marilyn Acetate II, 1964, 20 x 20 inches, Silver Gelatin Photograph, KIWI Arts Group.

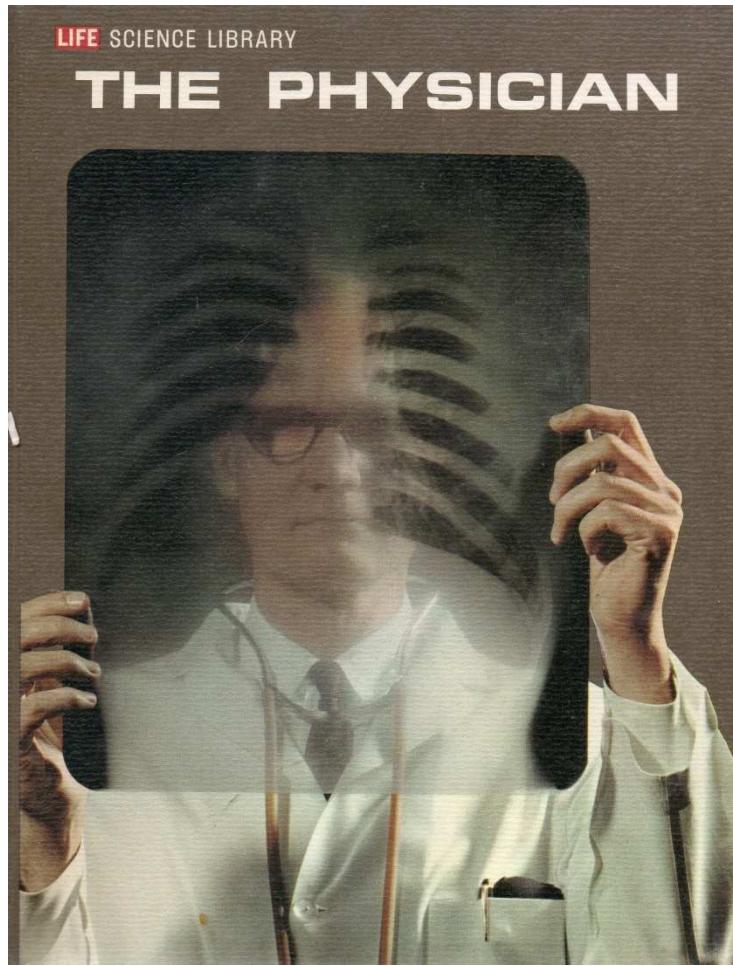


Figure 3. Russell V. Lee, *Life Science Library: The Physician*, 1967, First Edition, TIME.

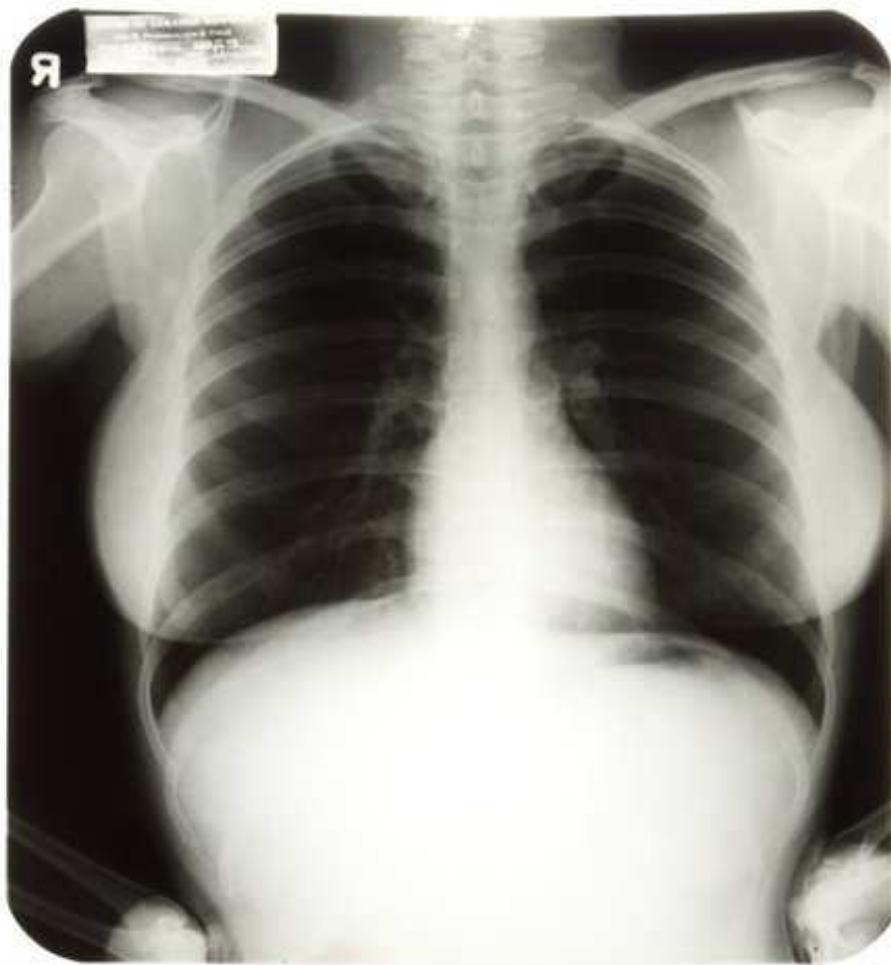


Figure 4. Marilyn Monroe, ca.1954, Radiographic negative, Courtesy of Julien's Auctions.

CHAPTER 1

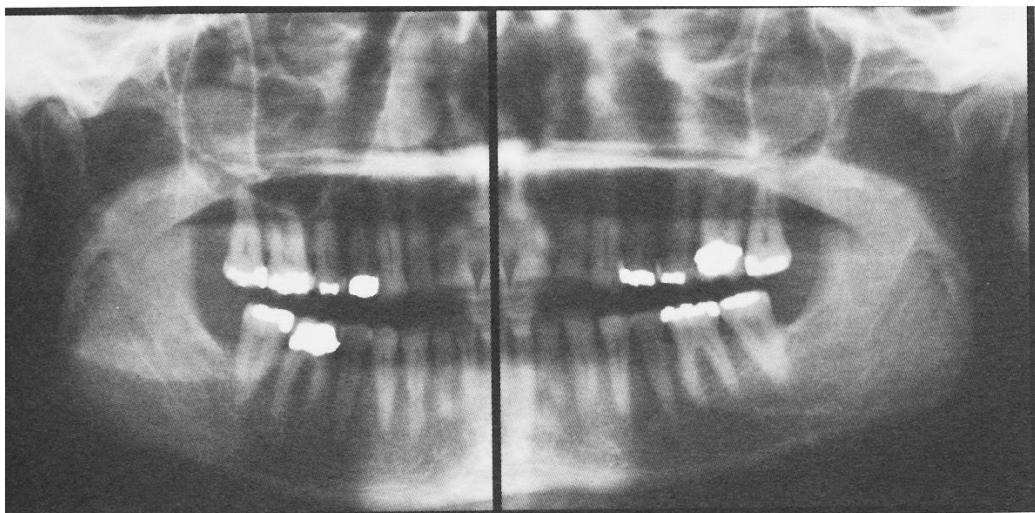


Figure 5. Gary Schneider, *Dental Panoramic Radiograph*, 1997, 29 x 31 inches (print size), 5 x 5 1/2 inches (original radiograph negative), Specimen prepared by Pasquale J. Malpeso, D.M.D.

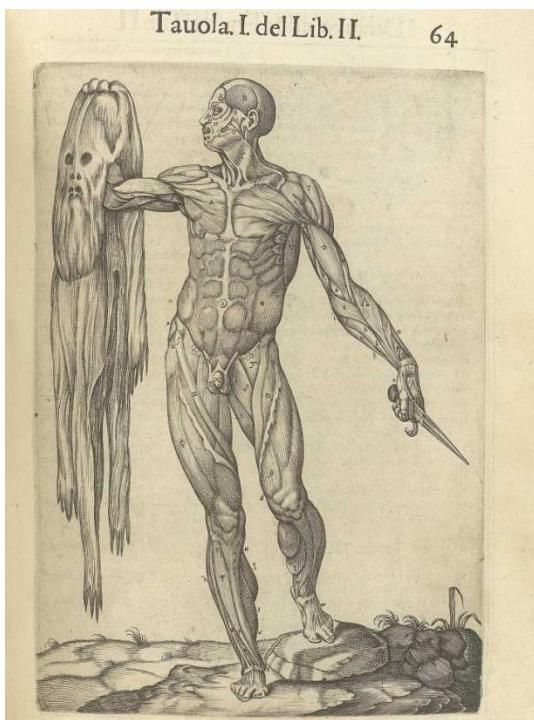


Figure 6. Juan Valverde de Amusco (anatomist). Gaspar Becerra (artist), *Anatomia del corpo humano...* (Rome, 1559). Copperplate engraving, Collection of the National Library of Medicine.

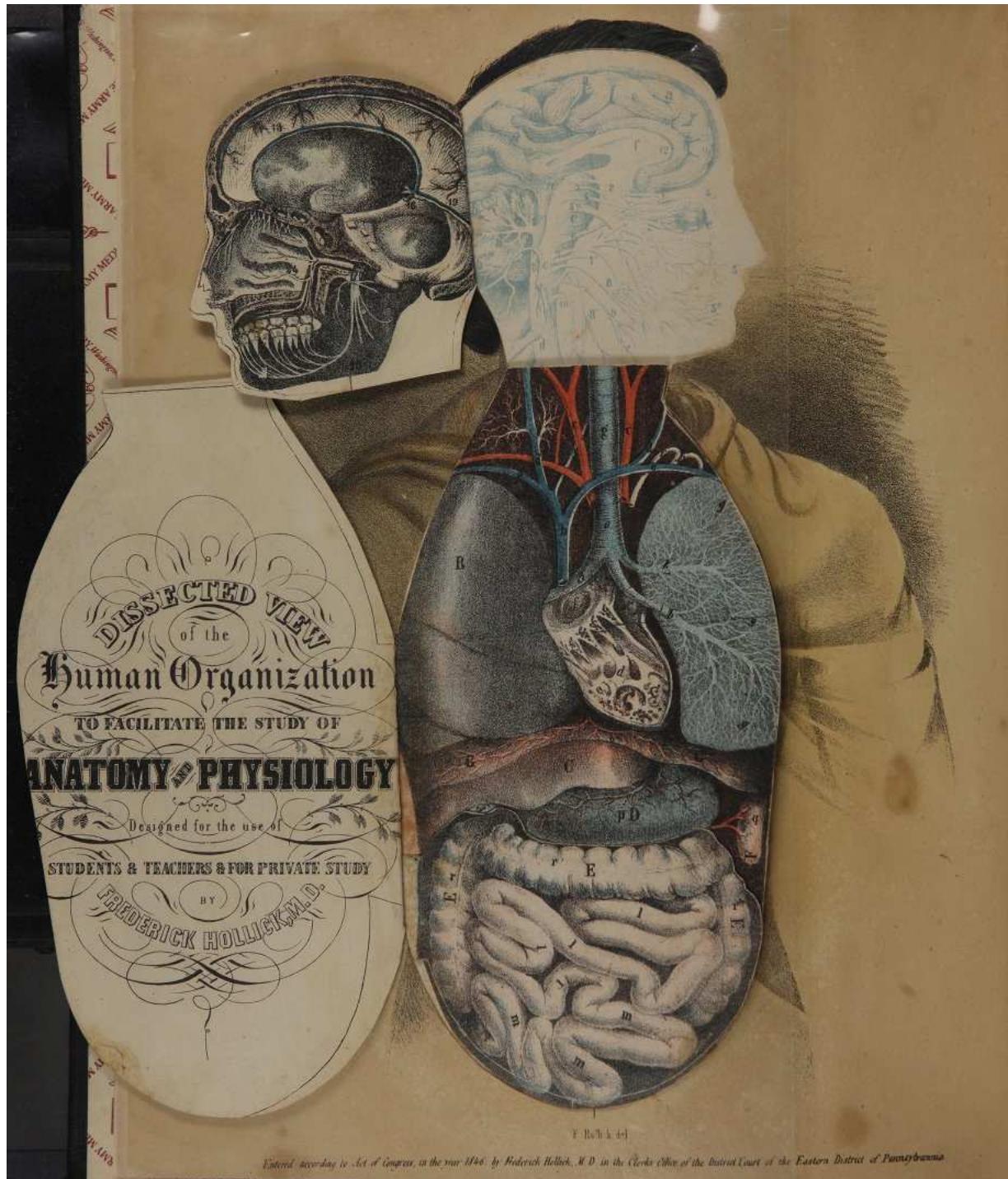


Figure 7. "Dissected plate" F.C. Hollick, *Outlines of Anatomy and Physiology* (Philadelphia, 1847). Courtesy of the American Antiquarian Society.

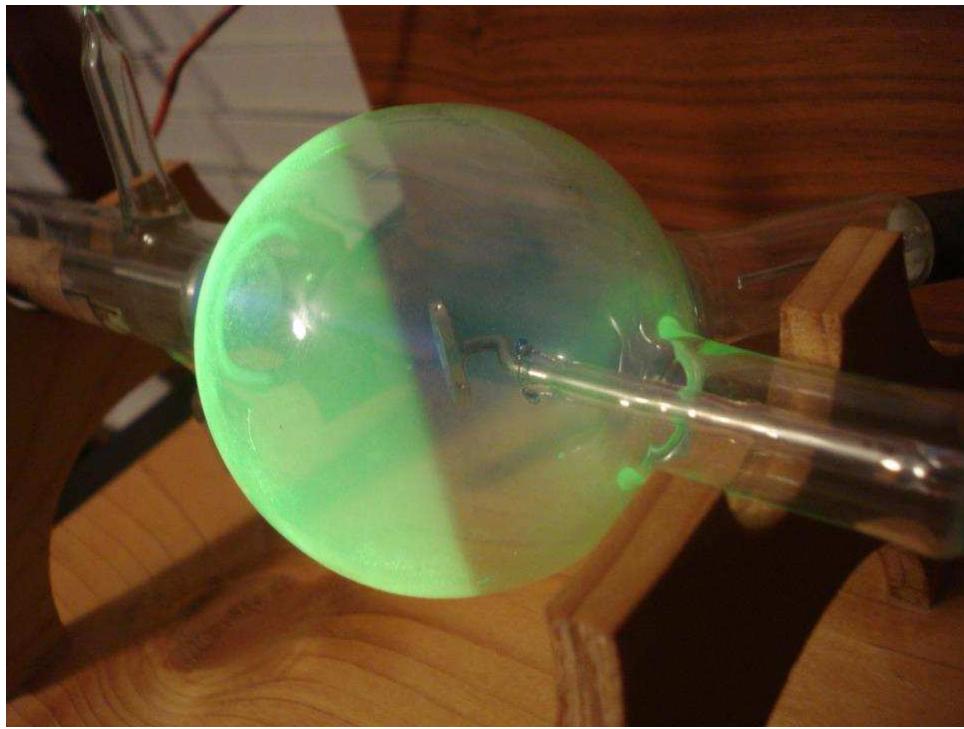


Figure 8. A properly focused X-ray tube. Image courtesy of the Electrotherapy Museum.



Figure 9. Illuminated Maltese Cross tube. Image courtesy of the Electrotherapy Museum.

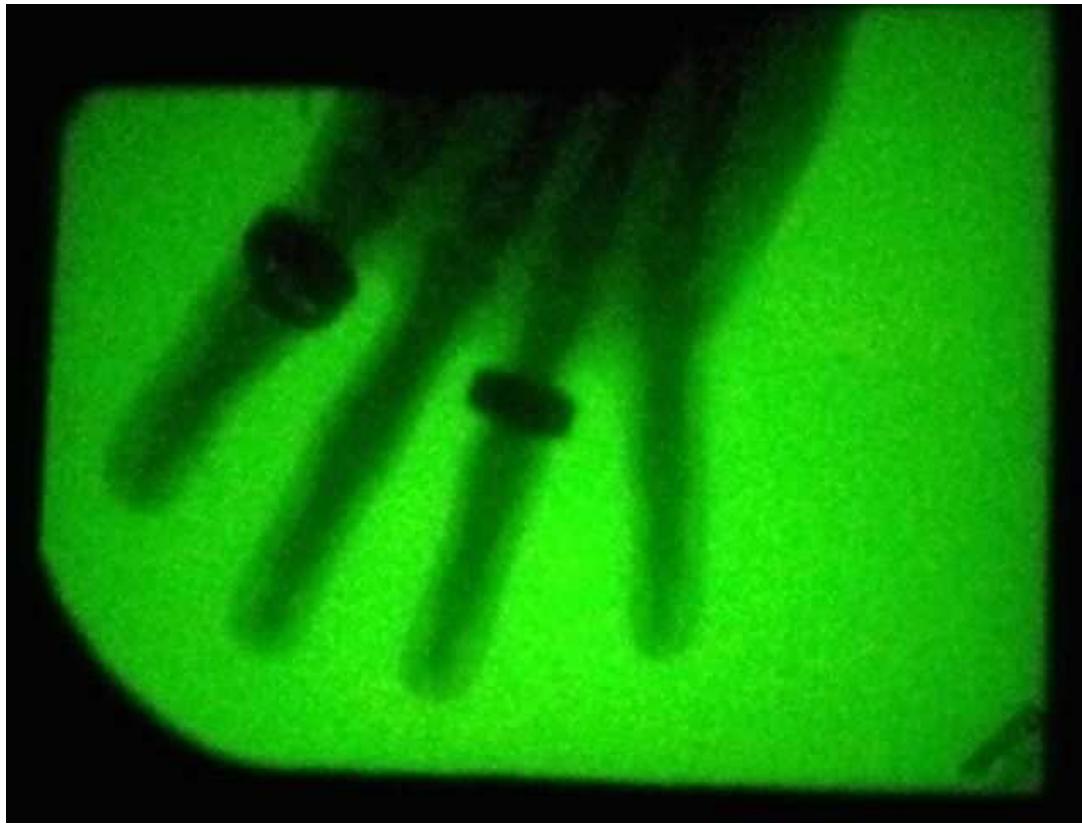


Figure 10. Hand viewed through the fluoroscope. Courtesy of the Electrotherapy Museum.

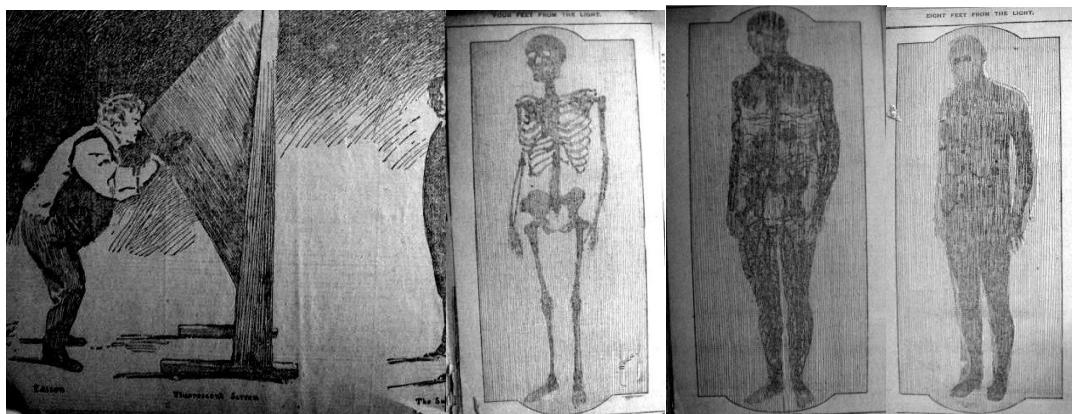
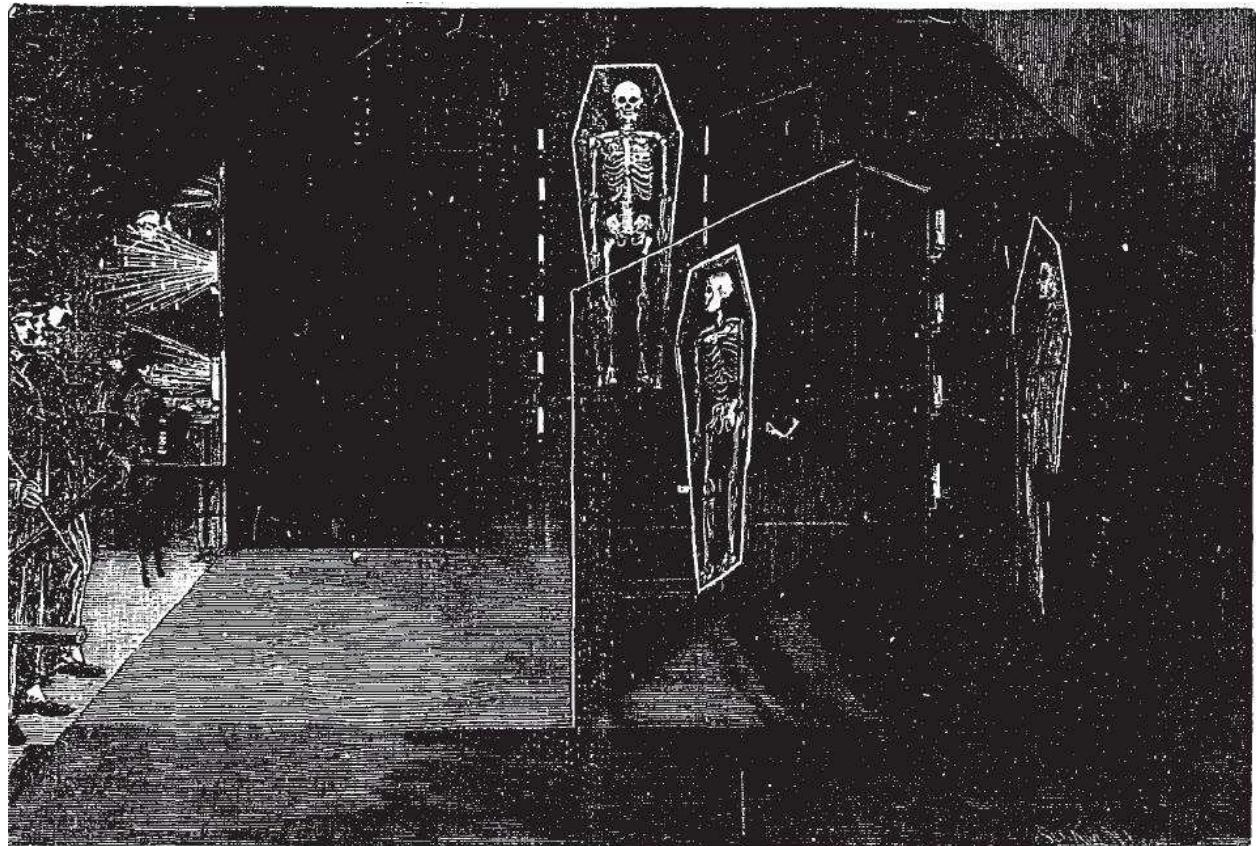


Figure 11. "Edison's Greatest Triumph," *The Journal*, March 22, 1896, Clipping, X-ray Scrapbook of William James Morton, Collection of the New York Academy of Medicine.



AN X RAY ILLUSION UPON THE STAGE—CONVERSION OF A LIVING MAN INTO A SKELETON.

Figure 12. "An X ray illusion upon the stage-conversion of a living man into a skeleton," *Scientific American*, March 1896.

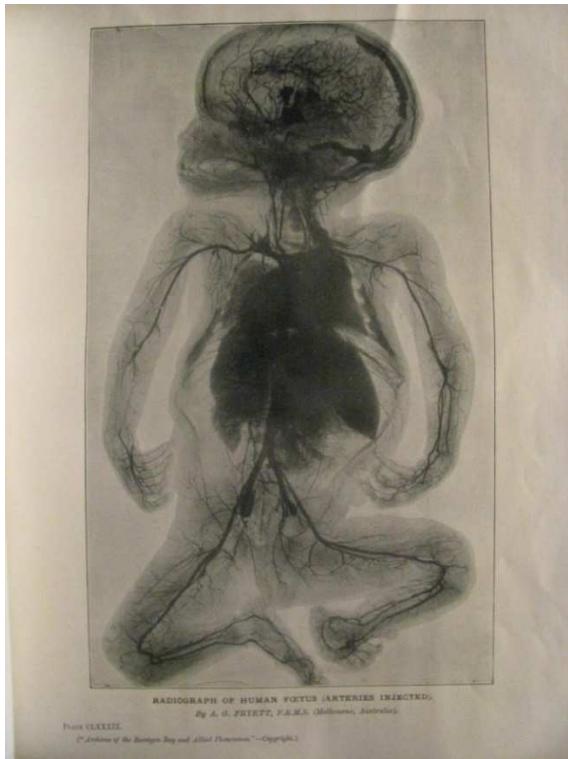


Figure 13. A.G. Fryett, Radiograph of Human Fetus (Arteries Injected), *Archives of the Roentgen Ray*, November 1903, Collection of the New York Academy of Medicine.



Figure 14. William James Morton, Demonstrating the overexposure of the hand, Clipping, N.D. The X-ray Scrapbook of William James Morton, Collection of the New York Academy of Medicine.



Figure 15. Frontispiece, *Roentgen Rays in Medical Work*, 1897, Private Collection.

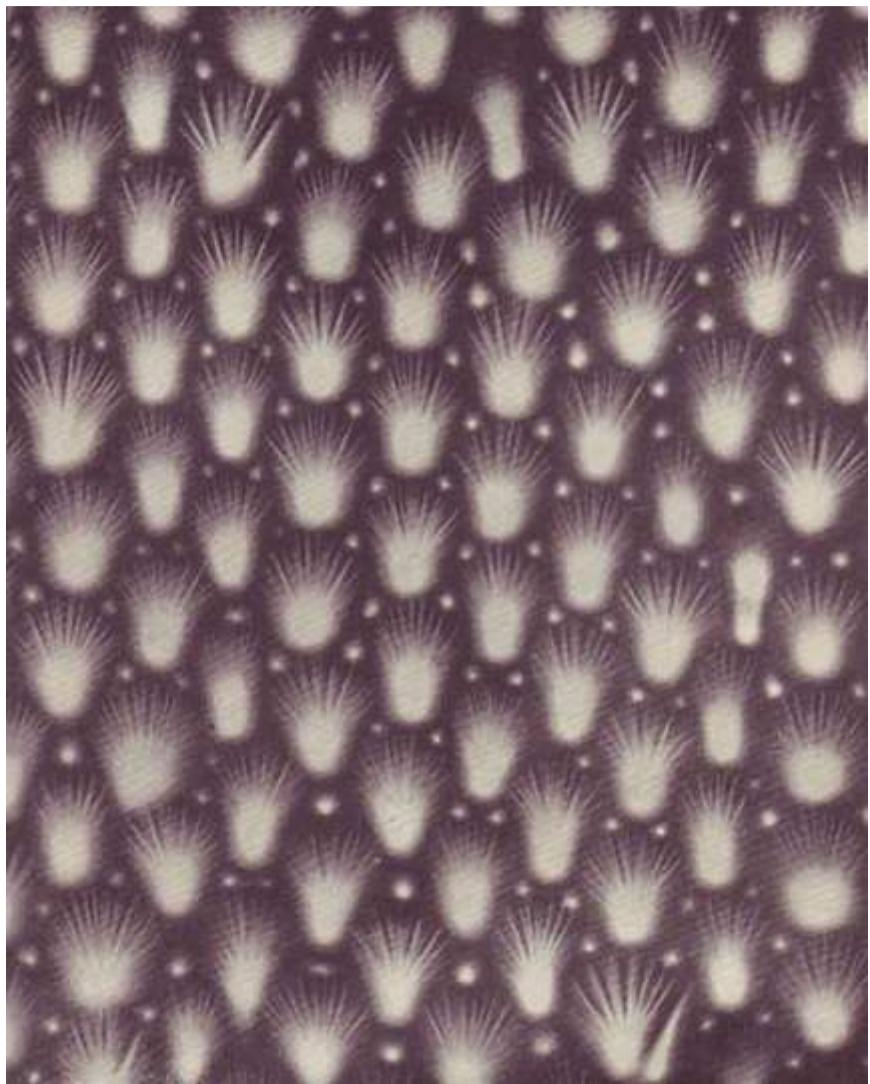


Figure 16. Thomas B. Kinraide, *Negative Ends of Electrical Entities*, reproduced in Anabel Parker, "Curious Electrical Forms: As Shown in Mr. T. Burton Kinraide's Recent Photographs of Electric Discharges," *Century Illustrated Magazine*, July 1902, LXIV, Plate VII, Collection of the Electrotherapy Museum.



Figure 17. Thomas B. Kinraide, Frontispiece, *The Jackson High Frequency Coil* (trade catalog), bulletin #35, ca. 1897-1902, Swett and Lewis Company, Boston, MA, Collection of the Electrotherapy Museum.



POSITIVE DISCHARGE FROM KINRAIDE COIL (Reduced)

Figure 18. Thomas B. Kinraide, Insert, *The Kinraide Coil* (trade catalog), ca. 1897-1902, Swett & Lewis Company, Boston, MA, Collection of the Electrotherapy Museum.

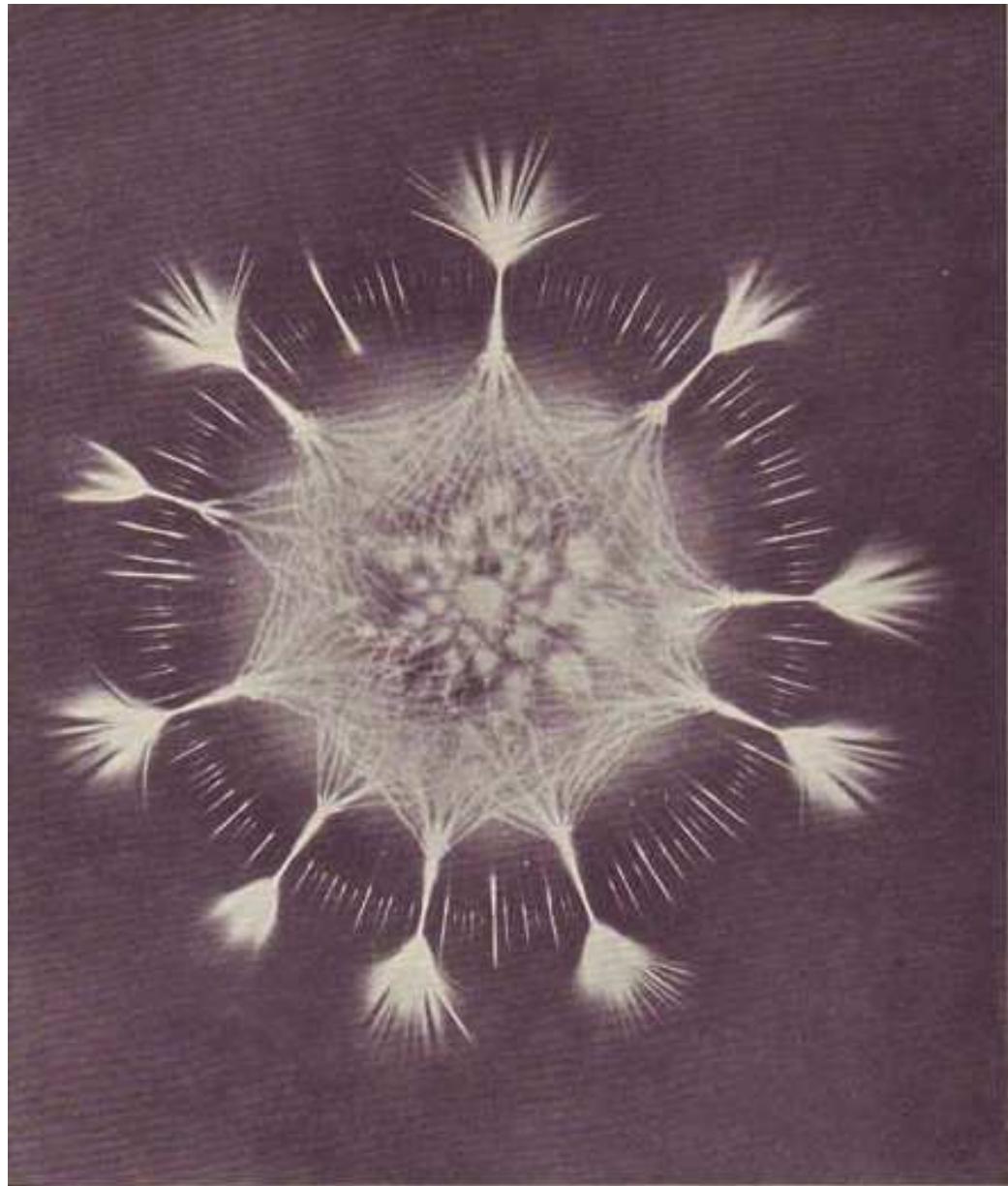


Figure 19. Thomas B. Kinraide, *Symmetrical Group of Electric Entities*, reproduced in Anabel Parker, "Curious Electrical Forms: As Shown in Mr. T. Burton Kinraide's Recent Photographs of Electric Discharges," *Century Illustrated Magazine*, July 1902, LXIV, Plate IV, Collection of the Electrotherapy Museum.



Figure 20. John Sloan, *The X Rays*, 1926, Etching and aquatint, second state of two, 14 15/16 x 11 13/16 inches, Collection of the Smithsonian American Art Museum.



Figure 21. Harold O. Mahoney, *Untitled*, ca.1935-1938 negative, ca.1940-1950 print, Cyanotype printed by the Army Medical Museum, 89.9 x 34.9 cm, Collection of the Museum of Fine Arts, Houston, Texas, Museum purchase funded by Joan Morgenstern in honor of Dr. Gilbert Lechenger.



Figure 22. Harold O. Mahoney, *Untitled*, ca.1935-1938 negative, early twenty-first century digital print, 90.6 x 35cm, Collection of David Winter.



Figure 23.Yale Joel, *The X-ray Barbecue*, silver gelatin photograph, republished in *Life Magazine*, April 17, 1950, 87, New York World Telegraph and Sun Collection, X-ray file, Prints and Photographs Division of the Library of Congress.



Figure 24. Still from *Man with the X-ray Eyes*, Roger Corman (1963, American International Pictures).

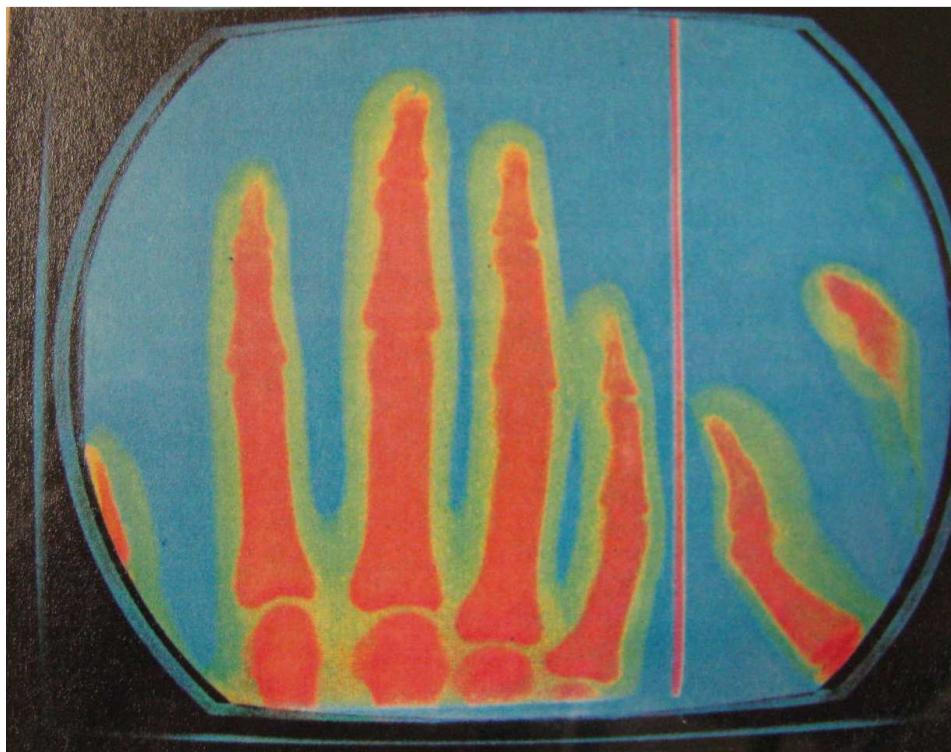


Figure 25. EXICON, Still from "X-rays in Color," *Look Magazine*, May 14, 1957, Collection of the Library of Congress, Prints and Photographs Division.

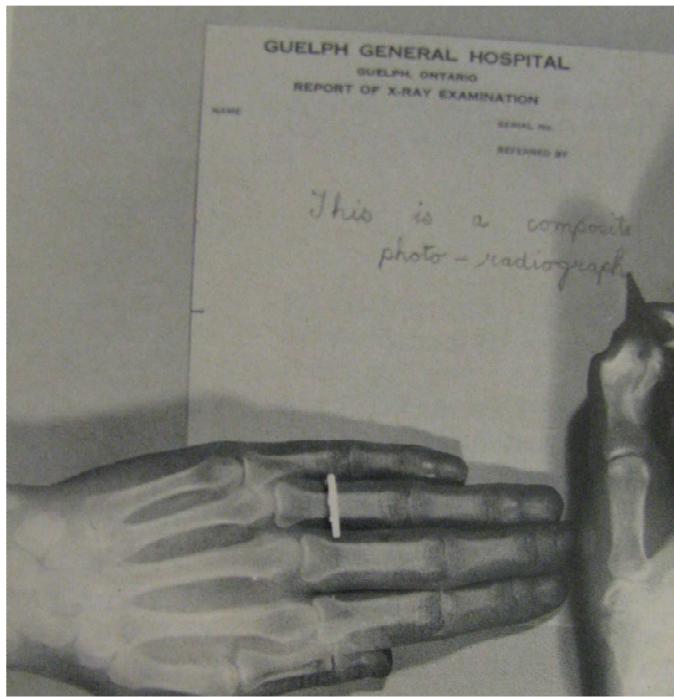


Figure 26. Still from Douglas C. Eaglesham, "Composite PhotoRadiography," *Journal of Canadian Association of Radiologists* 29. 4, December 1978.

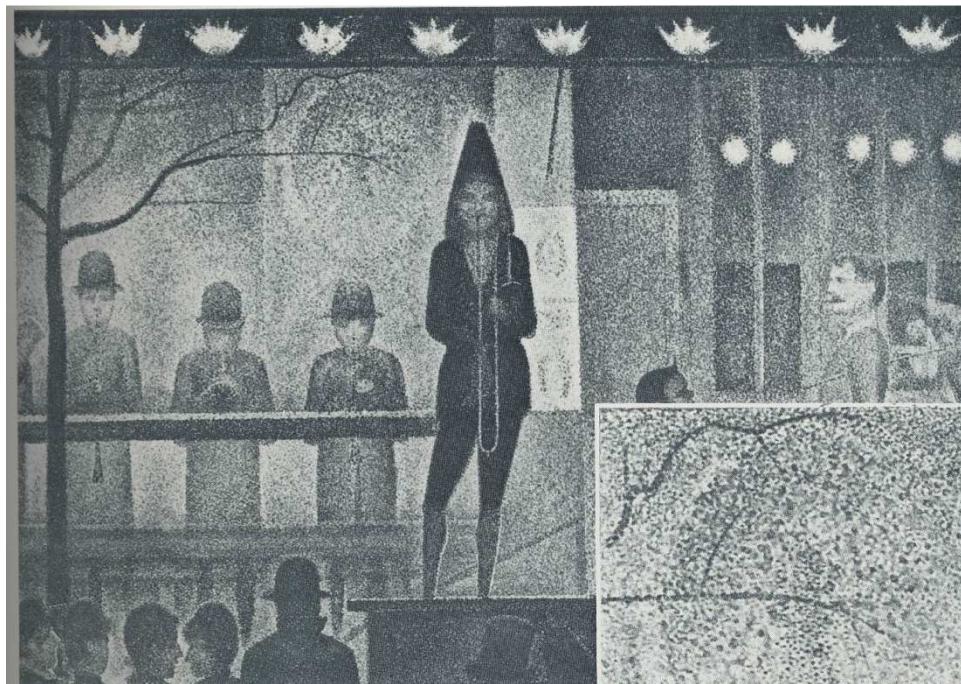


Figure 27. Plate 1-126, Ronald L. Eisenberg, *Atlas of Signs in Radiology*, Philadelphia: J.B. Lippencott Company, 1984.

CHAPTER 2



Figure 28. Wilhelm Conrad Röntgen, *Hand of Anna Bertha Röntgen*, Collection of the Center for the History of Medicine, Francis A. Countway Library of Medicine, Harvard University.



Figure 29. Charles Allen Gilbert, *All is Vanity*, 1892 (painting) and 1902 (Print), *LIFE*.



Figure 30. Stills from George Melies, *The Vanishing Lady, or, The Conjuring of a Woman at the House of Robert Houdin*, 1896.

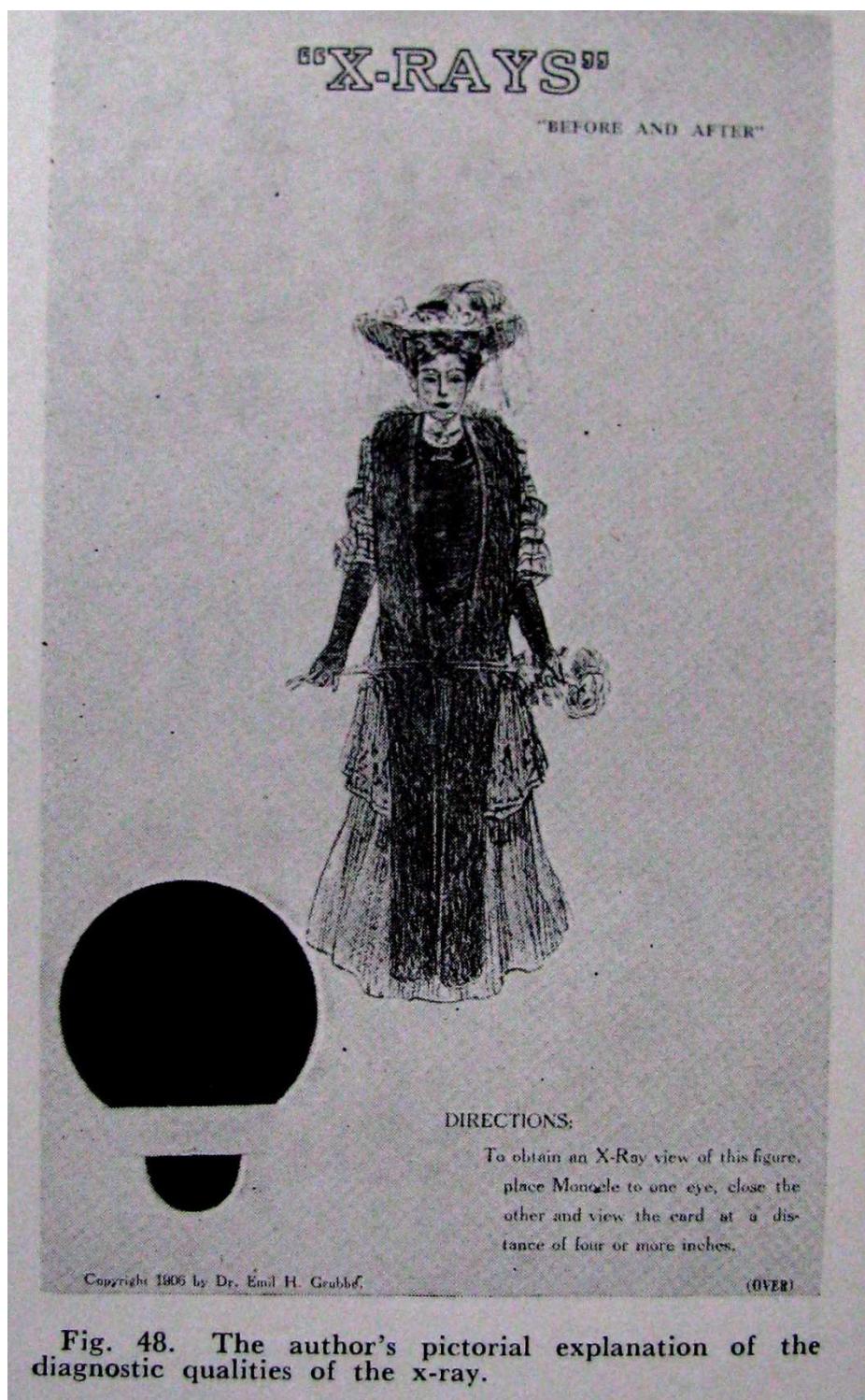


Figure 31. Plate from Emil Grubbe, *X-Ray Treatment: Its Origin, Birth, and Early History*, (Saint Paul, MN: Bruce Publishing Company, 1949), 130.

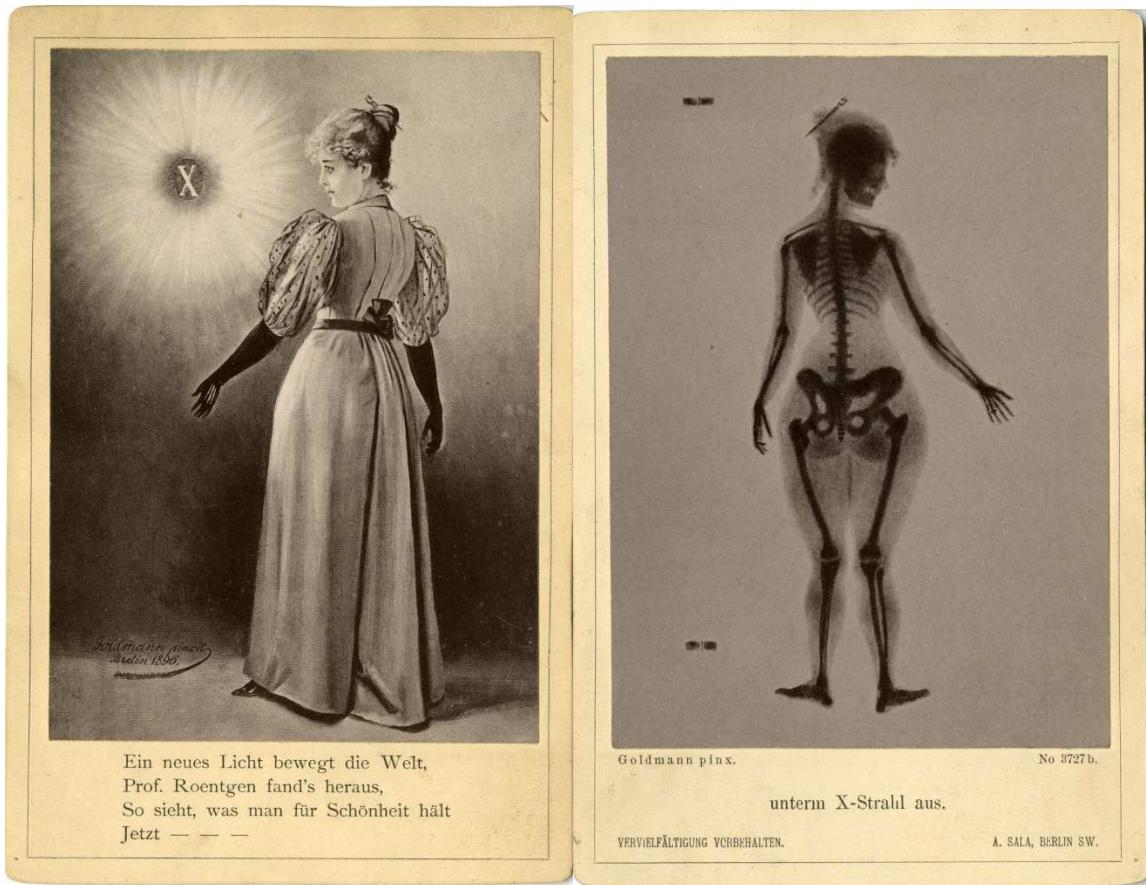
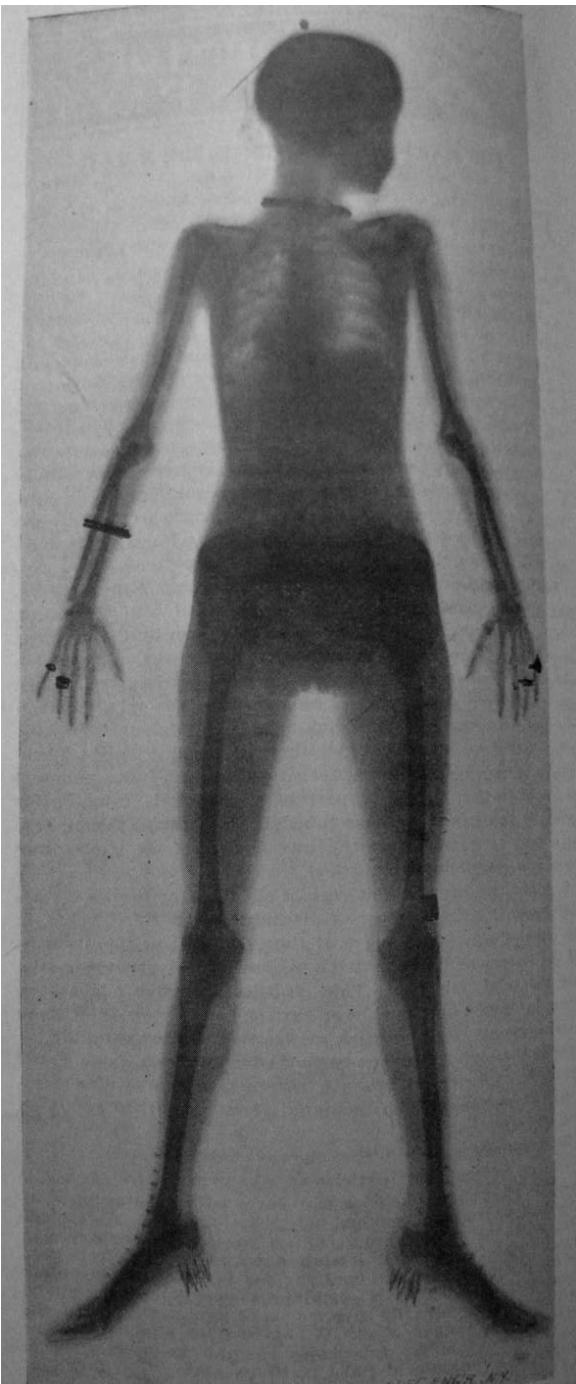


Figure 32. Cabinet Card, 1896, Collection of the Isabella Stewart Gardner Museum.



ROENTGEN RAY PHOTOGRAPH OF COMPLETE SKELETON MADE WITH
SINGLE FILM, 3 X 6 FEET, EXPOSURE 30 MINUTES. TAKEN
BY DR. W. J. MORTON.

Figure 33. William James Morton, "Roentgen Ray Photograph of Complete Skeleton Made with Single Film," *Electrical Engineer*, May 19, 1897: 522.



Figure 34. *May Bragdon's hand*, Cyanotype printed from a glass negative made on March 14, 1899. Collection of the Bragdon Family Papers, University of Rochester Rare Books and Special Collection.

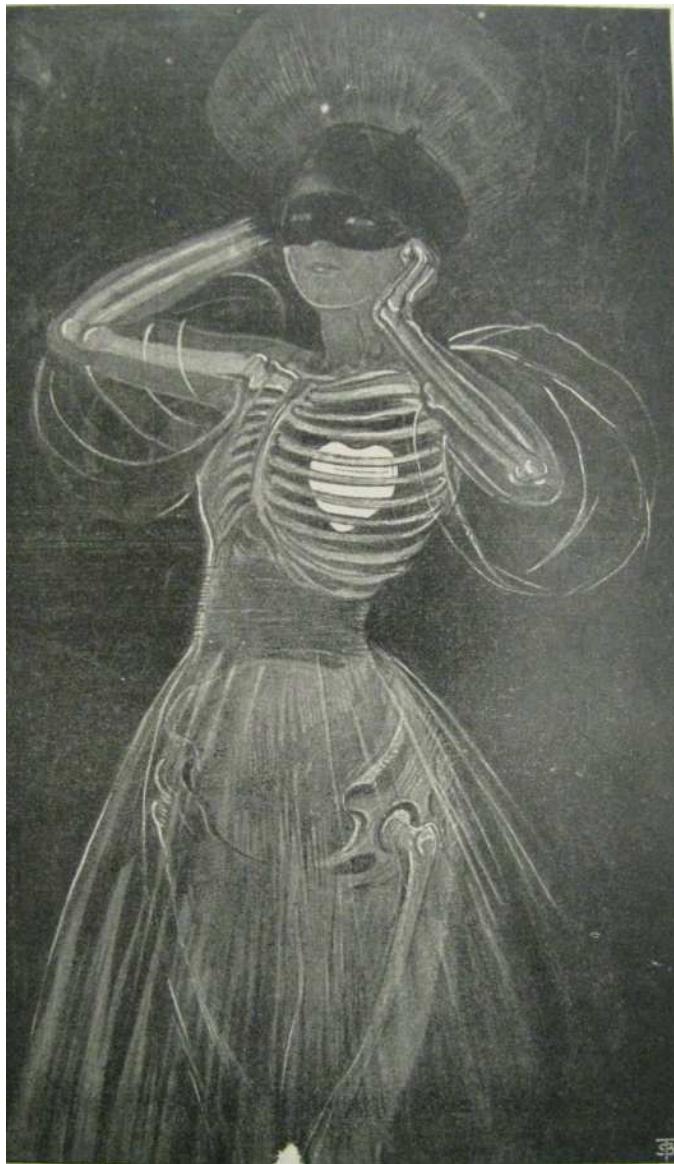


Figure 35. *Untitled*, 1896, Collection of the New York Public Library Picture Collection.



Figure 36. "Muriel Martin—An X-ray Portrait," 1916, Silver Gelatin Photograph, Collection of Richard Kremer.



Figure 37. Jack Downey (photographer), Press Photo of Dorothy Tidwell as Miss Perfect Posture, 1956, Collection of the author.



Figure 38. "X-rays and You," Cover, *Science Illustrated*, August 1947. Collection of the author.



Figure 39. Arthur Fuchs' radiograph, installed at the Mees Gallery in George Eastman House, ca. 1960, Silver Gelatin Photograph, George Eastman Legacy Collection, George Eastman Museum.



Figure 40. Barbara Kruger, *Untitled (Memory is your image of perfection)*, 1982, 61 x 33 ¾ inches, Collection of Henry S. McNeill, Jr., Philadelphia.



Figure 41. Still from “Defiance” commercial, Citrical, 2014.

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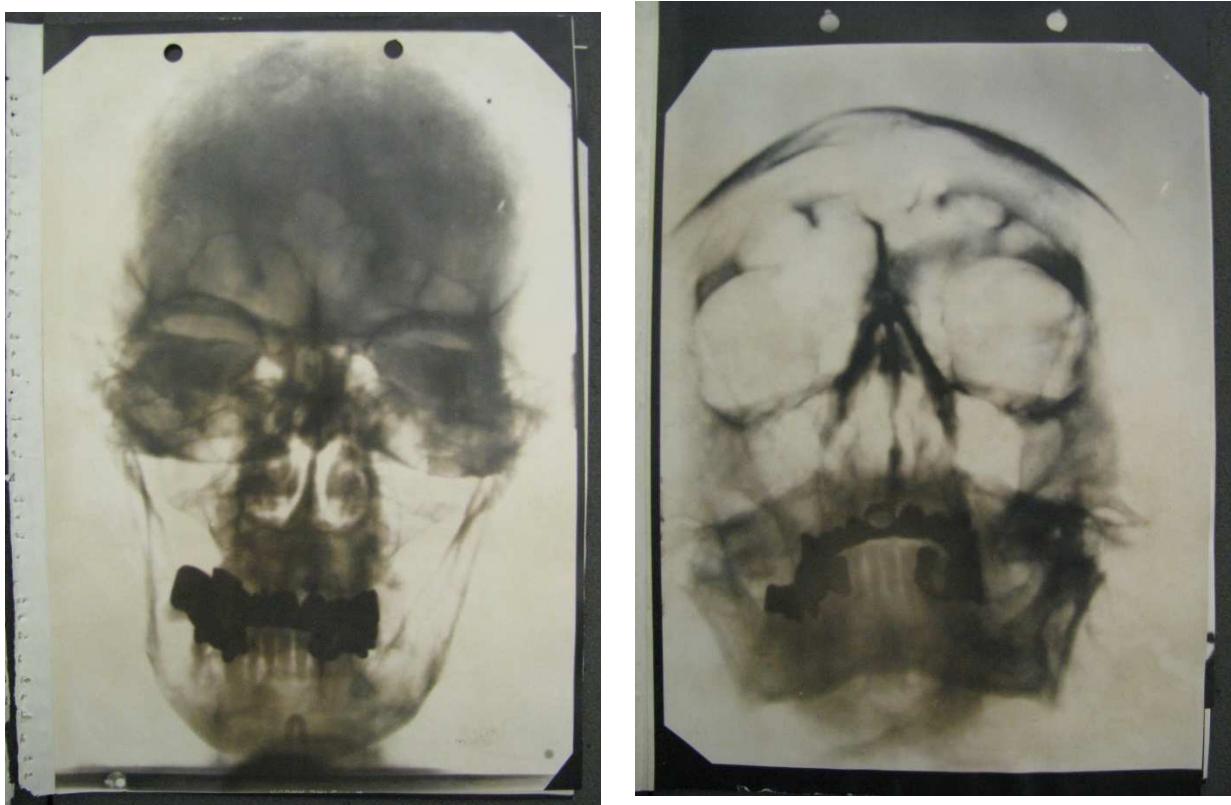


Figure 42a and 42b. *Hitler As Seen by His Doctors (1945-46)*, Frankfurt-am-Main, Germany. X-ray photographs. Collection of the National Library of Medicine.



PICTURE OF BALL IN ITS PRESENT LOCATION.

Figure 43. Plate from Samuel Wing, *The Soldier's Story*, (Phillips, ME: Phonograph Steam Book and Job Print, 1898).

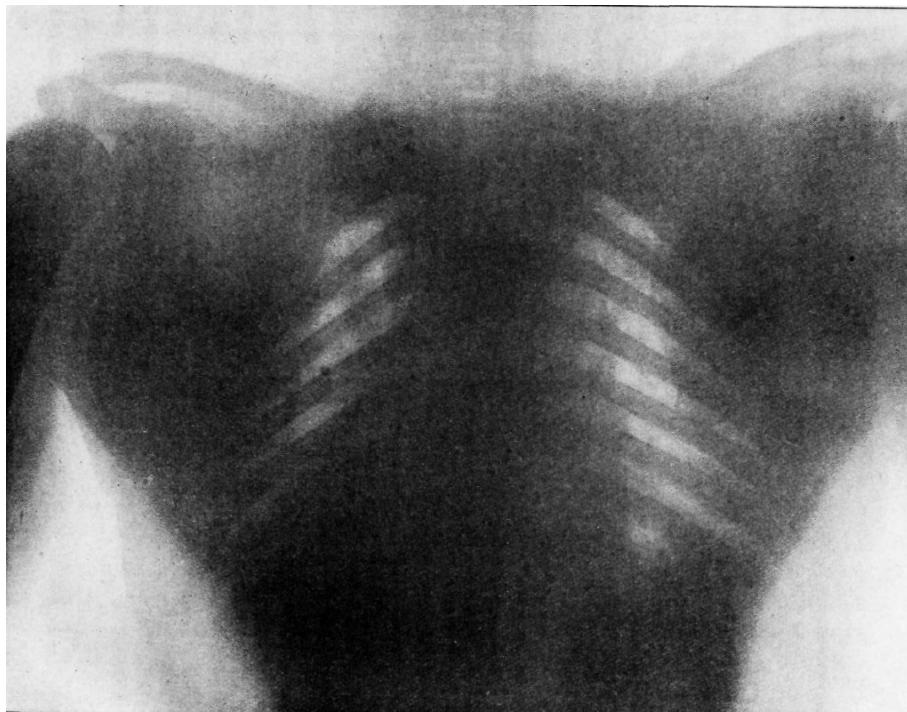


Figure 44a. Plate from Medicus, "Sandow Under X-Rays," *Sandow's Magazine of Physical Fitness*, June 1901.

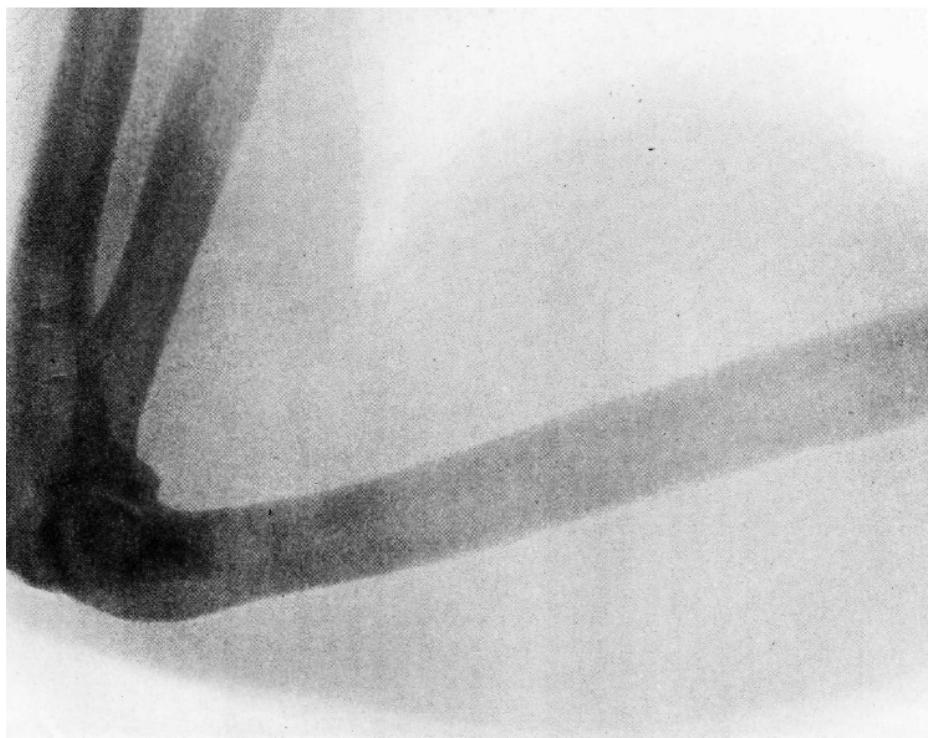


Figure 44b. Plate from Medicus, "Sandow Under X-Rays," *Sandow's Magazine of Physical Fitness*, June 1901.



Figure 45. Plate from "X-ray Works Overtime on Pugilist's Skull," *Popular Mechanics* 25.6, June 1911: 829.

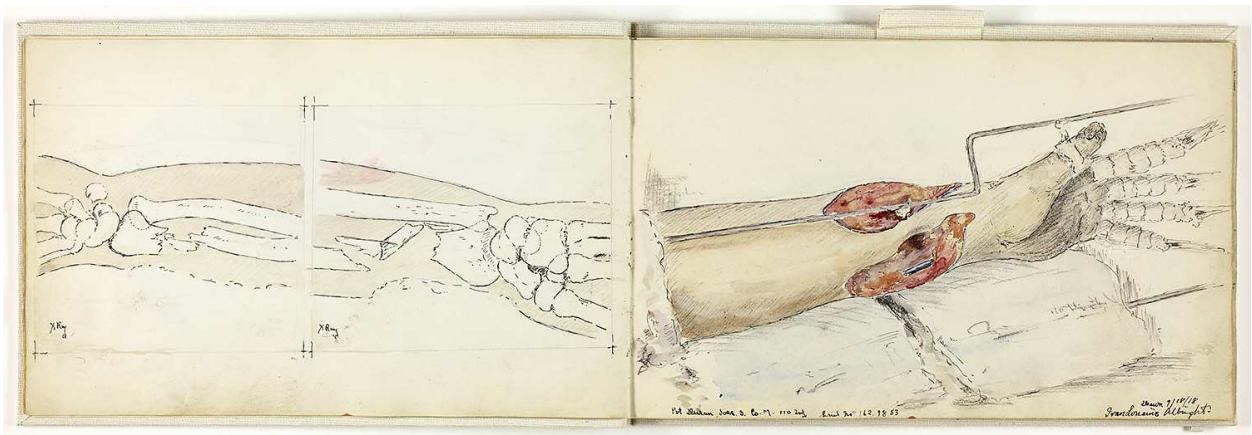


Figure 46. Ivan Albright, Drawing of radiographs and surgical procedure, September 18, 1918. *Medical Sketchbook*, 1918. Collection of the Art Institute of Chicago.

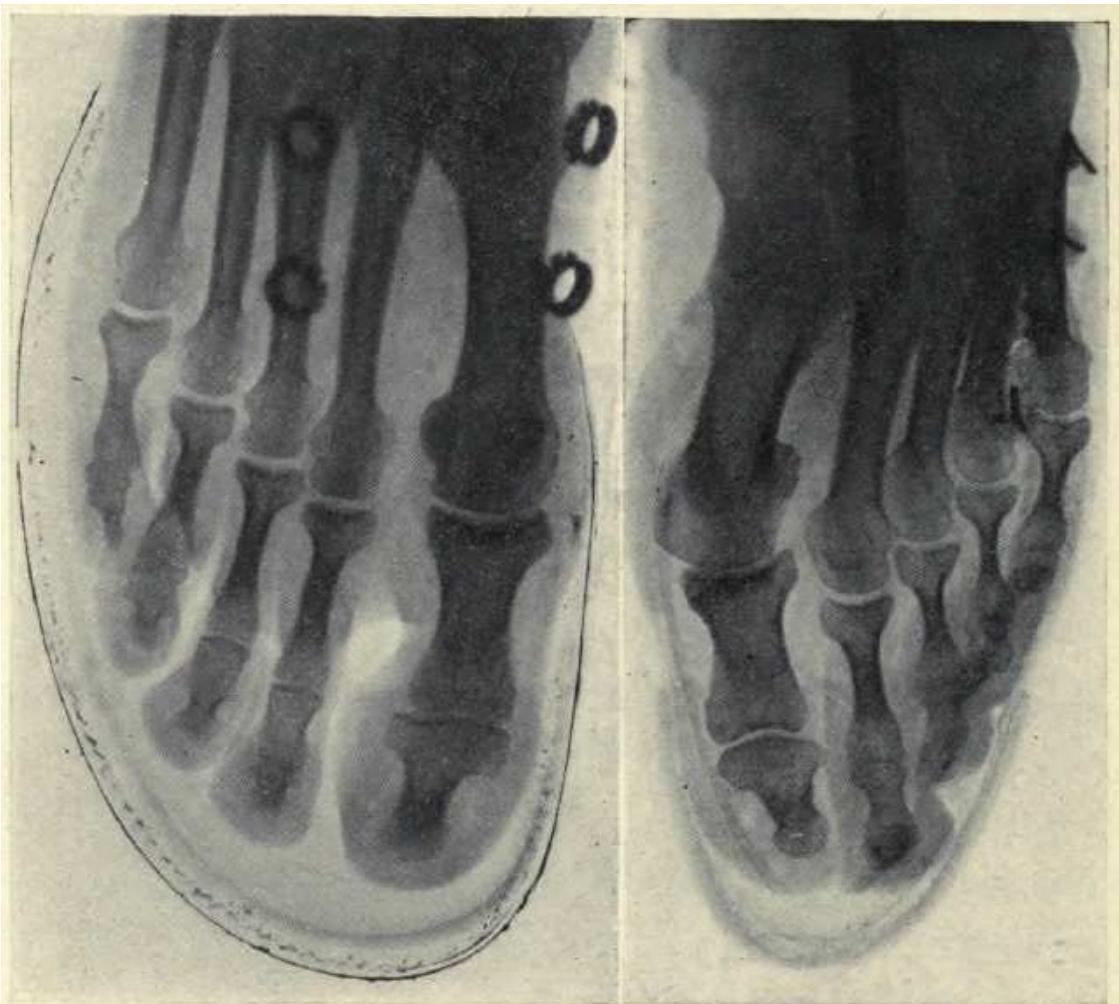


Fig. 7.—Skiagrams (x-ray pictures) of feet: Left, well-shaped foot in new model army shoe. Right, deformed foot in type of shoe responsible for the deformity.

Figure 47. Plate from Frank Keefer, *A Text-Book of Military Hygiene and Sanitation* (Philadelphia, PA: W.B. Sanders, 1914), 104.

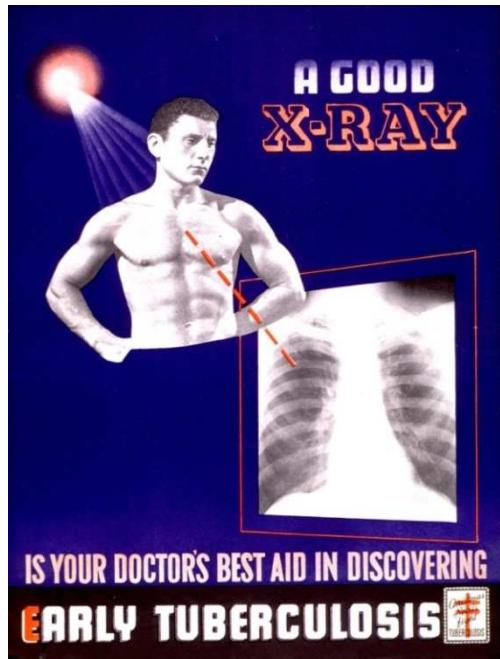


Figure 48. The American Lung Association, “A Good X-ray is Your Doctor’s Aid in Discovering Early Tuberculosis,” Ca.1930. Photomechanical Print (poster), 38 x 28cm, Collection of the National Library of Medicine.

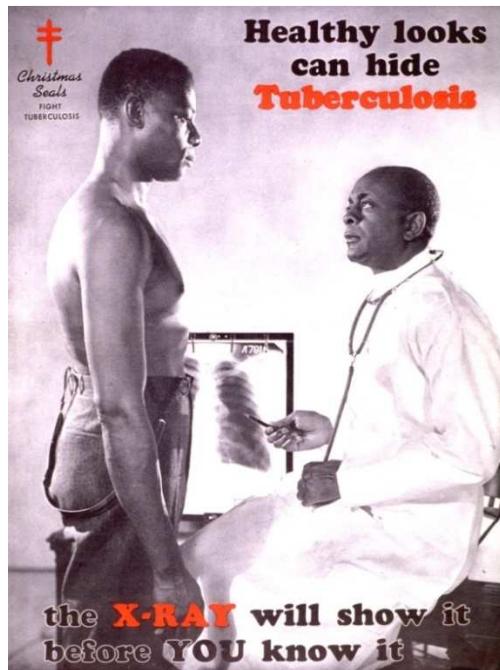
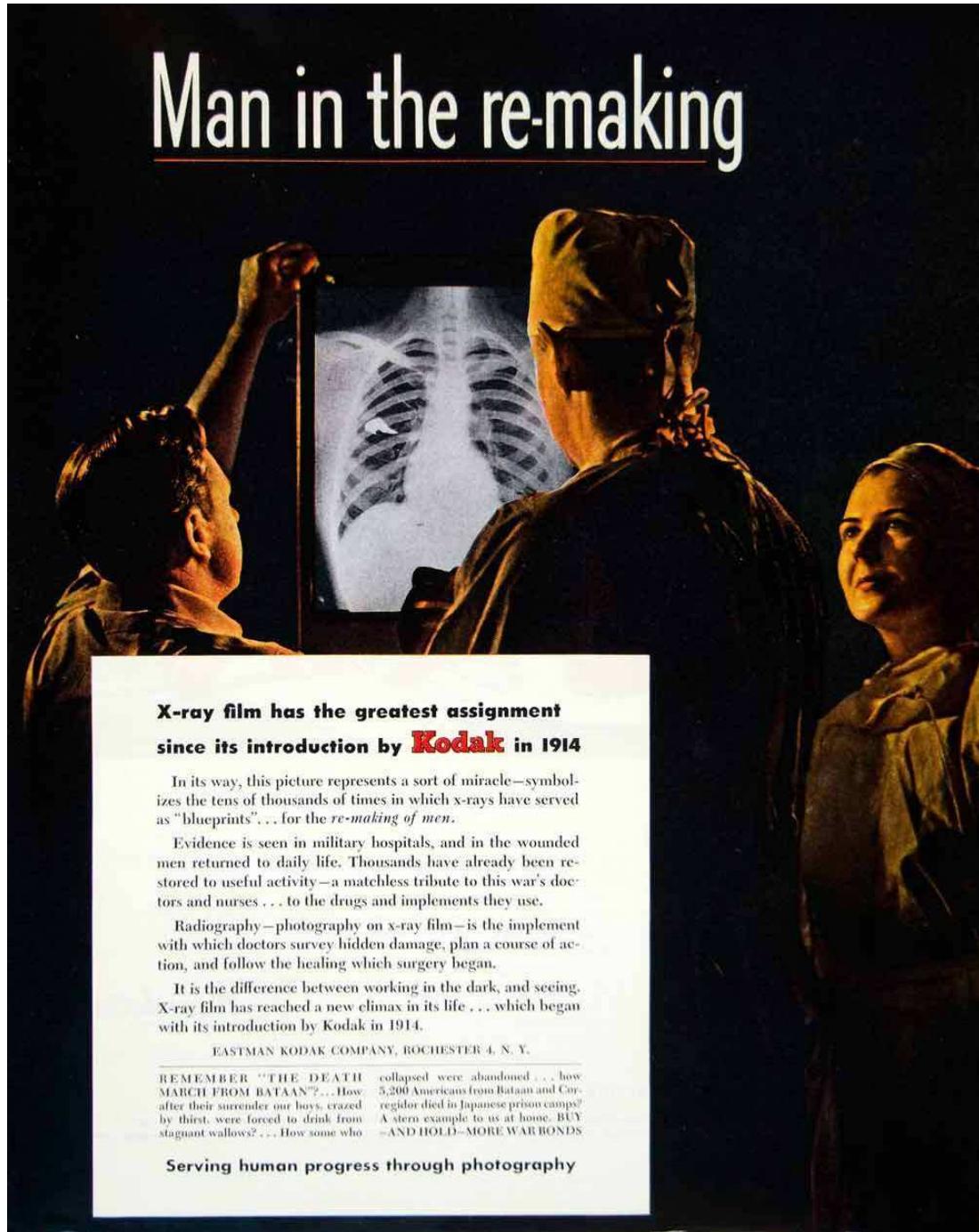


Figure 49. The American Lung Association, “Healthy Looks can hide Tuberculosis, the X-RAY will show it before YOU know it,” Ca. 1930s. Photomechanical print (poster), 38 x 28cm. Collection of the National Library of Medicine.



**X-ray film has the greatest assignment
since its introduction by **Kodak** in 1914**

In its way, this picture represents a sort of miracle—symbolizes the tens of thousands of times in which x-rays have served as “blueprints” . . . for the *re-making* of men.

Evidence is seen in military hospitals, and in the wounded men returned to daily life. Thousands have already been restored to useful activity—a matchless tribute to this war’s doctors and nurses . . . to the drugs and implements they use.

Radiography—photography on x-ray film—is the implement with which doctors survey hidden damage, plan a course of action, and follow the healing which surgery began.

It is the difference between working in the dark, and seeing. X-ray film has reached a new climax in its life . . . which began with its introduction by Kodak in 1914.

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.

REMEMBER “THE DEATH MARCH FROM BATAAN”? . . . How after their surrender our boys, crazed by thirst, were forced to drink from stagnant swallows? . . . How some who collapsed were abandoned . . . how 5,200 Americans from Bataan and Corregidor died in Japanese prison camps? A stern example to us at home. BUY —AND HOLD—MORE WAR BONDS

Serving human progress through photography

Figure 50. Eastman Kodak Company, “Man in the Remaking,” 1944, advertisement.

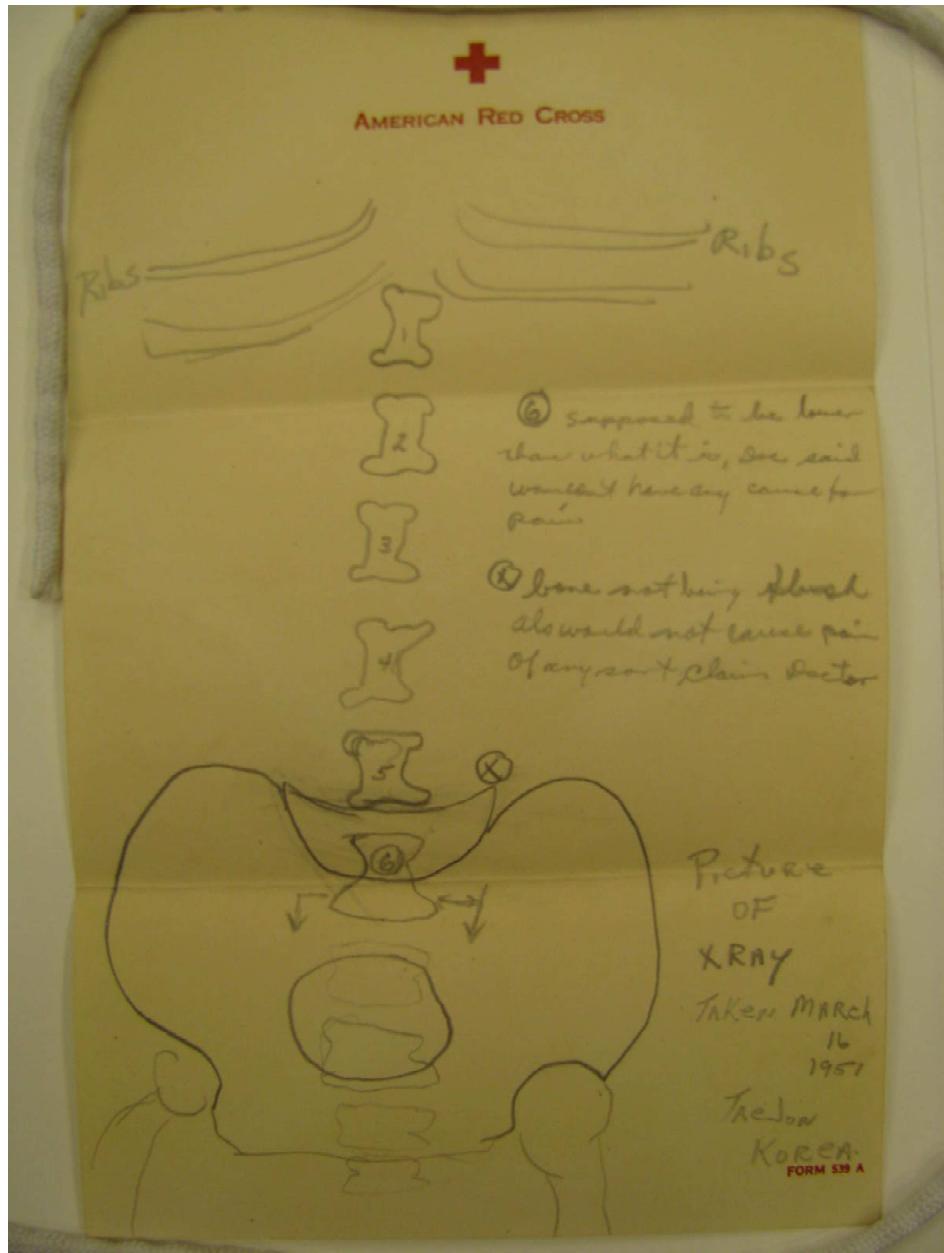


Figure 51. Martin L. Duda, "Letter to Mrs. Phyllis Duda," March 17, 1951. Martin L. Duda Letters, 1950-1951. Earl Gregg Swem Library Special Collections.

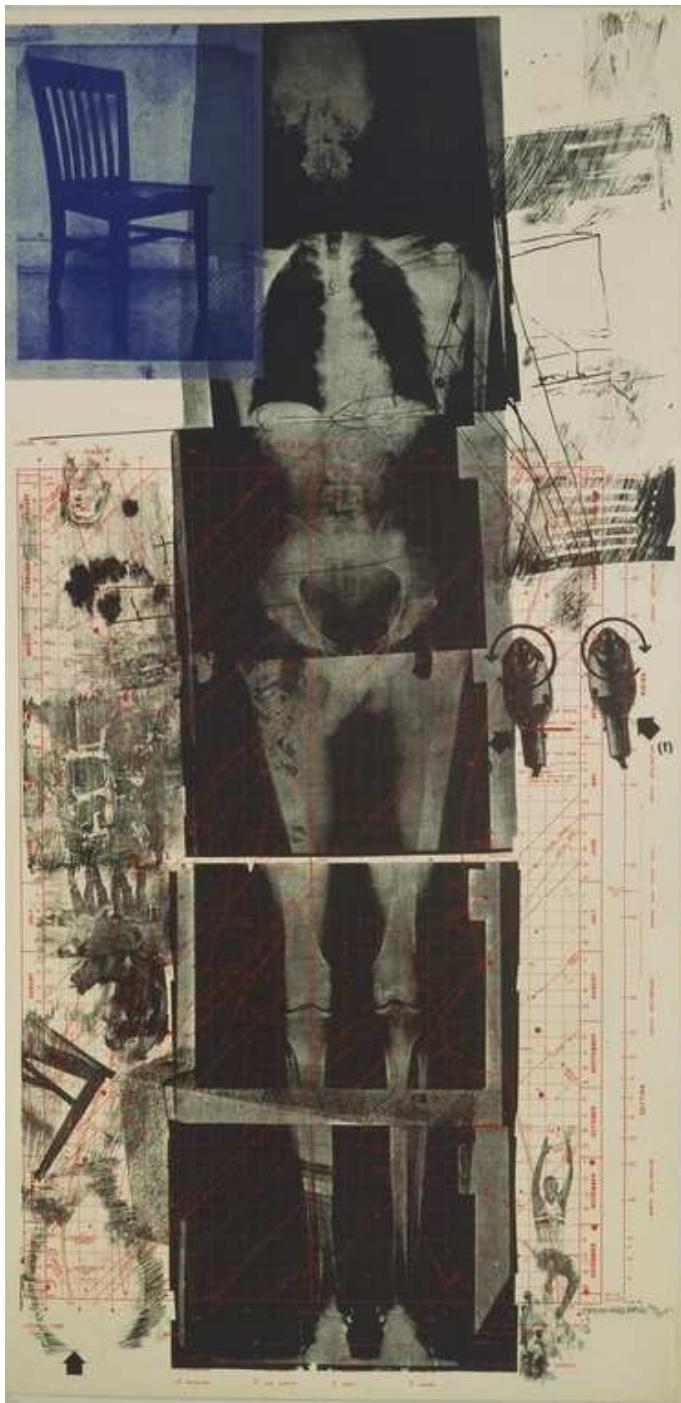


Figure 52. Robert Rauschenberg, *Booster* from the series *Booster and 7 Studies*, 1967, Lithograph and Screenprint, $71\frac{1}{2} \times 35\frac{1}{8}$ inches, Collection of the Museum of Modern Art, John B. Turner Fund.



Figure 53. Lev T. Mills, *I'm Funky But Clean*, 1972. Screenprint on paper with colored-pencil additions, Image: 23 x 19 in. (58.4 x 48.3 cm). Brooklyn Museum, Gift of R.M. Atwater, Anna Wolfrom Dove, Alice Fiebiger, Joseph Fiebiger, Belle Campbell Harriss, and Emma L. Hyde, by exchange, Designated Purchase Fund, Mary Smith Dorward Fund, Dick S. Ramsay Fund, and Carll H. de Silver Fund, 2012.80.34. © Lev T. Mills.



Figure 54. Plate 11 in Jim Scanlon and Bob Doctor, "X-ray Evaluation of the Above Knee Socket; A Supplement to Standard Check-out Procedures," Ca. 1977. Fitzsimons Army Medical Center Institutional Memory Preservation Project, Digital Resource Foundation for the Orthotics and Prosthetics Community: Virtual Library Project.



Figure 55. "Our extraoral films deliver dramatic performance," Kodak advertisement, 1975, George Eastman Legacy Collection, George Eastman Museum.



Figure 56. "After Trayvon," cover, *Time Magazine*, July 29, 2013.

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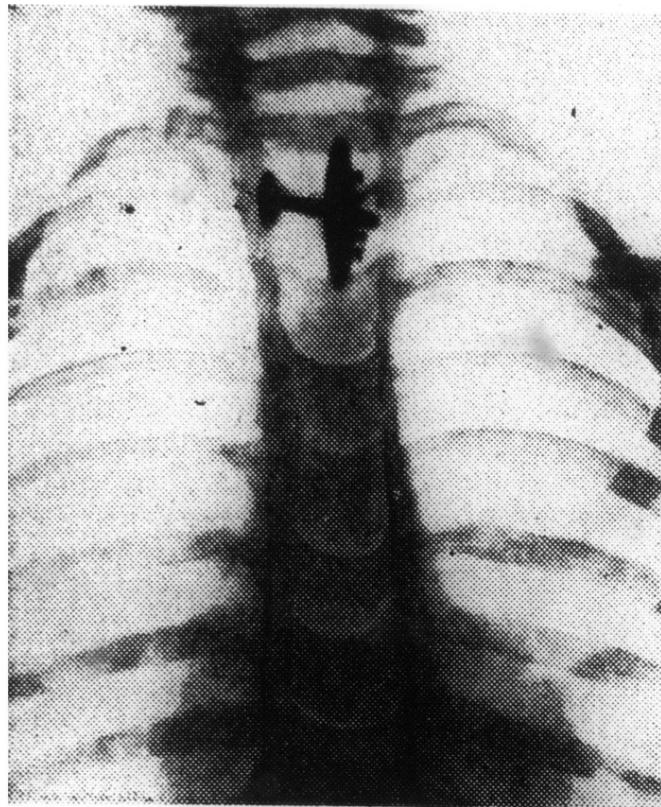


Figure 57. "Don Downs a Bomber..." *The Washington Post*, December 6, 1940, 14.

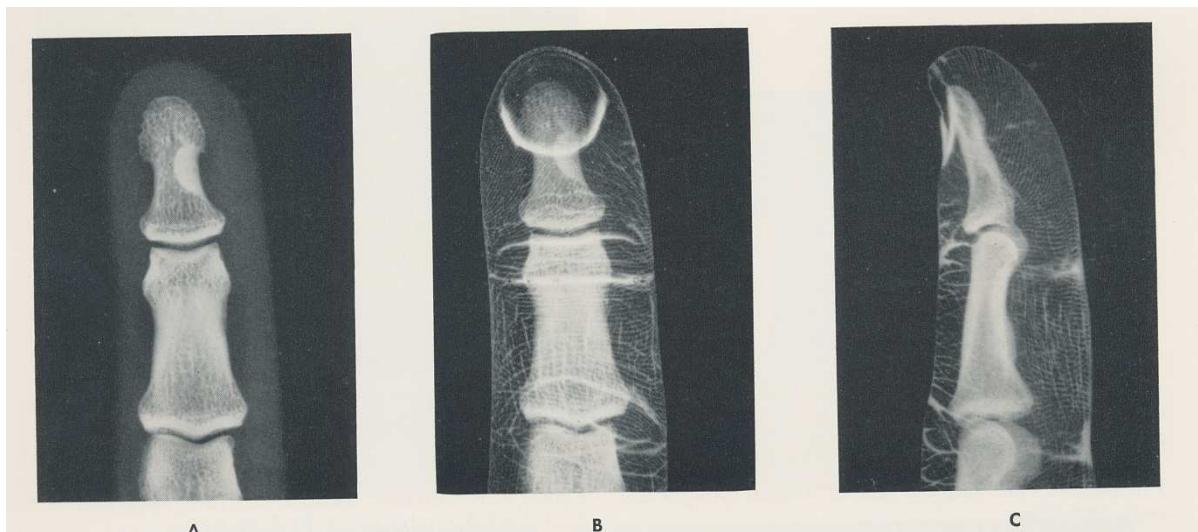


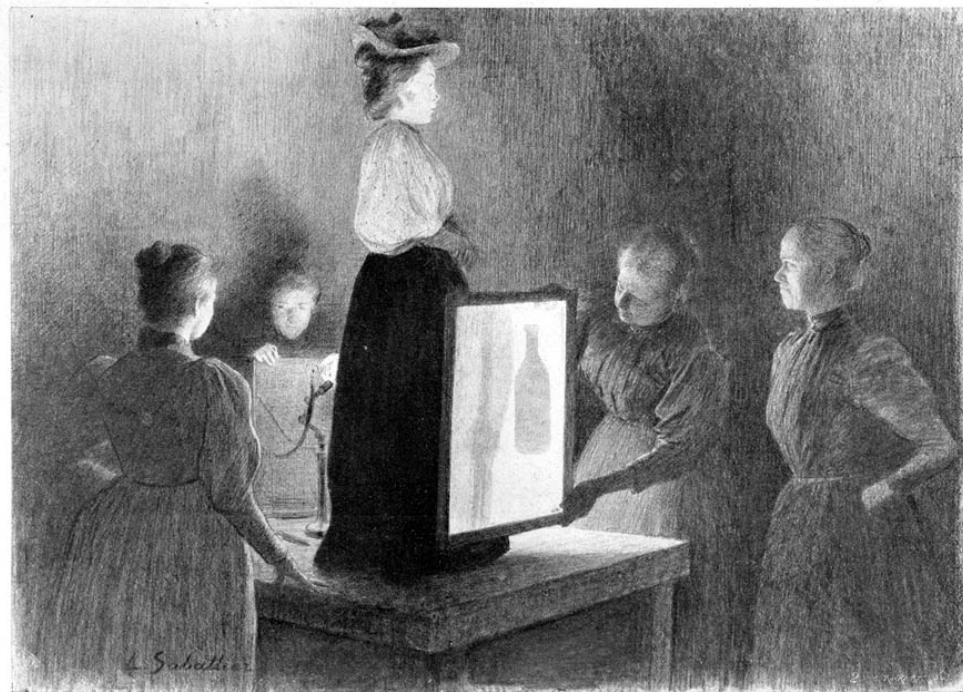
Figure 58 (a-c). Three X-ray fingerprints. N.D. Reproduced in Lucy Frank Squire, *Fundamentals of Roentgenology* (Cambridge, Mass: Harvard University Press, 1966), 14.



Figure 59. X Ray Picture of a Six-Fingered Hand, National Library of Medicine, N.d., in William H. Whitslar, *Photographs and Hand Silhouettes from the collection of W.H. Whitlsar* (2010).



Figure 60. *Normal Hand, An Exceptionally Clear Radiograph.* 1905. CP22596.
National Museum of Health and Medicine.



Fraudeuse dénoncée par les rayons X.

Figure 61. "Fraudeuse Denoncée par les Rayons X," *L'Illustration* July 3, 1897.Figure 62a. Still, Gaston Bretteau, *L'Utilité des Rayons X* (1898), Courtesy of Lobster Films.



Figure 62b. Still, Gaston Bretteau, *L'Utilite des Rayons X* (1898). Courtesy of Lobster Films.



Figure 62c. Still, Gaston Bretteau, *L'Utilite des Rayons X* (1898). Courtesy of Lobster Films.



Figure 62d. Still, Gaston Bretteau, *L'Utilite des Rayons X* (1898). Courtesy of Lobster Films.

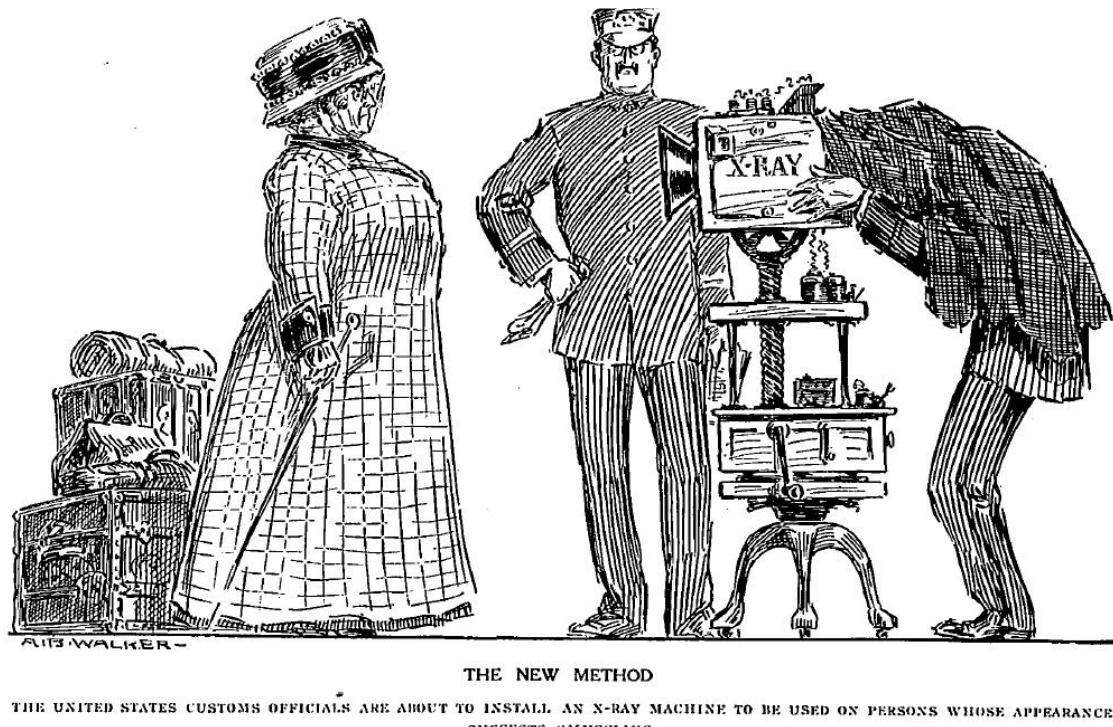


Figure 63. A.I.B. Walker, "The New Method," *Life*, September 15, 1910.

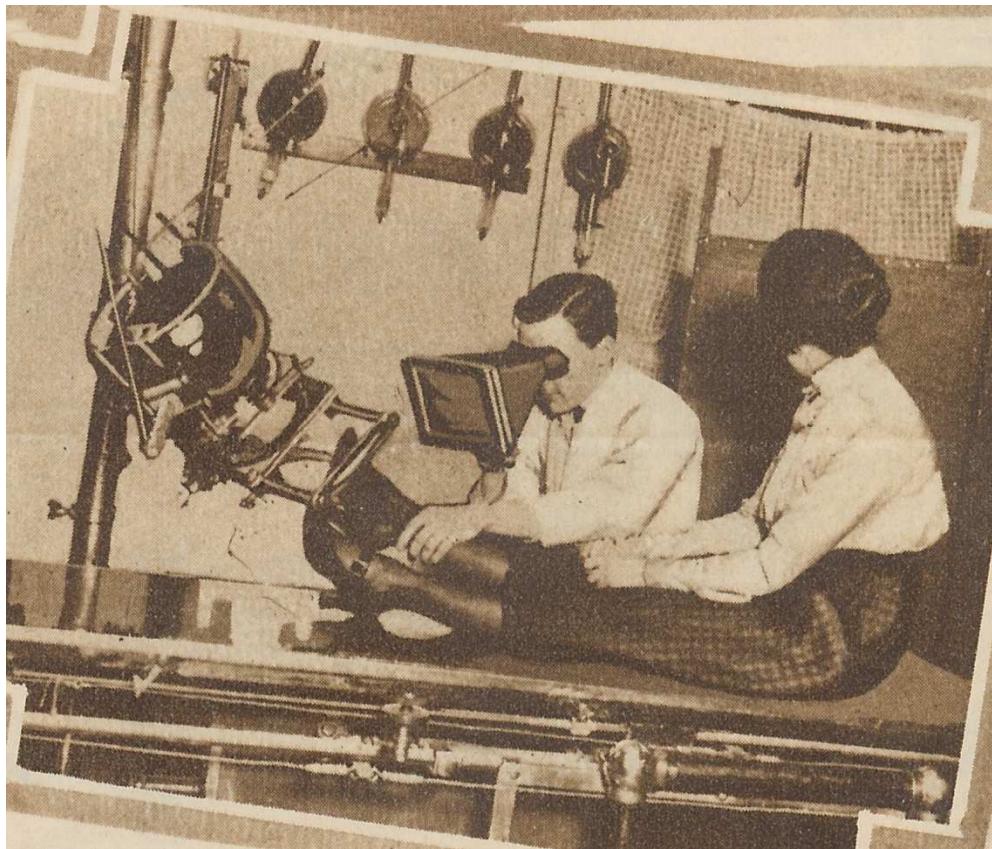


Figure 64a. Detail, "Odd Uses for X-Rays," *Science and Invention*, 1921.

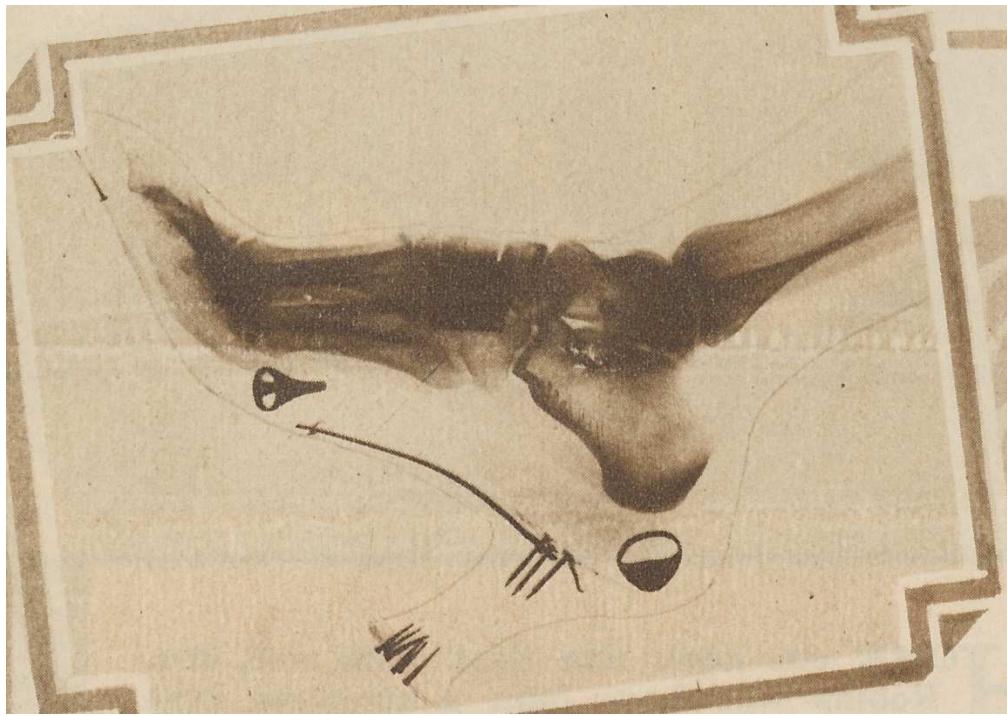
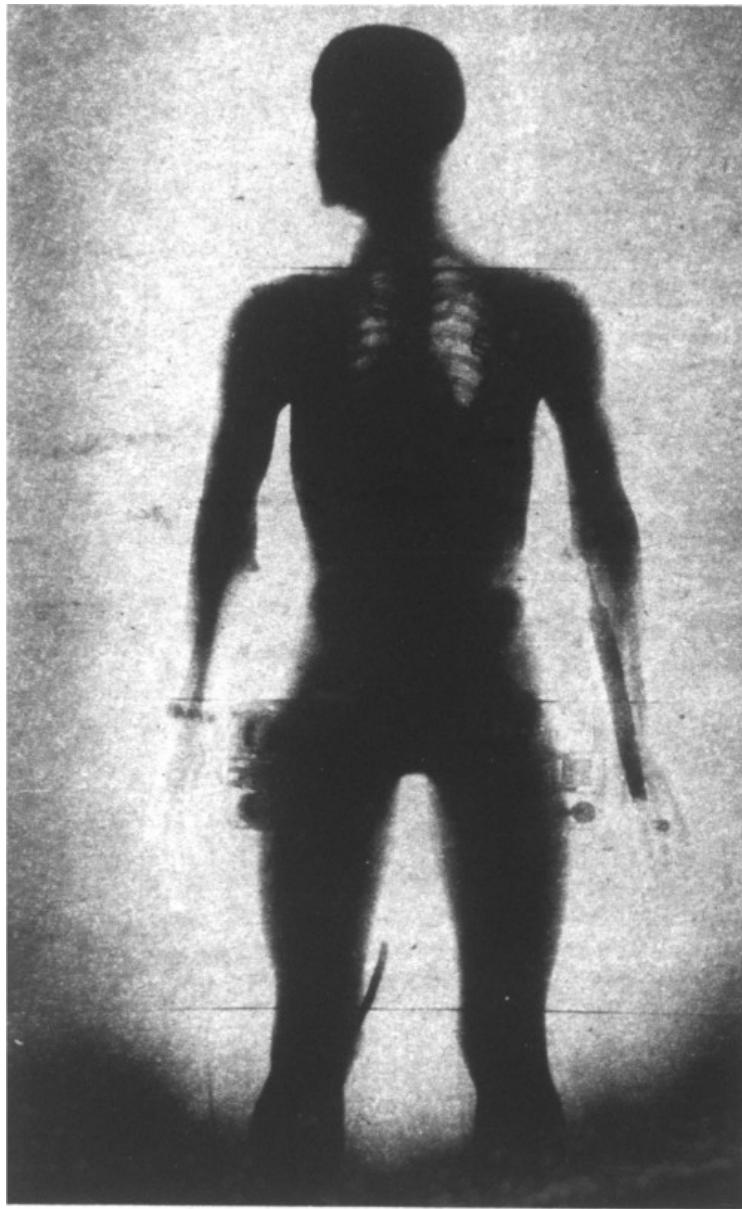


Figure 64b. Detail, "Odd Uses for X-Rays," *Science and Invention*, 1921.



INSPECTOSCOPE IMAGE is fluoroscopic, reveals all objects worn or carried

Figure 65. Frank Cameron, "Mr. Sicular's Magic Eye," *Los Angeles Times*, May 2, 1954, L10.

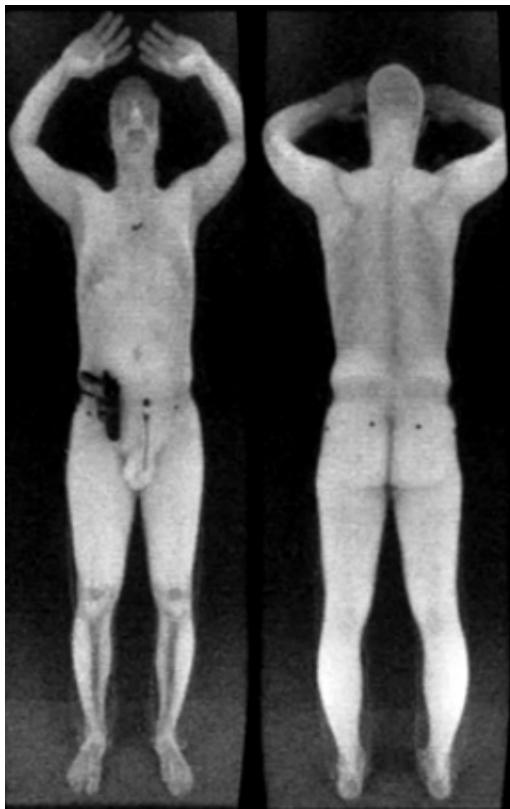


Figure 66. Rapiscan Systems backscatter X-ray body scanner image. From the independent study by Eric Wustrow and Hovav Shacham: "Security Analysis of a Full Body Scanner," (2014). https://www.youtube.com/watch?v=x_f4HUrN-NA Accessed on 3/30/2015.

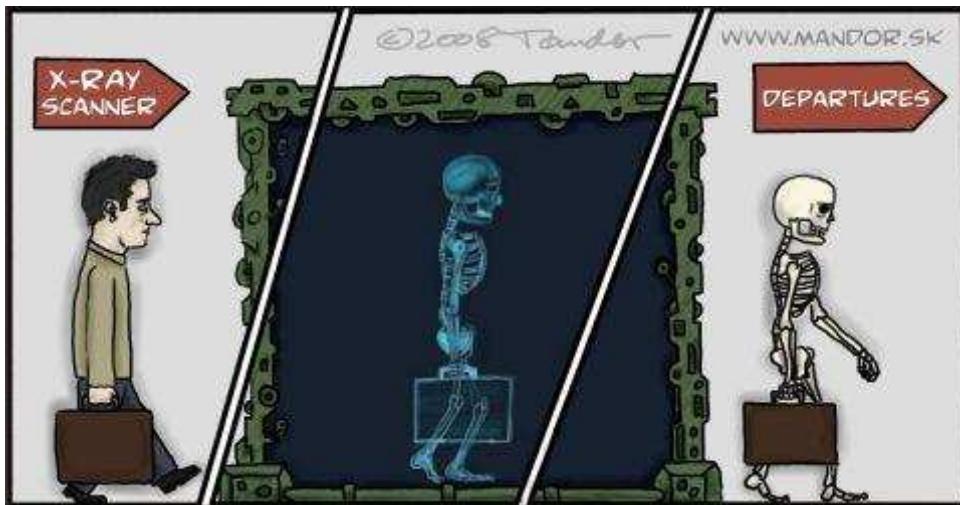


Figure 67. *Airport X-ray Scanner*, 2008.
http://www.toonpool.com/cartoons/Airport%20X-ray%20scanner_24421#img9
Accessed on 4/1/2015.



Figure 68. Darek Gogol, Conceptual Illustration, In Timothy Shaner's *The Art of the Pirates of the Caribbean* (New York: Welcome Book, Disney Edition, 2007).



Figure 69a. Still, Gore Verbinski, *Pirates of the Caribbean: Curse of the Black Pearl* (2003), Walt Disney Pictures.



Figure 69b. Still, Gore Verbinski. *Pirates of the Caribbean: Curse of the Black Pearl* (2003), Walt Disney Pictures.



Figure 69c. Still, Gore Verbinski, *Pirates of the Caribbean: Curse of the Black Pearl* (2003), Walt Disney Pictures.

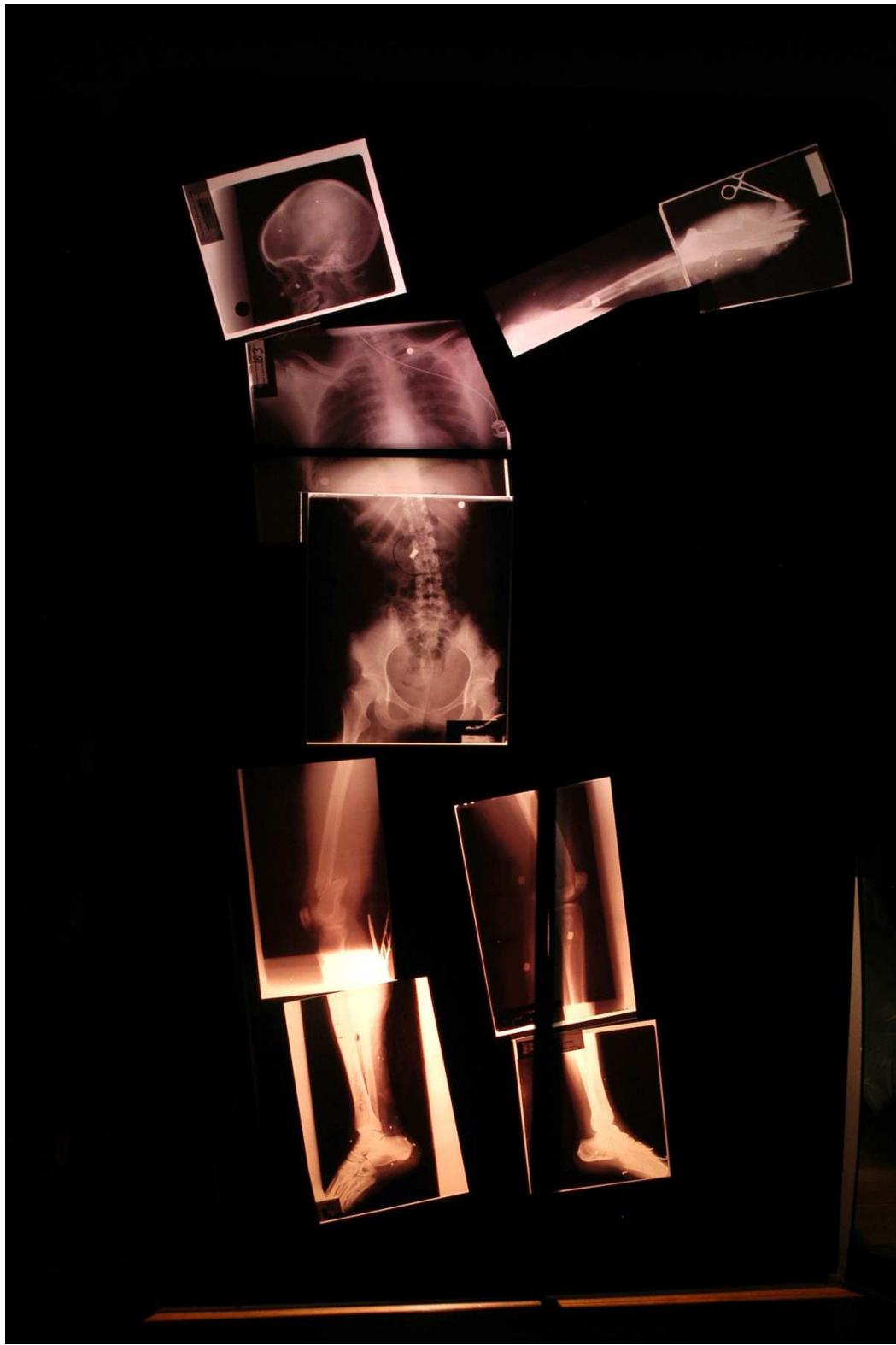


Figure 70. Diane Covert, *The Composite Man (I was eating pizza)*, 2006, 50 x 84 inches, Duratrans Film Kiosk.

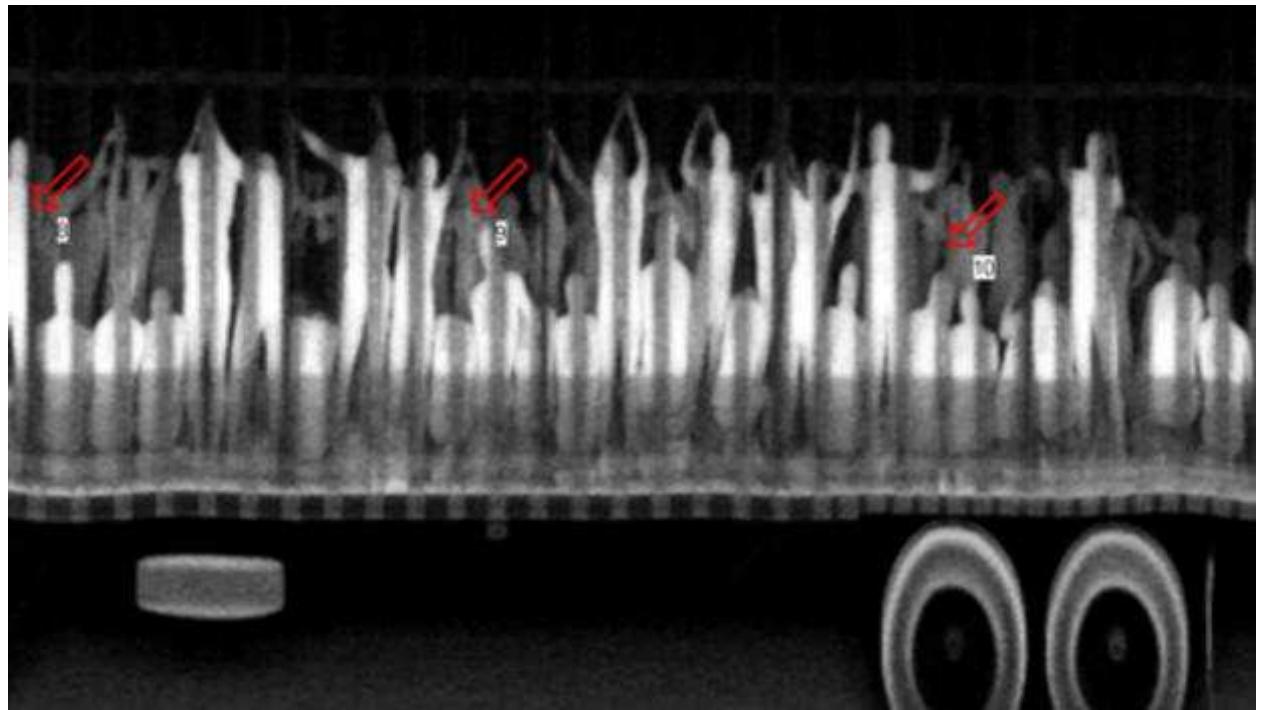


Figure 71. Still from “X-Rays lead to human cargo bust,” CBSNews.com, May 18, 2011.

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Figure 72. Antonio Vanegas Arroyo (Firm) and José Guadalupe Posada, *Gran Calavera Eléctrica* (*The Great Electric Skeleton*), Print on white fabric: relief etching, original 1903, reprint ca. 1900-1974. Prints and Photographs Division. Library of Congress.



Figure 73a. Diego Rivera, *Man, Controller of the Universe*, 1934. Palacio de Bellas Artes, Mexico City.

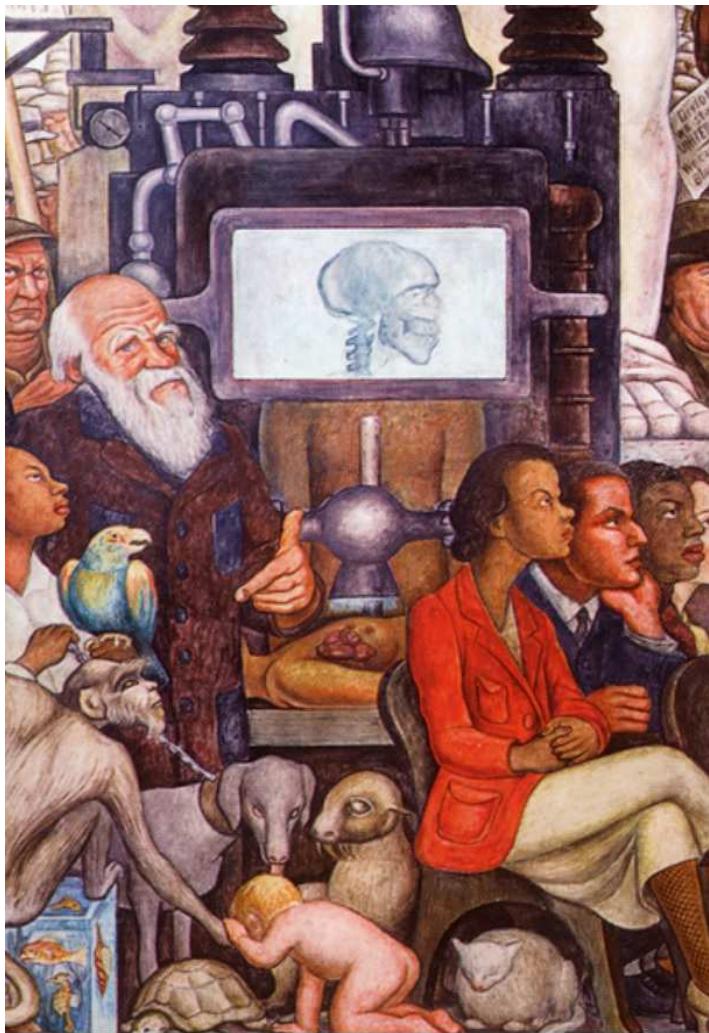


Figure 73b. Detail, Diego Rivera, *Man, Controller of the Universe*, 1934. Palacio de Bellas Artes, Mexico City.

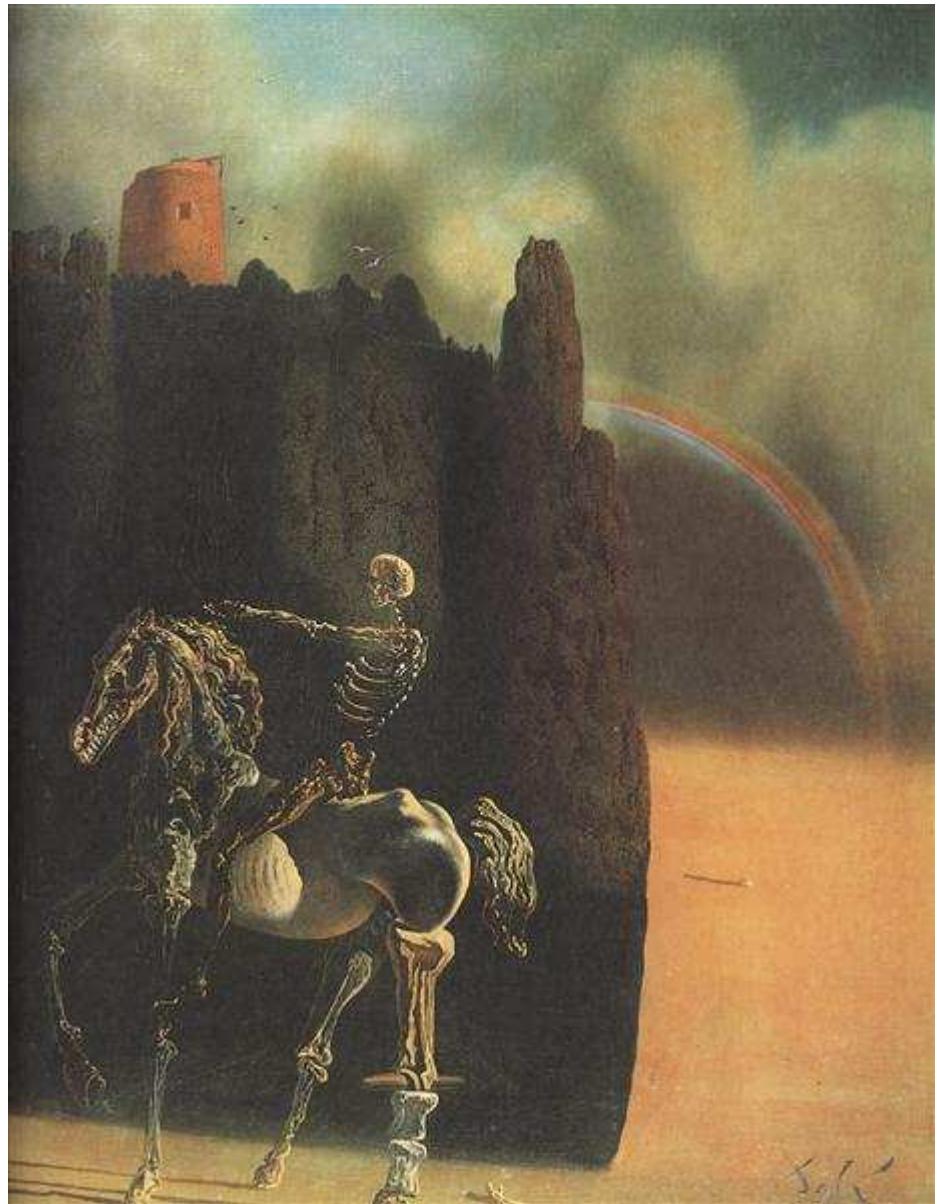


Figure 74. Salvador Dalí, *The Horseman of Death*, 1935. Oil painting, 54 x 65cm. Andre-Francois Petit, Paris, France.



Figure 75. Pavel Tchelitchew, *Phenomena* (1936-38), Oil on Canvas. 79 x 106 ½ inches, The State Tretyakov Gallery, Moscow.



Figure 76. Pavel Tchelitchew, *Hide and Seek*, 1942. Oil on Canvas, 199.3cm x 215.3cm. Museum of Modern Art, Mrs. Simon Guggenheim Fund.

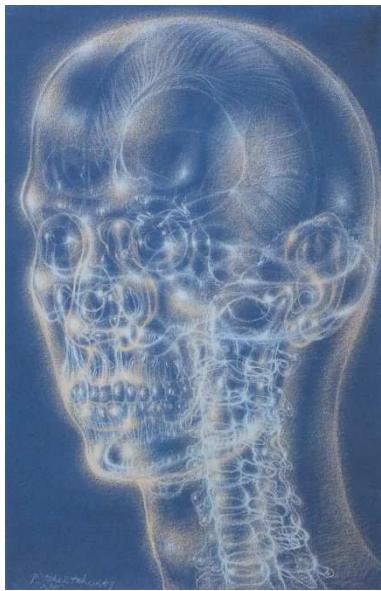


Figure 77. Pavel Tchelitchew, *Interior Landscape*, 1949. Oil Pastel on Paper, 19 ¾ x 12 ¾ in. Collection of Thomas Royal and Louis Cantabrana.



Figure 78a. Jasper Johns, *In Memory of My Feelings—Frank O'Hara*, 1961. Oil on canvas with objects, 40x 60 x 2 7/8in. Museum of Contemporary Art, Chicago, partial gift of Apollo Plastics Corporation, courtesy of Stefan Edlis and H. Gael Neeson.

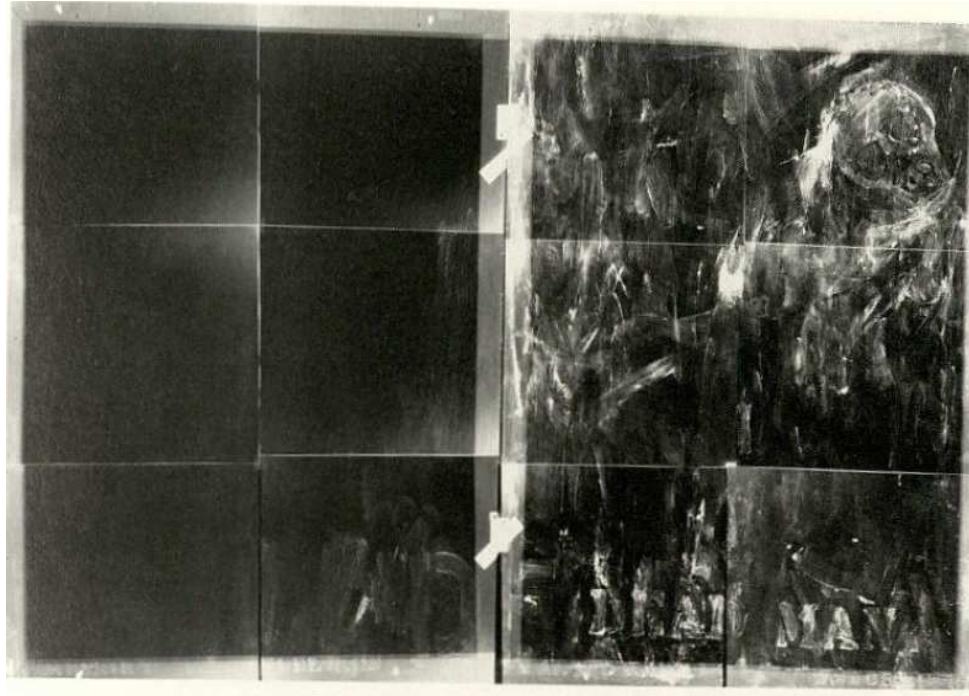


Figure 78b. “Transilluminated X-ray photographs of *In Memory of My Feelings—Frank O'Hara*.” Published in Fred Orton, *Figuring Jasper Johns*, (London: Reaktion Books, 1994).



Figure 79. Jasper Johns, *Skin with O'Hara Poem*, 1963-1965. Lithograph in black from two stones on commercially printed off-white semi-transparent wove paper. 539 x 839mm. Collection of the Art Institute of Chicago, Mr. and Mrs. Thomas Dittmer; restricted gift of supporters of the Department of Prints and Drawings; Centennial Endowment; Margaret Fisher Endowment Fund.



Figure 80. David Hammons, *Boy with Flag*, 1968, Body print and silkscreen, 40x30 inches. Collection of the Tilton Gallery.

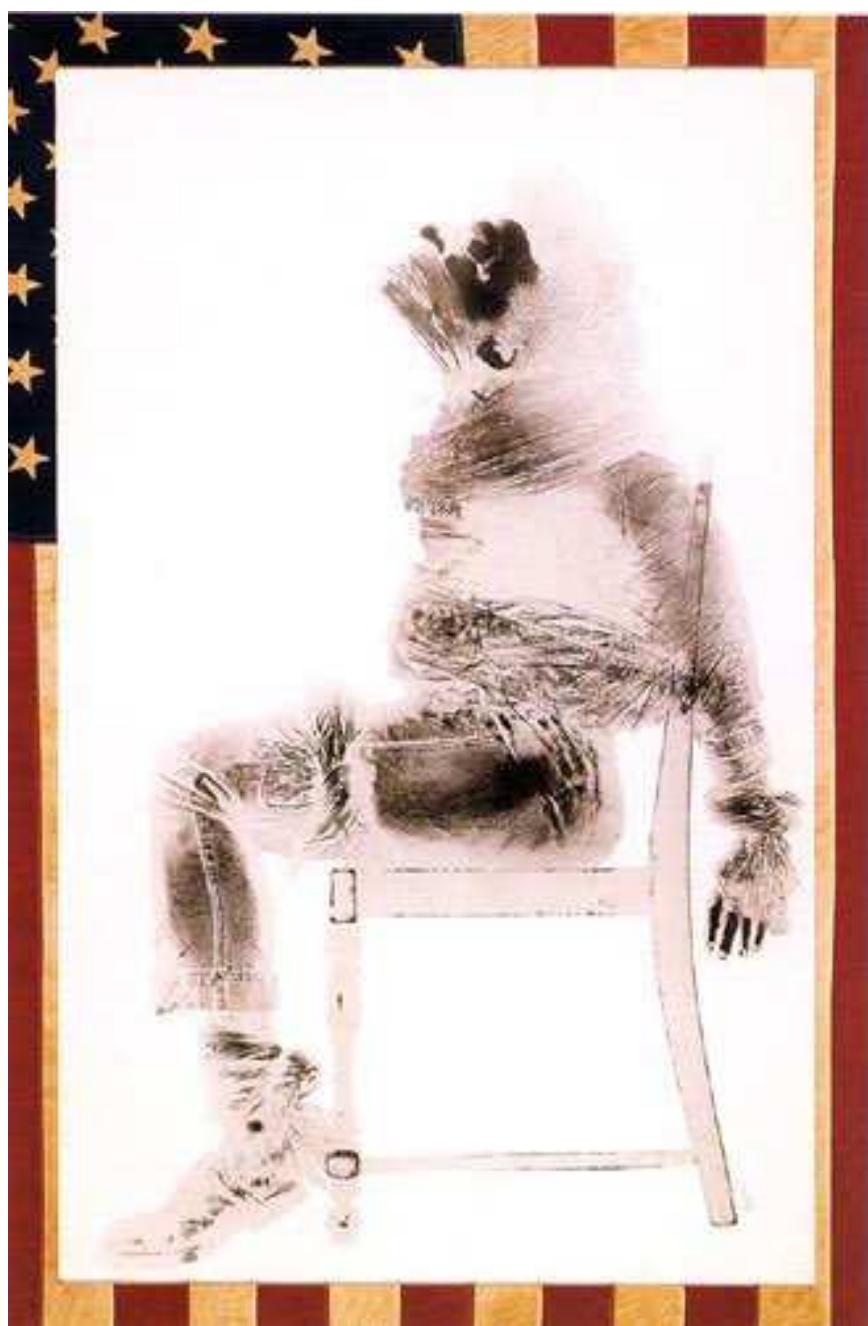


Figure 81. David Hammons, *Injustice Case*, 1970. Body print (margarine and powdered pigments) and American Flag, 63 x 40 ½ in. Los Angeles County Museum of Art, Museum Acquisition Fund.



Figure 82. Jean-Michel Basquiat, *Samo X-ray Vision/ Postcard*, ca. 1978. Collage and mixed media on paper, 3.5 x 5.5 in. Private Collection.



Figure 83. Jean Michel-Basquiat, *Boy and Dog in a Johnnypump*, 1982. Acrylic, crayon, spray paint, canvas, 420.5 x 240 cm. Private Collection



Figure 84. Jean Michel-Basquiat, *Irony of a Negro Policeman*, 1981. Acrylic, crayon, canvas, 122 x 183 cm. Private Collection.

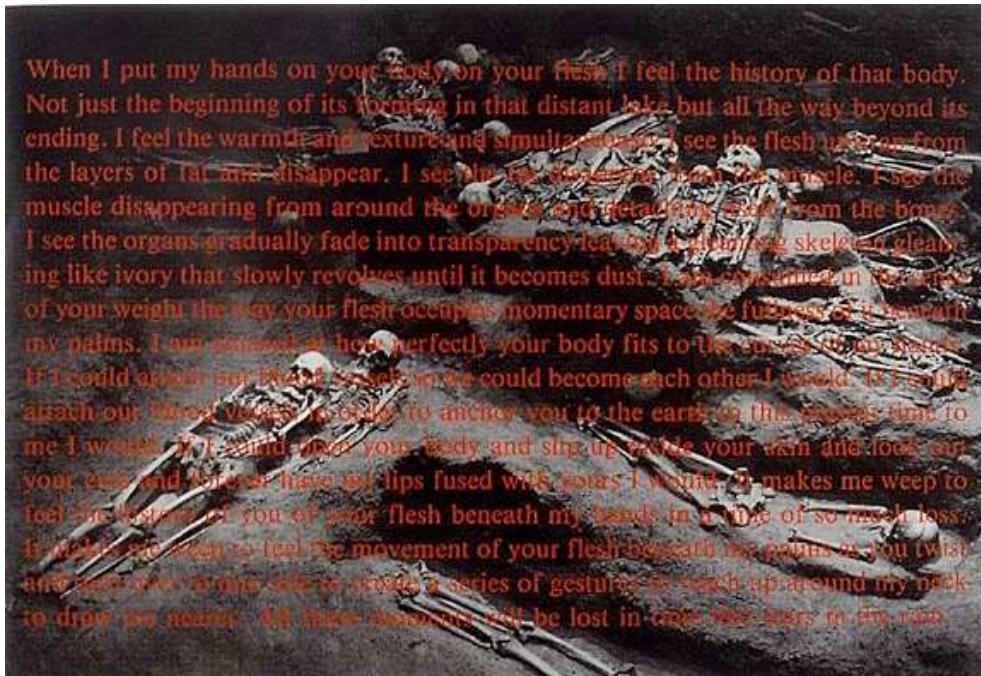


Figure 85. David Wojnarowicz, *Untitled- When I put my hands on your body*, 1990. Gelatin silver print and silkscreen text, mounted, 66 x 96.5 cm. Private Collection.



Figure 86. David Wojnarowicz, *I Feel a Vague Sense of Nausea*, 1990. Black and white photographs, acrylic, string, text on board, 60x48 inches. The Estate of David Wojnarowicz, PPOW Gallery.

CONCLUSION



Figure 87a. Still, Ad Council, *Love Has No Labels*, 2015.



Figure 87b. Still, Ad Council, *Love Has No Labels*, 2015.

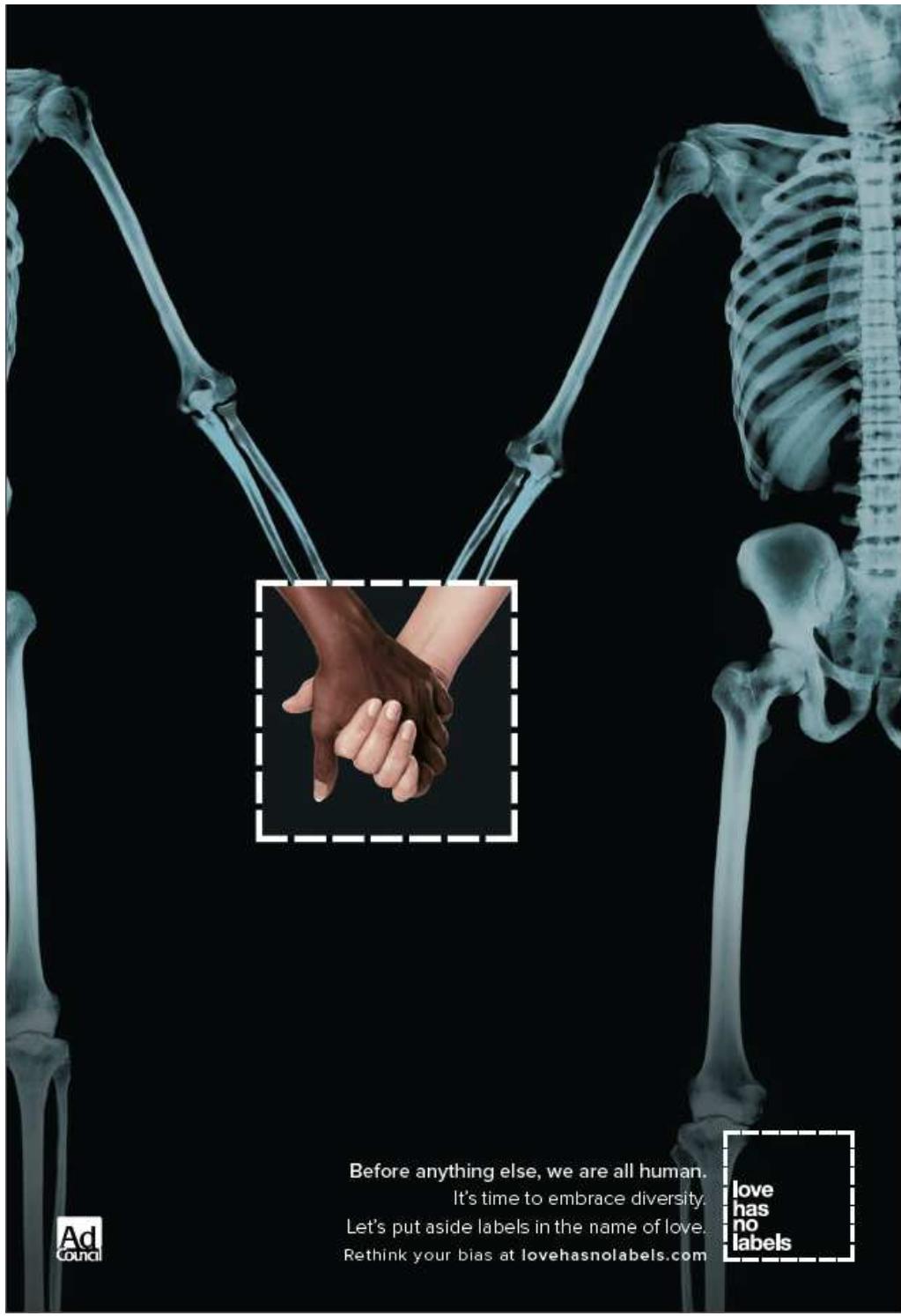


Figure 88. Poster, Ad Council, *Love Has No Labels*, 2015.

BIBLIOGRAPHY

- "2 With Gem Cache Held in Smuggling." *New York Times*, February 11, 1952, 17.
- "10 Most Shocking Things Found In People's Stomachs." *Oddee*. Accessed April 24, 2012. http://www.oddee.com/item_92016.aspx.
- "15 Most Bizarre X-Rays." *Oddee*. Accessed April 24, 2012. http://www.oddee.com/item_96558.aspx.
- 411, FOX. "Kim Kardashian X-Rays Her Fanny to Prove Its Not Made of Plastic." *Fox News*, June 24, 2011. <http://entertainment.blogs.foxnews.com/2011/06/24/14418/?test=faces>.
- "A Bourbon Princess's Hand." *New York World*. May 24, 1896.
- "A Few Customs Men Do a Big Job Here." *New York Times*, July 13, 1952, 62.
- A. H. F. "The Family Album." *Life*, October 23, 1924.
- "A Marvel of Science: Popular Lecture Describing the Roentgen Rays by Professor Joseph S. Ames." *The Sun*. March 11, 1896.
- "A Special Correspondent. "Electric Eye on Smugglers." *Sydney Morning Herald*, July 10, 1947, 9.
- "A Strange Oversight." *New York Times*, April 19, 1896.
- "A Study of the Size of the Sella Turcica in White and Colored Males and Females between the Eighth and Ninth Years as Measured on Flat X-Ray Films." *American Journal of Physical Anthropology* 14 (1930): 451–58.
- "About X-Ray Photography." *New York Times*, September 6, 1896.
- Ad Council. *Love Has No Labels*, 2015. <https://www.youtube.com/watch?v=PnDgZuGlhHs>.
- . *Love Has No Labels: One Year Anniversary | Diversity & Inclusion | Ad Council*, 2016. <https://www.youtube.com/watch?v=oWDZCVejcZQ&nohtml5=False>.
- Ades, Dawn. "Posada and the Popular Graphic Tradition." In *Art in Latin America: The Modern Era, 1820-1980*, 119. Yale University Press, 1989.
- Adorno, Theodor W. *In Search of Wagner*. Verso, 2005.
- "Advance in Photography during 1896." *The Cosmopolitan: A Monthly Illustrated Magazine*, January 1897.
- "African Americans and the World of Tomorrow." *New-York Historical Society*, November 18, 2011. <http://blog.nyhistory.org/african-americans-and-the-world-of-tomorrow/>.
- "Agents of Germany Indicted for Fraud." *New York Times*, May 28, 1915.
- A'Hearn, Joan. "For Immediate Release: Dr. William D. Coolidge." Press Release, October 21, 1968. General Electric Collection. Schenectady Museum.
- Alaimo, Stacy. *Bodily Natures Science, Environment, and the Material Self*. Bloomington: Indiana University Press, 2010. <http://public.eblib.com/EBLPublic/PublicView.do?ptID=613606>.
- . "Eros and X-Rays: Bodies, Class, and 'Environmental Justice.'" In *Bodily Natures Science, Environment, and the Material Self*. Bloomington: Indiana University Press, 2010. <http://public.eblib.com/EBLPublic/PublicView.do?ptID=613606>.

- Albrecht, Thomas. *The Medusa Effect: Representations of Horror in Psychoanalysis and Victorian Aesthetics*. State University of New York Press, 2009.
- Albright, John Brannon. "Airport Inspection of Passengers, Bags: Frisk or X-Ray?" *Chicago Tribune*, March 24, 1974, C5.
- Allen, K.D.A. "The Ideal X-Ray Technician." *The X-Ray Technician* 23 (1951): 72–83.
- Allen, Richard. "Representation, Illusion, and the Cinema." In *The Visual Turn : Classical Film Theory and Art History*. New Brunswick, N.J.: Rutgers University Press, 2003.
- Aly, Frank. "Astride the Line: A Visiting Gringo's Description of the Lively Border Town of Naco." *Los Angeles Times*, April 17, 1904.
- "Amazon.com: Jean-Michel Basquiat: Radiant Child: Jean Michel Basquiat, Tamra Davis: Movies & TV." Accessed August 17, 2015. http://www.amazon.com/Jean-Michel-Basquiat-Radiant-Jean-Michel/dp/B003MWHUMY/ref=sr_1_2?ie=UTF8&qid=1439781731&sr=8-2&keywords=radiant+child.
- American Roentgen Ray Society. "Transactions of the American Roentgen Ray Society." *Transactions of the American Roentgen Ray Society*., 1902.
- American Roentgen Ray Society, and American Radium Society. "AJR, American Journal of Roentgenology." *AJR, American Journal of Roentgenology*., 1976.
- "American Women and the Making of Modern Consumer Culture --- the Electronic Text." Accessed May 3, 2016. <http://www.albany.edu/jmmh/vol1no1/peiss-text.html>.
- American X-Ray Journal*. American X-Ray Publishing Company, 1899.
- Anderson, Robert Lee. *The Diggs-Caminetti Case, 1913-1917: For Any Other Immoral Purpose*. E. Mellen Press, 1990.
- Andreas Huyssen. "The Vamp and the Machine." In *Fritz Lang's Metropolis: Cinematic Visions of Technology and Fear*. Rochester, NY: Camden House, 2000.
- Ankori, Gannit. *Imaging Her Selves : Frida Kahlo's Poetics of Identity and Fragmentation*. Westport, Conn.: Greenwood Press, 2002.
- Appadurai, Arjun, Ethnohistory Workshop, Ethnohistory Workshop, and Symposium on the Relationship Between Commodities and Culture. "The Social Life of Things : Commodities in Cultural Perspective." Cambridge [Cambridgeshire]; New York: Cambridge University Press, 1986.
- "Archives of Clinical Skiagraphy (1896)." *British Journal of Radiology* 68, no. 805 (January 1, 1995): H2–20. doi:10.1259/0007-1285-68-805-H2.
- Army Institute of Pathology: Army Medical Museum. Washington, DC: Army Institute of Pathology, 1945.
- Aronowitz, Jesse N. "Ethereal Fire: Antecedents of Radiology and Radiotherapy." *American Journal of Radiology* 188 (April 2007): 904–12.
- Associated Press. "Don Downs a Bomber." *Washington Post*, December 6, 1940.
- New York State Medical Association. *Transactions of the New York State Medical Association for the Year 1884-1899. Volume I-XVI*., 1897.
- Badger, Gerry. *Collecting Photography*. London: Mitchell Beazley, 2003.
- . *Collecting Photography*. London: Mitchell Beazley, 2003.

- Bahrampour, Tara. "TSA Scanners, Pat-Downs, Particularly Vexing for Muslims, Other Religious Groups." *Washington Post*, December 23, 2010.
<http://www.washingtonpost.com/wp-dyn/content/article/2010/12/22/AR2010122202919.html>.
- Bailey, Joyce Waddell. "The Penny Press." In *Posada's Mexico*. Library of Congress, 1979.
- Ballard, C.H. "X-Ray Examination of the Sinuses." *Western Medical Review: A Journal of Medicine* 20, no. 12 (December 1915): 664–66.
- Barker, Jennifer M. *The Tactile Eye : Touch and the Cinematic Experience*. Berkeley: University of California Press, 2009.
- Barrett, Frank J. "The Organizational Construction of Hegemonic Masculinity: The Case of the US Navy." *Gender, Work, and Organization* 3, no. 3 (July 1996).
- Barthes, Roland. *Camera Lucida : Reflections on Photography*. New York: Hill and Wang, 1981.
- Barton, William S. "Our Expanding Universe." *Los Angeles Times*, July 18, 1937.
- Basalla, George. "Pop Science: The Depiction of Science in Popular Culture." In *Science and Its Public: The Changing Relationship*. Boston: D. Reidel, 1976.
- Basquiat, Jean Michel, Larry Warsh, and Demosthenes Davvetas. *Jean-Michel Basquiat : The Notebooks*. New York: Art + Knowledge, 1993.
- Baudrillard, Jean. *Symbolic Exchange and Death*. London; Thousand Oaks: Sage Publications, 1993.
- Baysinger, Tim. "How the Ad Council and R/GA Created the Powerful 'Love Has No Labels' PSA." *AdWeek*. Accessed April 12, 2016.
<http://www.adweek.com/news/advertising-branding/how-ad-council-and-rga-created-powerful-love-has-no-labels-psa-166412>.
- Bazin, André. "The Ontology of the Photographic Image." In *What Is Cinema?*, 9–16. Berkeley: University of California Press, 1967.
- Beauchamp, Toby. "Artful Concealment and Strategic Visibility: Transgender Bodies and U.S. State Surveillance After 9/11." *Surveillance & Society* 6, no. 4 (2009): 1.
- "Beauty's Bones." *Time* 24, no. 5 (July 30, 1934): 44.
- Beckman, Karen. *Vanishing Women: Magic, Film, and Feminism*. Duke University Press Books, 2003.
- Bederman, Gail. *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917*. University of Chicago Press, 2008.
- Benjamin, Walter. *The Arcades Project*. Harvard University Press, 1999.
- Benjamin, Walter, and J. A Underwood. *The work of art in the age of mechanical reproduction*. London: Penguin, 1936.
- Benthien, Claudia. *Skin : On the Cultural Border between Self and the World*. New York: Columbia University Press, 2002.
- Berenson, Bernard, Isabella Stewart Gardner, Mary Berenson, and Rollin Van N. Hadley. *The Letters of Bernard Berenson and Isabella Stewart Gardner, 1887-1924, with Correspondence by Mary Berenson*. Northeastern University Press, 1987.
- Berg, Roland H. "X-Rays in Color." *Look*, May 14, 1957. Department of Prints and Photographs. Library of Congress.

- "Beyond the Power of Man." *Chicago Chronicle*. n.d. X-ray Clippings. Thomas Edison National Historic Park.
- Bhabha, Homi K. *The Location of Culture*. Routledge, 2012.
- Black, Suzanne. "Domesticating the Crystal: Sir Lawrence Bragg and the Aesthetics of X-Ray Analysis." *Configurations*, Spring 2005.
- Blackton, J. Stuart. *Liquid Electricity; Or, the Inventor's Galvanic Fluid*, 1907.
- Blaine, E. "The Relation of the Roentgenologist to the Physician and Surgeon." *Illinois Medical Journal* 33 (November 1916): 338.
- Blakeslee, Alton L. *And the Spark Became a Flame: The Beginnings of Mass Chest X-Ray*. Queensboro Tuberculosis and Health Association, 1954.
- Bloch, Lucienne. "On Location With Diego Rivera." *Art in America*, February 1986, 103–23.
- "Bloomingdale's (Advertisement)." *The World*. September 13, 1896.
- Blythe, Sylvia. "For Beautiful Feet: Here's How to Take Proper Care of Them." *Los Angeles Times*. July 21, 1940.
- "Bobby-Seale--Political Prisoner." *The Black Panther*, January 10, 1970, 1.
- Boetzkes, Amanda. "Phenomenology and Interpretation Beyond the Flesh." In *Art History: Contemporary Perspective on Method*., 1st ed. Hoboken: Wiley-Blackwell, 2010.
- Bois, W. E. B. Du, and William Edward Burghardt Du Bois. *The Souls of Black Folk*. Unabridged edition. New York: Dover Publications, 1994.
- Borden, W. C. *The Use Of The Roentgen Ray By The Medical Department Of The United States Army In The War With Spain*, 1898. Edited by George M. Sternberg. Kessinger Publishing, LLC, 2010.
- Bourdieu, Pierre, Alain Darbel, and Dominique Schnapper. *The Love of Art: European Art Museums and Their Public*. Stanford, Calif.: Stanford University Press, 1990.
- Bradbury, Ray. *The Illustrated Man*. Garden City, N.Y.: Doubleday, 1951.
- Braddock, Alan. "Jeff College Boys': Thomas Eakins, Dr. Forbes, and the Anatomical Fraternity in Postbellum Philadelphia." *American Quarterly* 57, no. 2 (June 2005): 355–83.
- Bragdon, May. "Diary of May Bragdon," March 14, 1899. Bragdon Family Papers. University of Rochester Rare Books and Special Collections.
- Brandon, Ruth. *The Life and Many Deaths of Harry Houdini*. New York: Random House Trade Paperbacks, 2003.
- Brecher, Ruth, and Edward Brecher. *The Rays: A History of Radiology in the United States and Canada*. Williams and Wilkins Company, 1959.
- Breslin, James E. B. *Mark Rothko: A Biography*. University of Chicago Press, 2012.
- Breton, André. *Manifestoes of Surrealism*. University of Michigan Press, 1969.
- Breton, Andre. "What Is Surrealism?," June 1, 1934.
<http://home.wlv.ac.uk/~fa1871/whatsurr.html>.
- Breton, Andre, and Mark Polizzotti. *Anthology of Black Humor*. City Lights Books, 1997.
- Breton, Andre, and Diego Rivera. "Manifesto: Towards a Free Revolutionary Art." *Partisan Review* 6, no. 1 (Fall 1938): 49–53.
- Brin, David. *The Transparent Society : Will Technology Force Us to Choose between Privacy and Freedom?* Reading, Mass.: Addison-Wesley, 1998.

- Brodsky, Allen, Ronald L. Kathren, and Charles A. Willis. "History of the Medical Uses of Radiation: Regulatory and Voluntary Standards of Protection." *Health Physics* 69, no. 5 (November 1995): 783–823.
- Brogdon, B. G. *Forensic Radiology*. CRC Press, 2002.
- "Brooklyn's Newest Fad." *New York Sun*, November 20, 1898.
- Brown, Percy. "Ellen Maria Dryden's Rontgen Record," 1910. Eastman Legacy Collection. George Eastman Museum.
- Browne, Ray Broadus. *Popular Culture Values and the Arts: Essays on Elitism Versus Democratization*. McFarland, 2009.
- _____. *Popular Culture Values and the Arts: Essays on Elitism Versus Democratization*. McFarland, 2009.
- Bruce, Robert V. *The Launching of Modern American Science 1846-1876*. 1st edition. New York: Knopf, 1987.
- Bruckheimer, Jerry, Ted Elliott, Terry Rossio, Gore Verbinski, Johnny Depp, Geoffrey Rush, Orlando Bloom, et al. *Pirates of the Caribbean. The curse of the Black Pearl*. [United States]; Burbank, CA: Walt Disney Home Entertainment ; Distributed by Buena Vista Home Entertainment, 2003.
- Burgess, Rupert, and Robert Rosenblum. *Philip's Skull*. New York, New York: Gagosian Gallery, 1999.
- Burnett, Ron. *Cultures of Vision : Images, Media, and the Imaginary*. Bloomington: Indiana University Press, 1995.
- Burroughs, Alan. *Some Aesthetic Values Recorded by the X-Ray*. Cambridge: Harvard University Press, 1931.
- Butler, Judith. *Bodies That Matter: On the Discursive Limits Of "Sex."* Psychology Press, 1993.
- Bynum, W. F, Roy Porter, and Symposium on Medicine and the Five Senses. "Medicine and the Five Senses." Cambridge; New York, N.Y., USA: Cambridge University Press, 1993.
- Byrn, Edward W. "The Progress of Invention During the Past Fifty Years." *Scientific American* LXXV, no. 4 (July 25, 1896): 82.
- Cadaver Act*. Vol. 410 ILCS 510/, 1965.
- Cameron, Frank. "Mr.Sicular's Magic Eye." *Los Angeles Times*, May 2, 1954, L10.
- Cappello, Mary. *Swallow : Foreign Bodies, Their Ingestion, Inspiration, and the Curious Doctor Who Extracted Them*. New York: New Press : Distributed by Perseus Distribution, 2011.
- Carlton, Richard, and Arlene Adler. *Principles of Radiographic Imaging: An Art and A Science*. Cengage Learning, 2012.
- Carr, C. *Fire in the Belly: The Life and Times of David Wojnarowicz*. Bloomsbury Publishing USA, 2012.
- Cartwright, Lisa. *Screening the Body : Tracing Medicine's Visual Culture*. Minneapolis: University of Minnesota Press, 1995.
- Carty, John. "Some Important Considerations of Soft Tissue Anatomy as Revealed by Radiography of Anatomical Sections." *Radiology* 37, no. 6 (December 1941).
- Caufield, Catherine. *Multiple Exposures : Chronicles of the Radiation Age*. New York: Perennial Library, 1989.

- "Cephalometrics: History, Evolution, and Landmarks." 11:59:18 UTC.
<http://www.slideshare.net/indiandentalacademy/ceph-history-evolution-landmarks>.
- Cernuschi, Claude. *Re/casting Kokoschka: Ethics and Aesthetics, Epistemology and Politics in Fin-de-Siècle Vienna*. Fairleigh Dickinson University Press, 2002.
- _____. *Re/casting Kokoschka: Ethics and Aesthetics, Epistemology and Politics in Fin-de-Siècle Vienna*. Fairleigh Dickinson Univ Press, 2002.
- C.F. "Bryan's Railroad Pass." *Los Angeles Times*, August 30, 1897.
- _____. "Roentgen Rays." *Evening Telegraph*. February 25, 1896.
- Champlin, Charles. "The Irony That Was Marilyn." *Los Angeles Times*. August 6, 1968.
- Charney, Leo. *Cinema and the Invention of Modern Life*. University of California Press, 1995.
- C.H. T. Crosthwaite. "Rontgen's Curse." *Longman's Magazine* 28 (1896): 469–84.
- Chatwood, Arthur Brunel. *The New Photography*. London: Downey, 1896.
- Cherry, Brigid. "Refusing to Look: Female Viewers of the Horror Film." In *Identifying Hollywood's Audiences : Cultural Identity and the Movies*. London: British Film Institute, 1999.
- _____. "Refusing to Look: Female Viewers of the Horror Film," n.d.
- Chicago Daily Tribune. "Séance of X Ray Ghosts [Sic] of Paris: Wonderful and Startling Display—Thrilling Story Related in the Journal Des Debats," March 27, 1897.
- "Child Who Swallowed Tack on Spinach and Cotton Diet." *Los Angeles Times*, April 15, 1937.
- Childs, Elizabeth C., ed. *Suspended License: Censorship and the Visual Arts*. University of Washington Press, 1998.
- Clark, Claudia. *Radium Girls, Women and Industrial Health Reform : 1910-1935*. Chapel Hill, NC: University of North Carolina Press, 1997.
- Cobb, W. Montague. "The Physical Constitution of the American Negro." *Journal of Negro Education* 3, no. 3 (n.d.).
- Cohl, Emil. *X-Ray Glasses*. Societe des Etablissements L. Gaumont, 1909.
- Collins, Douglas. *The Story of Kodak*. Harry N. Abrams , Incorporated, 1990.
- Committee on Commercial Aviation Security, Panel on Passenger Screening, Commission on Engineering and Technical Systems, National Research Council. "Airline Passenger Security Screening: New Technologies and Implementation Issues." National Academies Press, 1996. www.nap.edu.
- Considine, Austin. "Will New Airport X-Rays Invade Privacy?" *New York Times*, October 9, 2005, D3.
- Corman, Roger. *Man with the X-Ray Eyes*. American International Pictures, 1963.
- Corn, Wanda M. *The Great American Thing: Modern Art and National Identity, 1915-1935*. New edition. Berkeley: University of California Press, 2001.
- Corporation, Bonnier. *Popular Science*. Bonnier Corporation, 1959.
- Coulthard, Lisa. "Visible Violence in Kiki Smith's Life Wants to Live." *Journal of Medical Humanities* 25, no. 1 (Spring 2004).

- "Counterfeiting, Moonshining Wane As Smuggling Increases." *Washington Post*, February 7, 1946, 12.
- Cozzolino, Robert. "Ivan Le Lorraine Albright." *Illinois Historical Art Project*, n.d. <http://www.illinoisart.org/#!ivan-albright/c1mnq>.
- Crary, Jonathan. *Suspensions of Perception: Attention, Spectacle, and Modern Culture*. Cambridge, Mass.: MIT Press, 1999.
- _____. *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. Cambridge, Mass.: MIT Press, 1990.
- Crimp, Douglas. "Pictures." *October* 8 (Spring 1979): 75–88.
- Crist, Kenneth. "X-Ray: The Master of Magic." *Popular Mechanics*, January 1935. http://books.google.com/books?id=xt0DAAAAMBAJ&pg=PA90&dq=x-ray+magic&hl=en&sa=X&ei=_I6DT8XFNIOq2QXxtrzoBg&ved=0CD8Q6AEwAA#v=onepage&q&f=false.
- Crookes, William. *Crookes and the Spirit World; a Collection of Writings by or Concerning the Work of Sir William Crookes, O.M., F.R.S., in the Field of Psychical Research*. New York: Taplinger Pub. Co., 1972.
- Crow, Thomas E. *The Rise of the Sixties: American and European Art in the Era of Dissent*. Laurence King Publishing, 1996.
- Cumming, Paul. Oral history with Ivan Le Lorraine Albright, February 5, 1972. Archives of American Art, Smithsonian Institution.
- _____. "Oral History with Ivan Le Lorraine Albright," n.d.
- Current Medical Digest*. Williams & Wilkins Company, 1953.
- Curtin, Maureen. "Materializing Invisibility as X-Ray Technology: Skin Matters in Ralph Ellison's Invisible Man." *Literature Interpretation Theory (LIT)*, April 1999.
- "Customs Trap Four With \$200,000 Gems." *New York Times*, August 5, 1954, 1.
- "Cyanotype - Atlas_cyanotype.pdf." Accessed October 12, 2015. https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/atlas_cyanotype.pdf.
- Daffner, Richard H., and Matthew Hartman. *Clinical Radiology: The Essentials*. Lippincott Williams & Wilkins, 2013.
- Dally, J.F. Halls. "The Lancet." *On the Use of Roentgen Rays in the Diagnosis of Pulmonary Tuberculosis.*, June 1903, 1800–1806.
- "Danger Lies in the X-Rays." *New York Press*, November 30, 1896. Clipping. Thomas Edison National Historic Park.
- "Dangerous X-Rays: Improperly Used They Produce Serious Injuries." *Los Angeles Times*, June 1, 1897.
- Daston, Lorraine, and Peter Galison. "The Image of Objectivity." *Representations: Seeing Science* 0, no. 40 (Autumn 1992): 81–128.
- Daves, Marvin L., and William E. Loechel. *The Interpretation of Tomograms of the Head: An Atlas*. Springfield, Ill.: Charles C. Thomas Publisher, 1962.
- Davis, Tamra. *Jean-Michel Basquiat: Radiant Child*. Arthouse Films, 2010.
- Thomas de la Pena, Carolyn. "'Bleaching the Ethiopian': Desegregating Race and Technology through Early X-Ray Experiments." *Technology and Culture*, January 2006.
- Debord, Guy. *Society of the Spectacle*. Marxists.org, 1967. <https://www.marxists.org/reference/archive/debord/society.htm>.

- DeLue, Rachael. "Diagnosing Pictures: Sadakichi Hartmann and the Science of Seeing, circa 1900." *American Art* 21, no. 2 (Summer 2007).
- Department of Homeland Security. *DHS Advisory to Security Personnel, No Change in Threat Level*, 2003.
http://www.dhs.gov/xnews/releases/press_release_0238.shtml.
- Deutsch, Hermann. "Camera Fights a Killer." *Saturday Evening Post* 215 (May 29, 1943): 24–26.
- Devereaux, Emile. "Doctor Alan Hart: X-Ray Vision in the Archive." *Australian Feminist Studies* 25, no. 64 (June 2010): 175–87.
- Dijck, José van. *The Transparent Body : A Cultural Analysis of Medical Imaging*. Seattle: University of Washington Press, 2005.
- DiSantis, David J., and DiSantis, Denis M. "Wrong Turns on Radiology's Road to Progress." *Radiographics: The Journal of Continuing Medical Education in Radiology* 111 (1991): 1137.
- "Dixie in Chicago." *Chicago Daily Tribune*, February 20, 1896.
- Dixon, Adrian K., David J. Bowden, Harold Ellis, and Bari M. Logan. *Human Sectional Anatomy: Atlas of Body Sections, CT and MRI Images, Fourth Edition*. CRC Press, 2015.
- Dixon, Andrew D., David A. N. Hoyte, and Olli Ronning. *Fundamentals of Craniofacial Growth*. CRC Press, 1997.
- "Does Danger Lurk in the X Rays." *New York Morning Journal*, November 26, 1896. Clipping. Thomas Edison National Historic Park.
- "Doings at the Electrical Exhibition." *Electrical Engineer*, January 1898.
- Donoghue, Francis. "X-Ray Interpretation and Standardization." In *Workmen's Compensation Problems: Proceedings of the Eighth Annual Meeting of the International Association of Industrial Accident Boards and Commissions, Chicago, IL September 18-23, 1921*. U.S. Government Printing Office, 1922.
- Doss, Erika. "Revolutionary Art Is a Tool for Liberation." In *Liberation, Imagination and the Black Panther Party: A New Look at the Black....*, edited by Kathleen Cleaver and George Katsiaficas. New York, NY: Routledge, 2001.
- Dreiser, Theodore. "March 1896." In *Theodore Dreiser's Ev'ry Month*, edited by Nancy Barineau, 1st edition. Athens: University of Georgia Press, 1996.
- DuBois, W. E. B. *The Souls of Black Folk*. A.C. McClurg & Company, 1904.
- Duda, Martin L. "Letter to Mrs. Phyllis Duda," March 17, 1951. Martin L. Duda Letters, 1950-1951. Earl Gregg Swem Library Special Collections.
- Duffin, Jacalyn, and Charles R. R. Hayter. "Baring the Sole: The Rise and Fall of the Shoe-Fitting Fluoroscope." *Isis* 91, no. 2 (June 2000): 260–82.
- Duncan, Michael. *Pavel Tchelitchew: The Landscape of the Body*. Katonah, New York: Katonah Museum of Art, 1998.
- Duray, Dan. "Sotheby's Finds Hidden Basquiat Signature." *The Observer*, February 14, 2012. <http://observer.com/2012/02/sothebys-finds-hidden-basquiat-signature/>.
- Dwight, C.A.S. "Moral Uses of Astonishment." *New York Observer and Chronicle*, December 10, 1896.
- Dyson, E.D. "Shoe-Fitting X-Ray Fluoroscopes: Radiation Measurements and Hazards." *British Medical Journal*, August 4, 1956, 269–72.

- Eaglesham, Douglas C. "Composite Radiography." *Medical Radiography and Photography* 31, no. 1 (1955): 52–57.
- . "Visual Illusions Affecting Radiographic Interpretations." *Journal of Canadian Association of Radiologists* 19, no. 2 (June 1968): 96–104.
- "Easter Gowns for Matrons: Styles That Will Rule in Paris, Where It Is the Duty of Every Woman to Be Young. X-Ray Goods by Far the Most Popular." *The Times*. April 4, 1897.
- Eastman Kodak. "Radiography: The First Century," 1993. George Eastman Legacy Collection. George Eastman House.
- Eastman Kodak Company. *X-Rays and You*. 125190. Rochester, NY: Eastman Kodak Company Medical Division, 1941.
- Ebenstein, Joanna, and Colin Dickey, eds. *The Morbid Anatomy Anthology*. 1 edition. Morbid Anatomy Press, 2014.
- Eberle, Henrik, and Hans-Joachim Neumann. *Was Hitler ILL?: A Final Diagnosis*. 1 edition. Cambridge ; Malden, MA: Polity, 2012.
- Eddy, Arthur Jerome. *Cubists and Post-Impressionism*. A.C. McClurg & Company, 1919.
- Eder, Josef Maria, and Eduard Valenta. *Versuche über Photographie mittelst der röntgen'schen Strahlen*. Wien: R. Lechner (W. Müller), 1896.
- Edison, Thomas. "Correspondence between Jos Lippincott Vance and Thomas Alva Edison, Original Dated June 19, 1896," June 22, 1896. Document File Series D9631. The Thomas Edison Papers, Rutgers University.
<http://edison.rutgers.edu/NamesSearch/DocDetImage.php3>.
- "Edison Describes Effect of X-Rays," n.d. Clippings. Thomas Edison National Historic Park.
- "Edison Fears Hidden Perils of the X-Rays." *New York World*, August 3, 1903.
- "Edison Fears Hidden Perils of the X-Rays." *New York World*. August 3, 1903.
- "Edison Tells of New Value of X-Ray." *Fort Wayne Sentinel*, August 4, 1903.
- Edison, Thomas. "Letter," June 1896.
- "Edison's Modern Miracle." *Wheeling Register*, November 21, 1896.
- Eisenberg, Ronald L. *Atlas of Signs in Radiology*. Philadelphia, PA: J.B. Lippincott Company, 1984.
- Eisenberg, Ronald L. *Radiology : An Illustrated History*. St. Louis, MO: Mosby Year Book, 1992.
- Elcott, Noam M. *Artificial Darkness: An Obscure History of Modern Art and Media*. University of Chicago Press, 2016.
- Elder, R. Bruce. *DADA, Surrealism, and the Cinematic Effect*. Wilfrid Laurier Univ. Press, 2013.
- Electrical Engineer*. Williams & Co., 1896.
- "Electrical Field: The Effect of Roentgen Rays upon the Eye." *Los Angeles Times*. April 5, 1896.
- Elias, Bart. *Airport Passenger Screening: Background and Issues for Congress*. DIANE Publishing, 2010.
- Elias, Bartholomew. *Airport and Aviation Security: U.S. Policy and Strategy in the Age of Global Terrorism*. CRC Press, 2009.

- Ellenbogen, Josh. "Photography and the Imperceptible : Bertillon, Galton, Marey," 2005.
- Ellison, Ralph. *Invisible Man*. Modern Library, 1994.
- "Empress Under X-Rays: Kaiserin Subject of Experiment with Roentgen Plant She Presented." *New York Times*, October 1, 1908.
- Enwezor, Okwui, Helaine Posner, Hilton Als, Isaac Julien, Thelma Golden, and Shamim M. Momin. *Lorna Simpson*. 1st edition. New York: Harry N. Abrams in association with the American Federation of Arts, 2006.
- Evans, Fred, and Leonard Lawlor. *Chiasms Merleau-Ponty's Notion of Flesh*. Albany, NY: State University of New York Press, 2000.
<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=70730>.
- Evans, Jessica, and Stuart Hall. *Visual Culture: The Reader*. SAGE, 1999.
- Eversmann, Jr., William W. "Recollections of the Radiographic Control of the Position of the Femur in Prosthetic Fitting of the AK Amputee Fitzsimons Army Medical Center 1974 to 1983." Denver, CO, n.d.
www.oandplibrary.org/.../letter_from_Bill_W._Eversmann_jr-ocred.pdf.
- "Examination of Metallic Objects with X Rays." *Literary Digest* 15, no. 21 (September 18, 1897): 614–15.
- "Examinations of Metallic Objects with X-Rays." *Literary Digest* 15, no. 21 (n.d.): 614–15.
- "Examine Bales by X-Ray." *New York Times*, January 22, 1915.
- "Examined." *Zion's Herald*, September 8, 1897.
- "Experiments with X-Rays: The First Victim." *Los Angeles Herald*. March 9, 1896.
- Eycleshymer, Albert Chauncey. *A Cross-Section Anatomy*,. New York, 1911.
<http://hdl.handle.net/2027/mdp.39015004403419>.
- Eycleshymer, Albert Chauncey, and Daniel M. Shoemaker. *A Cross-Section Anatomy*, New York: D. Appleton and Company, 1911.
<http://hdl.handle.net/2027/mdp.39015004403419>.
- Fahs, Alice. *Out on Assignment: Newspaper Women and the Making of Modern Public Space*. Univ of North Carolina Press, 2011.
- Fairchild, Amy L. *Science at the Borders: Immigrant Medical Inspection and the Shaping of the Modern Industrial Labor Force*. 1 edition. Baltimore: Johns Hopkins University Press, 2003.
- Farris, Edmond J. *Art Students' Anatomy*. Second Edition Revised. New York: Dover Publications, 1961.
- Feder, Barnaby. "Surge in Demand to Use Biometrics." *New York Times*, December 17, 2001, C21.
- "Feds Admit Storing Checkpoint Body Scan Images." *CNET*. Accessed June 3, 2016.
<http://www.cnet.com/news/feds-admit-storing-checkpoint-body-scan-images/>.
- Files, Glenn W., ed. *Medical Radiographic Technic*. Springfield, Ill.: Charles C. Thomas Publisher, 1943.
- Finder, Alan. "No Takers for the X-Ray Option." *New York Times*, January 24, 1999, WK3.
- "Fine Art Quality In Photographs." *Hartford Daily Times*, December 13, 1930.

- Fink, Eleanor. "COLLECTING THE PHOTOGRAPH." *ARLIS/NA Newsletter* 3, no. 6 (October 1, 1975): 104–5.
- "Fluoroscope A Success: Mr. Edison's Invention Shown at the Electrical Exposition." *New York Times*, May 12, 1896.
- "Foot Full of Glass." *The New York Journal*, March 19, 1896. New York Academy of Medicine. William James Morton Scrapbook.
- "For and Against the X-Ray." *Los Angeles Times*. September 28, 1897.
- Foucault, Michel. *Abnormal: Lectures at the Collège de France, 1974-1975*. Macmillan, 2007.
- _____. *Discipline and Punish: The Birth of the Prison*. Vintage Books, 1977.
- _____. *Power, Truth, and Strategy*. Edited by Morris, Meaghan. Sydney, Australia: Feral Publications, 1979.
- _____. *Power, Truth, Strategy*. Sydney, Australia: Prometheus Books, 1979.
- _____. *The Birth of the Clinic: An Archaeology of Medical Perception*. Vintage, 1994.
- Foucault, Michel, and Colin Gordon. "The Eye of Power." In *Power/Knowledge : Selected Interviews and Other Writings, 1972-1977*. New York: Pantheon Books, 1980.
- Fox, Howard. "Observations on Skin Diseases in the Negro." In *Official Transactions Sixth International Dermatological Congress, Held at the New York Academy of Medicine, 15-17 West 43d Street, September 9th to 14th, 1907*, by International Congress of Dermatology, John Addison Fordyce, and New York Academy of Medicine, 204, 1908. <http://catalog.hathitrust.org/api/volumes/oclc/6664504.html>.
- Frank, Patrick. *Posada's Broadsheets: Mexican Popular Imagery, 1890-1910*. University of New Mexico Press, 1998.
- Freud, Sigmund. "Medusa's Head (1940 [1922])." In *Freud on Women: A Reader*, 272–73. W. W. Norton & Company, 1992.
- "From the Rare Book and Special Collections Division." Accessed May 30, 2016. http://lcweb2.loc.gov/cgi-bin/ampage?collId=rbc3&fileName=rbc0001_2009pre23451page.db.
- Fuchs, Arthur W. "Edison and Roentgenology." *The American Journal of Roentgenology and Radium Therapy* LVII, no. 2 (February 1947): 156.
- Fuchs, W. "Historical Notes on X-Ray Plates and Films." In *Classic Descriptions in Diagnostic Roentgenology*. Springfield, Ill.: Thomas, 1964.
- Fuchs, Arthur W. "Radiography of 1896." *Image: The Journal of the George Eastman House of Photography* 1 (March 1960).
- Fuller, Loie. "A Draft of the Lecture on Radium," 1911 1907. Loie Fuller Papers. New York Public Library Performing Arts Division.
- Fuller, Hoyt. "Introduction: Towards a Black Aesthetic." In *The Black Aesthetic*, edited by Addison Gayle. Doubleday, 1971.
- Gaddis, Eugene R. *Magician of the Modern: Chick Austin and the Transformation of the Arts in America*. Knopf Doubleday Publishing Group, 2011.
- Gaines, Jane, and Michael Renov. *Collecting Visible Evidence*. Minneapolis: University of Minnesota Press, 1999.
- Gallery, Jean-Michel Basquiat and Tony Shafrazi. *Jean-Michel Basquiat 1st Edition*. TONY SHAFRAZI GALLERY, 1999.

- Gamboni, Dario. *The Destruction of Art: Iconoclasm and Vandalism Since the French Revolution*. Reaktion Books, 1997.
- "Game Supper Greatly Enjoyed: The Fur, Fin, and Feather Club Gives Its Annual Dinner at Home of Dr. J.D. Robertson." *Cambridge Chronicle*, December 17, 1904.
- Gamwell, Lynn. *Exploring the Invisible : Art, Science, and the Spiritual*. Princeton, N.J.: Princeton University Press, 2002.
- Gangi, Tony. *Carny Sideshows : Weird Wonders of the Midway*. New York: Citadel Press, 2010.
- Garciagodoy, Juanita. *Digging the Days of the Dead a Reading of Mexico's Días de Muertos*. Niwot, Colo.: University Press of Colorado, 1998.
- Garellick, Rhonda K. *Electric Salome: Loie Fuller's Performance of Modernism*. Princeton University Press, 2007.
- "Gay New York. Scenes and Incidents of Everyday Life in the Paris of America." *Wisconsin Weekly Advocate*. May 30, 1901.
- Geczy, Adam, and Vicki Karaminas. *Queer Style*. A&C Black, 2013.
- General Electric. *The Story of X-Ray*. Milwaukee, WI: General Electric Company, 1963.
- General Electric Company. *The National in the World War: April 6, 1917-November 11, 1918*. Cleveland, OH: Gilman Printing Company, 1920.
- George, Arial. "The Workmen's Compensation Act." In *Workmen's Insurance and Compensation Series: Proceedings of the Fourth Annual Meeting of the International Association of Industrial Accident Boards and Commissions. Held at Boston, Mass., August 21-25, 1917*. U.S. Government Printing Office, 1918.
- Gerson, Edwin. "Scenes from the Past X-Ray Mania: The X Ray in Advertising, Circa 1895." *Radiographics: The Journal of Continuing Medical Education in Radiology* 24 (March 2004).
- Giffords, Gloria Fraser. *Mexican Folk Retablos*. UNM Press, 1992.
- Gill, Miranda. *Eccentricity and the Cultural Imagination in Nineteenth-Century Paris*. 1 edition. Oxford ; New York: Oxford University Press, 2009.
- Gilmore, David D. *Manhood in the Making: Cultural Concepts of Masculinity*. Yale University Press, 1990.
- Gilmore, Paul. *Aesthetic Materialism: Electricity and American Romanticism*. Stanford University Press, 2009.
- Girard, François. *Diary of One Day: Thirty Two Short Films about Glenn Gould*. Columbia Tristar Home Video, 1995.
- "Girl Student Swallows Pin." *New York Times*, October 18, 1938.
- Glasser, Otto. *Dr. W. C. Rontgen*. Springfield, Ill.: Clarence C. Thomas, 1945.
- Glasser, Otto, Jessie C Tucker, and Margret Boveri. *Wilhelm Conrad Röntgen and the Early History of the Roentgen Rays*,. Springfield, Ill.: C.C. Thomas, 1934.
- Godey, Louis Antoine, and Sarah Josepha Buell Hale. *Godey's Magazine*. Godey Company, 1897.
- Goldberg, Daniel. "Suffering and Death among Early American Roentgenologists: The Power of Remotely Anatomizing the Living Body in Fin-de-Siecle America." *Bulletin of the History of Medicine*, Spring 2011.

- Goldin, Nan. "In the Valley of the Shadow." In *To Stop Our Vanishing*. New York, NY: Artists Space, 1989.
- Gorham, C.W. *Riverside Glass Works of Wellsburg, West Virginia: 1879-1907*. Springfield, MO: C.W. Gorham, 1995.
- Gould, Stephen Jay. *The Mismeasure of Man*. W. W. Norton & Company, 1996.
- "Government Replaces Body Scanners at Some Airports." *Yahoo! News*. Accessed October 26, 2012. <http://news.yahoo.com/government-replaces-body-scanners-airports-211658277.html>.
- Grabell, Michael. "U.S. Government Glossed Over Cancer Concerns As It Rolled Out Airport X-Ray Scanners." *ProPublica*, November 1, 2011. <http://www.propublica.org/article/u.s.-government-glossed-over-cancer-concerns-as-it-rolled-out-airport-x-ray>.
- Green, Nancy L. *The Other Americans in Paris: Businessmen, Countesses, Wayward Youth, 1880-1941*. University of Chicago Press, 2014.
- . *The Other Americans in Paris: Businessmen, Countesses, Wayward Youth, 1880-1941*. University of Chicago Press, 2014.
- Greenberg, Brian, Linda S. Watts, Richard A. Greenwald, Gordon Reavley, Alice L. George, Scott Beekman, Cecelia Bucki, et al. *Social History of the United States*. ABC-CLIO, 2008.
- Grigg, E. R. N. *The Trail of the Invisible Light, from X-Strahlen to Radio(bio)logy*. Springfield, Ill.: Thomas, 1965.
- "Grim Fads." *Times-Picayune New Orleans*, March 18, 1896.
- Grimberg, Salomón. *Frida Kahlo : Song of Herself*. London: Merrell, 2008.
- Griswold, Wesley. "How Science Is Making It Tougher for Smugglers." *Popular Science*, June 1959, 61–63, 200.
- Grove, Allen. "Rontgen's Ghosts: Photography, X-Rays, and the Victorian Imagination." *Literature and Medicine*, Fall 1997.
- Grubbe, Emil H. "The X-Ray Treatment of Skin Cancer." *The Medical Brief*, August 1914, 496–501.
- Gunderman, Richard B., and C. Matthew Hawkins. "The Self-Portraits of Frida Kahlo." *Radiology* 247, no. 2 (May 1, 2008): 303–6.
- Gunning, Tom. "Illusions of the Past and Future: The Phantasmagoria and Its Specters." *Media History*, 2004. <http://www.mediaarthistory.org/refresh/Programmatic%20key%20texts/pdfs/Gunning.pdf>.
- Gunning, Tom. "From the Kaleidoscope to the X-Ray: Urban Spectatorship, Poe, Benjamin, and Traffic in Souls (1913)." *Wide Angle* 10, no. 4 (October 1997): 25–61.
- . "The Cinema of Attractions: Early Film, Its Spectator and the Avant-Garde." In *Early Cinema : Space, Frame, Narrative*, by Thomas Elsaesser and Adam Barker. London: BFI Pub., 1990.
- Hage, Stephen J. *Let There Be Light: Physics, Philosophy & The Dimensional Structure of Consciousness*. Algora Publishing, 2013.
- . *Let There Be Light: Physics, Philosophy & The Dimensional Structure of Consciousness*. Algora Publishing, 2013.

- Hagen, Charles. "‘Collecting the Photograph’: Was It Worth It?" *Afterimage* 25, no. 6 (June 1998): 3–4.
- . "‘Collecting the Photograph’: Was It Worth It?" *Afterimage* 25, no. 6 (June 1998): 3–4.
- Hammer, Barbara. *Sanctus*. Paris, France: Re:Voir Video, 2004.
- Hand, David. *Snow White and the Seven Dwarfs*. Animation. RKO Radio Pictures, Walt Disney Productions, 1937.
- Hannavy, John. *Encyclopedia of Nineteenth-Century Photography*. CRC Press, 2008.
- Harris, E. L. *The Shadowmakers: A History of Radiologic Technology*. 1st edition.
- Albuquerque, N.M: American Society of Radiologic Technologists, 1995.
- Hart, Alan. *These Mysterious Rays: A Non-Technical Discussion of the Uses of X Rays and Radium, Chiefly in Medicine*. Harper & Brothers, 1943.
- . *These Mysterious Rays, a Non-Technical Discussion of the Uses of X Rays and Radium, Chiefly in Medicine*. New York: Harper, 1943.
- Hartzman, Marc. *American Sideshow : An Encyclopedia of History’s Most Wondrous and Curiously Strange Performers*. New York: Jeremy P. Tarcher/Penguin, 2005.
- Harvey, David. *Paris, Capital of Modernity*. Routledge, 2004.
- Harvey, Edmund Newton. *A History of Luminescence from the Earliest Times until 1900*. Philadelphia: American Philosophical Society, 1957.
- Heard, Mervyn. *Phantasmagoria : The Secret Life of the Magic Lantern*. Hastings: Projection Box, 2006.
- Henderson, Linda Dalrymple. "Picabia, Radiometers, and X-Rays in 1913." *Art Bulletin* 71, no. 1 (March 1989): 114–23.
- . "X-Rays and the Quest for Invisible Reality in the Art of Kupka, Duchamp, and the Cubists." *Art Journal* 47 (Winter 1988): 323–40.
- "Her Latest Photograph: It Is an Electric Picture, and the Woman Has the Interior of Her Hand Shadowed Forth." *New York Times*, May 29, 1898.
- Herzig, Rebecca. *Suffering For Science: Reason and Sacrifice in Modern America*. Rutgers University Press, 2005.
- Hill-Kayser, Christine E., John P. Plastaras, Zelig Tochner, and Eli Glatstein. "The Case for Combined-Modality Therapy for Limited-Stage Hodgkin’s Disease." *The Oncologist* 17, no. 8 (August 2012): 1006–10. doi:10.1634/theoncologist.2012-0148.
- Hinds, R. W. "Medico-Military Notes." *The Military Surgeon: Journal of the Association of Military Surgeons of the United States* 42, no. 1 (January 1918).
- Hirshler, Erica E., Janet L. Comey, Ellen E. Roberts, and Museum of Fine Arts Boston. *A Studio of Her Own: Women Artists in Boston, 1870-1940*. MFA Publications, 2001.
- "Hold On, Mr. Edison." *Commercial Advertiser*, February 13, 1896. Clipping. Thomas Edison National Historic Park.
- Holmes, Diana, and arrie Tarr. *A Belle Epoque?: Women and Feminism in French Society and Culture 1890-1914*. Berghahn Books, 2011.
- "Home X-Rays." *Boston Journal*, August 17, 1896.
- Hopkins, Samuel Augustus. *The Care of the Teeth*. Appleton, 1908.

- Horvath, David G. "The Acetate Negative Survey: Final Report." University of Louisville, Ekstrom Library, Photographic Archives, February 1987.
http://gawainweaver.com/images/uploads/Horvath_AcetateNegativeSurvey.pdf.
- "How Much Radiation?" *Time Magazine*, July 4, 1949.
- "How Royal Hands Look Under the Roentgen Rays." *New York World*, August 2, 1896.
- Howerth, I. W. "War and the Survival of the Fittest." *The Scientific Monthly* 3, no. 5 (November 1916): 488–97.
- Hunter, J.M. Coin Controlled X-ray Machine. 695,154, n.d.
- Huyssen, Andreas. "Mass Culture as Woman: Modernism's Other." In *After the Great Divide: Modernism, Mass Culture, Postmodernism*. Indiana University Press, 1986.
- "Identified by X-Ray." *New York Times*, July 12, 1914, C3.
- "In Old Gray Cemeteries." *Godey's Magazine*, January 1897.
- "Items of Progress: X-Ray Slot Machines." *Wilson's Photographic Magazine*, March 1902.
- Jacob, Margaret C. *The Cultural Meaning of the Scientific Revolution*. McGraw-Hill, 1988.
- James, William. "The Hidden Self." *Scribner's Magazine*, March 1890.
- Jameson, Fredric. *Postmodernism, Or, The Cultural Logic of Late Capitalism*. Duke University Press, 1990.
- Jarvis, Christina S. *The Male Body at War: American Masculinity During World War II*. 1st edition. DeKalb: Northern Illinois University Press, 2010.
- Javidi, Bahram. *Optical Imaging Sensors and Systems for Homeland Security Applications*. New York: Springer, 2006.
<http://www.knovel.com/knovel2/Toc.jsp?BookID=1697>.
- Jerman, Ed C. *Modern X-Ray Technic*. Saint Paul, MN: Bruce Publishing Company, 1928.
- Jerman, Eddy Clifford. *Modern X-Ray Technic*. Bruce Publishing Company, 1928.
- John Hopkins University File 7. *Is X-Ray Harmful?* Video. Baltimore, MD, 1957.
- Johns, Jasper, and Kirk Varnedoe. *Jasper Johns: Writings, Sketchbook Notes, Interviews*. Museum of Modern Art, 1996.
- Johnson, Charles S. *The Negro in American Civilization (American Social Science Series)*. New York, NY: H.H. Holt and Company, 1930.
- Johnson, Robert Stanley, and Phillips Collection. *Cubism & La Section D'or: Reflections on the Development of the Cubist Epoch: 1907-1922*. Klees-Gustorf, 1991.
- "Johnson's Brain Has Armor-Plate Cover." *Los Angeles Times*, March 23, 1911.
- Jones, Kellie. "Black Art West." In *L.A. Object & David Hammons Body Prints*, edited by Connie Rogers Tilton and Lindsay Charlwood, 20–62. New York: Tilton Gallery, 2011.
- Joselit, David. "Notes on a Surface: Toward a Genealogy of Flatness." *Art History* 23, no. 1 (March 2000): 19–34.
- Josephson, Matthew. *Edison ; A Biography*. New York: McGraw-Hill, 1959.
- Juettner, Otto. "Principles and Practice of X-Ray Therapy." *Medical Brief* 33 (1905): 880.

- Julian, Rupert. *The Phantom of the Opera*. Horror, 1925.
- Julich, Solveig. "Media as Modern Magic: Early X-Ray Imaging and the Cinematography in Sweden." *Early Popular Visual Culture* 6, no. 1 (April 2008): 19–34.
- Kahlo, Frida. *The Diary of Frida Kahlo : An Intimate Self-Portrait*. New York; Mexico: H.N. Abrams ; La Vaca Independiente S.A. de C.V., 1995.
- Kahlo, Frida, Leo Eloesser, Teresa del Conde, and Carlos Phillips Olmedo. *Querido Doctorcito: Frida Kahlo-Leo Eloesser : correspondencia = correspondence*. México: DGE Equilibrista : Consejo Nacional para la Cultura y las Artes, 2007.
- Kahlo, Frida, and Raquel Tibol. *Escríturas*. México: Plaza y Janes, 2005.
- Kassabian, Mihran Krikor. *Röntgen Rays and Electro-Therapeutics: With Chapters on Radium and Phototherapy*. J.B. Lippincott Comapny, 1907.
- Kathren, Ronald L., and Allen Brodsky. "Radiation Protection," n.d.
- Katz, Jonathan D. *Hide/Seek: Difference and Desire in American Portraiture*. Smithsonian Books, 2010.
- Keefer, Frank. *A Text-Book of Military Hygiene and Sanitation*. Philadelphia, PA: W.B. Sanders, 1914.
- Keil, Charlie. "Modernity, Hyperstimulus, and the Rise of Popular Sensationalism." In *American Cinema's Transitional Era : Audiences, Institutions, Practices*, by Shelley Stamp and Charlie Keil. Berkeley: University of California Press, 2004.
- Keller, Corey, Jennifer Tucker, Tom Gunning, San Francisco Museum of Modern Art, and Graphische Sammlung Albertina. *Brought to Light: Photography and the Invisible, 1840-1900*. San Francisco Museum of Modern Art, 2008.
- Keller, Corey. "The Naked Truth or the Shadow of a Doubt? X-Rays and the Problematic of Transparency." *Invisible Culture an Electronic Journal for Visual Culture*., 2004.
- Kelsey, Robin Earle. *Archive Style: Photographs & Illustrations for U.S. Surveys, 1850-1890*. University of California Press, 2007.
- Kemp, Martin. "A Perfect and Faithful Record: Mind and Body in Medical Photography before 1900." In *Beauty of Another Order : Photography in Science*. New Haven, CT: Yale University Press in association with the National Gallery of Canada, Ottawa, 1997.
- Kevles, Bettyann. *Naked to the Bone : Medical Imaging in the Twentieth Century*. New Brunswick, N.J.: Rutgers University Press, 1997.
- King, Charles. "Modern Research and the Forgotten Prosthetic History of the Vietnam War." *Journal of Rehabilitation Research and Development* 46, no. 9 (2009).
- Kleege, Georgina. *Sight Unseen*. New Haven, CT: Yale University Press, 1999.
<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=53125>.
- Knight, Nancy. "The New Light: X-Rays and Medical Futurism." In *Imagining Tomorrow: History, Technology, and the American Future*., 10–30. Cambridge: MIT Press, 1986.
- Koskela, Hille. "'Cam Era'--the Contemporary Urban Panopticon." *Surveillance & Society* 1, no. 3 (2003). <http://www.surveillance-and-society.org>.
- . "Webcams, TV Shows and Mobile Phones: Empowering Exhibitionism." *Surveillance & Society* 2, no. 2/3 (2004).

- Kotz, Mary Lynn. *Rauschenberg, Art and Life*. H.N. Abrams, 1990.
- Koudounaris, Paul. *THE EMPIRE OF DEATH : A Cultural History of Ossuaries and Charnel Houses*. New York, New York: Thames & Hudson, 2011.
- Kruger, Barbara. *Remote Control: Power, Cultures, and the World of Appearances*. The MIT Press, 1994.
- Kugler, Matthew. "Perceived Intrusiveness of Searching Electronic Devices at the Border: An Empirical Study." *University of Chicago Law Review* 81, no. 3 (Summer 2014): 1165.
- Labor, United States Dept of, and U. S. Atomic Energy Commission. *Studies in Workmen's Compensation and Radiation Injury*. U.S. Govt. Print. Off., 1969.
- LaFaye, Jacques. "To Eternity." In *Posada's Mexico: Exhibition Catalogue*, edited by Ron Tyler. Washington: Library of Congress, U.S., 1982.
- LaFollette, Marcel C. *Making Science Our Own : Public Images of Science, 1910-1955*. Chicago: University of Chicago Press, 1990.
- Lavine, M. *The First Atomic Age: Scientists, Radiations, and the American Public, 1895-1945*. Springer, 2013.
- Lavine, Matthew. "A Cultural History of Radiation and Radioactivity in the United States, 1895-1945." University of Wisconsin-Madison, 2008.
- Lears, T. J. Jackson. *No Place of Grace : Antimodernism and the Transformation of American Culture, 1880-1920*. New York: Pantheon Books, 1981.
- Leja, Michael. *Looking Askance : Skepticism and American Art from Eakins to Duchamp*. Berkeley: University of California Press, 2004.
- "Leroy Luetscher, Arizona Man, Has Pruning Shears Removed from His Eye By Doctors." *Huffington Post*, November 10, 1930.
http://www.huffingtonpost.com/2011/08/30/pruning-shears-removed-eye_n_941772.html#s276534&title=Chen_Liu_of.
- Lewis, Leon, and Paul E. Caplan. "The Shoe-Fitting Fluoroscope as a Radiation Hazard." *California Medicine* 72, no. 1 (January 1950): 26–30.
- Lewis, Samella, Mary Jane Hewitt, and Floyd Coleman. *African American Art and Artists*. Revised & Expanded edition. Berkeley: University of California Press, 2003.
- Lienhard, John H. *Inventing Modern : Growing up with X-Rays, Skyscrapers, and Tailfins*. New York: Oxford University Press, 2003.
- "Life in the Rays." *Chicago Daily Tribune*, February 9, 1896.
- Lindsay, Samuel McCune. "Purpose and Scope of War Risk Insurance." *Annals of the American Academy of Political and Social Science: War Relief Work* 79 (September 1918).
- Linker, Kate. *Love for Sale: Words and Pictures of Barbara Kruger*. New edition edition. New York: Harry N. Abrams, 1996.
- Linsley, Robert. "Utopia Will Not Be Televised: Rivera at Rockefeller Center." *Oxford Art Journal* 17, no. 2 (1994): 48–62.
- Lippard, Lucy. "Passenger on the Shadows." In *David Wojnarowicz: Brush Fires in the Social Landscape*. New York, NY: Aperture, 1994.
- Lippit, Akira Mizuta. "From Modes of Avisuality: Psychoanalysis--X-Ray--Cinema." In *The Spectralities Reader: Ghosts and Haunting in Contemporary Cultural*

- Theory*, edited by Maria del Pilar Blanco and Esther Peeren, 257–78. New York, NY: Bloomsbury Publishing USA, 2013.
- . “Modes of Avisuality: Psychoanalysis-X-Ray-Cinema.” In *Atomic Light (Shadow Optics)*. Minneapolis: University of Minnesota Press, 2005.
- Lippit, Akira Mizuta. “Phenomenologies of the Surface: Radiation-Body-Image.” *Qui Parle: Special Issue on Lacan* 9, no. 2 (Spring/ Summer 1996): 31-50.
- Loewy, Raymond. *Never Let Well Enough Alone*. Baltimore, MD: The John Hopkins University Press, 2002.
- Lomas, David. “Remedy or Poison? Diego Rivera, Medicine and Technology.” *Oxford Art Journal* 30, no. 3 (2007): 456–83.
- “Looking Into the Unseen: The X Ray Experiments Rapidly Reaching Perfection: Dr. WM J Morton’s Marvelous Results.” *Wheeling Register*, October 11, 1896.
- Lutes, Jean Marie. *Front Page Girls: Women Journalists in American Culture and Fiction, 1880-1930*. Cornell University Press, 2007.
- MacArthur, Douglas. “Duty, Honor, Country: General Douglas MacArthur’s Speech to the Corps of Cadets at the Military Academy at West Point, N.Y.,” May 12, 1962. http://penelope.uchicago.edu/Thayer/E/Gazetteer/Places/America/United_States/Army/USMA/MacArthur/1962_speech_to_the_Corps.html.
- Mahoney, Harold O. “A Radiographic Study of Anatomic Sections.” *X-Ray Technician* 19, no. 1 (July 1947): 5–13.
- . “The Jerman Lecture.” *The X-Ray Technician* 19, no. 1 (July 1947): 5–13.
- Mahoney, Harold O., Barry J. Anson, and Roy F. Dent. “Roentgenographic Preparations from Gross Anatomic Sections.” *American Journal of Roentgenology and Radium Therapy* 56, no. 1 (July 1946): 49–54.
- Mann, Thomas, and H. T Lowe-Porter. *The magic mountain : Der Zauberberg*. New York: Knopf, 1953.
- Mannoni, Laurent. “The Phantasmagoria.” *Film History* 8, no. 4 (1996): 390–415.
- Mantegazza, Paolo. *Physiognomy*. Walter Scott, 1892.
- Manthorne, Katherine. “John Sloan’s Moving-Picture Eye.” *American Art* 18, no. 2 (June 1, 2004): 80–95.
- Markman, Roberta H., Peter T. Markman, and Joseph Campbell. *Masks of the Spirit: Image and Metaphor in Mesoamerica*. Berkeley: University of California Press, 1994.
- Martin, Frederick C., and Fuchs, Arthur W. “The Historical Evolution of Roentgen-Ray Plates and Films.” *The American Journal of Roentgenology and Radium Therapy* 26, no. 4 (October 1931): 540–48.
- Martinez, Gilberto Crespo y, and Agustin Barroso. *Datos para varios estudios, recogidos*. Oficina tip. de la Secretaría de fomento, 1899.
- Martschukat, Jurgen. “The Art of Killing by Electricity: The Sublime and the Electric Chair.” *The Journal of American History* 89, no. 3 (December 2002): 900–921.
- Marx, Gary T. “A Tack in the Shoe: Neutralizing and Resisting the New Surveillance.” *Journal of Social Issues* 59, no. 2 (2003): 369–90.
- Marx, Karl. “Fetishism of the Commodity.” In *The Visual Culture Reader*. London; New York: Routledge, 2002.
- “Mary Wore an X-Ray Dress.” In *American Negro Folk-Songs*, Hatboro, Pa.: Folklore Associates, 1928.

- Massey, Jonathan. *Crystal and Arabesque : Claude Bragdon, Ornament, and Modern Architecture*. Pittsburgh, Pa.: University of Pittsburgh Press, 2009.
- McCardell, Roy. "The Latest Marvels of the New Light!" *Puck*, August 12, 1896.
- McClafferty, Carla Killough. *The Head Bone's Connected to the Neck Bone : The Weird, Wacky, and Wonderful X-Ray*. New York: Farrar, Straus and Giroux, 2001.
- McGovern, John J. "Hysteria and Malingering and Their Diagnosis." In *Annual Meeting: Transactions of the Minneapolis, St. Paul & Sault Ste. Marie Railway Surgical Association Sixth Annual Meeting Held at Duluth, Minn., October 10 and 11, 1912*. Minneapolis: Press of the Journal-Lancet, 1913.
- McGrath, John. *Loving Big Brother: Surveillance Culture and Performance Space*. Routledge, 2004.
- McMahan, Alison. *Alice Guy Blache: Lost Visionary of the Cinema*. Bloomsbury Publishing USA, 2014.
- McQuire, Scott. *Visions of Modernity : Representation, Memory, Time and Space in the Age of the Camera*. London; Thousand Oaks, Calif.: SAGE Publications, 1998.
- Medicus. "Sandow Under X-Rays." *Sandow's Magazine of Physical Fitness*, June 1901.
- Melies, Georges. *The Vanishing Lady, Or, The Conjuring of a Woman at the House of Robert Houdin*, 1896.
- Menchine, Ron. *Propaganda Postcards of World War II: More Than 300 Postcards from Over 20 Nations with Incisive Commentary*. Iola, WI: Antique Trader Books, 1999.
- Merleau-Ponty, Maurice, and Claude Lefort. *The Visible and the Invisible; Followed by Working Notes*. Evanston [Ill.: Northwestern University Press, 1968.
- Meyer, Richard. *Outlaw Representation: Censorship & Homosexuality in Twentieth-Century American Art*. Oxford University Press, 2002.
- Meyrowitz, E. B. *X-Ray, High Frequency Apparatus and Accessories : Catalog Part V, No. 6*. New York: E.B. Meyrowitz, 1900.
- Michaeli, Ethan. *The Defender: How the Legendary Black Newspaper Changed America*. Houghton Mifflin Harcourt, 2016.
- Michette, Alan G, and Slawka Pfauntsch. *X-Rays : The First Hundred Years*. Chichester; New York: John Wiley & Sons, 1996.
- "Microsoft Word - Roach, Mary - Stiff, The Curious Lives of Human Ca - Stiff, The Curious Lives of Human Cadavers.pdf." Accessed December 12, 2015.
<http://justiciaforense.com/material/cursos2012/Cursos%202013/ARCHIVOS%20FORENSES%202/PDF/Stiff,%20The%20Curious%20Lives%20of%20Human%20Cadavers.pdf>.
- Military Intelligence Service. "Hitler As Seen By His Doctors." Report, December 1945. National Library of Medicine.
- "Mint Employees in Japan Examined by X-Ray Each Day." *Philadelphia Enquirer*, June 18, 1903.
- Mitchell, W. J. T. "What Do Pictures Really Want?" *October* 77 (Summer 1996): 71–82.

- Mitchell, W. J. T. *What Do Pictures Want? : The Lives and Loves of Images*. Chicago: University of Chicago Press, 2005.
- M'Kendrick, Archibald, and Charles Richard Whittaker. *An X-Ray Atlas of the Normal and Abnormal Structures of the Body*. E. & S. Livingstone, 1925.
- Moffett, Cleveland. "Rontgen Rays in America." *McClure's Magazine*, April 1896.
- Moholy-Nagy, L. "Make a Light Modulator." In *Moholy-Nagy: An Anthology*, edited by Richard Kostelanetz, 99–110. Da Capo Press, 1970.
- Moholy-Nagy, László. *Vision in Motion*. Chicago: P. Theobald, 1947.
- Monell, S. H. "Roentgen Society: Committee on Standards." *American X-Ray Journal* 8, no. 6 (1901): 926.
- Monell, Samuel Howard. *A System of Instruction in X-Ray Methods and Medical Uses of Light, Hot-Air, Vibration and High-Frequency Currents : A Pictorial System of Teaching by Clinical Instruction Plates with Explanatory Text, a Series of Photographic Clinics in Standard Uses of Scientific Therapeutic Apparatus for Surgical and Medical Practitioners : Prepared Especially for the Post-Graduate Home Study* ... New York: E.R. Pelton, 1902.
- Morgan, Bruce. "Dazed and Amazed: How the X-Ray Took America by Storm." *Tufts Medicine* 70, no. 3 (Winter 2012).
- Morton, William J. "X-Ray Scrapbook." New York, NY, 1896. William J. Morton Papers, 1871-1916. New York Academy of Medicine.
- Morton, William J., and Edwin W Hammer. *The X Ray or Photography of the Invisible and Its Value in Surgery*. New York: American Technical Book Co., 1896.
- Morton, William James. "The X Ray and Some of Its Applications In Medicine— Demonstrations of Apparatus At Work and Exhibition of Stereopticon Views." *Medical Record* 50 (July 4, 1896): 9.
- Mould, R. F. *A Century of X-Rays and Radioactivity in Medicine: With Emphasis on Photographic Records of the Early Years*. CRC Press, 1993.
- _____. *Mould's Medical Anecdotes: Omnibus Edition*. CRC Press, 1996.
- "Mr. Pulitzer." *Town Topics*, April 23, 1896.
- Mulligan, Michael E. *Classic Radiologic Signs : An Atlas and History*. New York: Parthenon Pub. Group, 1997.
- "Multiple Exposures : Chronicles of the Radiation Age (Book, 1989) [WorldCat.org]." Accessed April 24, 2012. http://www.worldcat.org/title/multiple-exposures-chronicles-of-the-radiation-age/oclc/19353829&referer=brief_results.
- Mulvey, Laura. "A Phantasmagoria of the Female Body: The Work of Cindy Sherman." *New Left Review* 188 (1991): 136–50.
- _____. "Visual Pleasure in Narrative Cinema." *Screen* 16, no. 3 (Autumn 1975): 6–18.
- Munich, Adrienne. *Andromeda's Chains: Gender and Interpretation in Victorian Literature and Art*. Columbia University Press, 1993.
- Munro, Heather Ross. "The History and Significance of the Gardner Collection of Photographs at the Kummel Library, Harvard University." Harvard University, 1988.
- Nader, Ralph. "TSA Is Delivering Naked Insecurity." *Common Dreams*, November 20, 2010. <http://www.commondreams.org/views/2010/11/20/tsa-delivering-naked-insecurity>.

- . “X-Ray Exposures.” *New Republic*, September 2, 1967, 11–12.
- “Nader Group Sues to Halt X-Ray Use By Major Airports.” *New York Times*, October 27, 1973, 63.
- National Tuberculosis Association, and Benjamin Kendall Emerson. *Report of the Committee on Tuberculosis among Negroes; a Five-Year Study and What It Has Accomplished*. National Tuberculosis Association, 1937.
- “Negroes Made White by X-Rays.” *New York Herald*, December 28, 1903.
- Nelson, Mark, and Sarah Hudson Bayliss. *Exquisite Corpse: Surrealism and the Black Dahlia Murder*. 1ST ed. Bulfinch, 2006.
- “New Luminous Dance: Loie Fuller Invents a New Dress That Lights Up a Theatre.” *New York Times*, February 5, 1911.
- “New Routes for X Rays: More Ways than One of Exciting the Mystical Dark Vibration.” *San Francisco Examiner*. March 3, 1896.
- “New Scientific Verbs Wanted.” *New York Times*, January 24, 1904.
- “New Works of Science.” *Scientific American* 74, no. 4 (February 15, 1896): 98.
- New York World’s Fair 1939, Department of Feature Publicity. “Medicine and Public Health at the New Yoork World’s Fair 1939,” February 15, 1939. New York World’s Fair Papers. New York Public Library Manuscripts and Archives Division.
- Noakes, Richard John. “*Cranks and Visionaries*: Science, Spiritualism and Transgression in Victorian Britain. University of Cambridge, 1998.
- “No Title.” *Tacoma Times*, May 11, 1911.
- Nye, David E. *American Technological Sublime*. MIT Press, 1996.
- O’Connor, Erin. “Camera Medica: Towards a Morbid History of Photography.” *History of Photography* 23, no. 3 (Autumn 1999).
- Office of Law Enforcement Standards. “Portable X-Ray Systems for Use in Bob Identification.” National Institute of Justice: Office of Science and Technology, December 2007.
- “On This Day.” Accessed September 16, 2015.
https://www.facebook.com/onthisday/?source=notification¬if_t=onthisday.
- “Ordinary Photography and ‘New Photography.’” *Life*, April 6, 1896.
- Orton, Fred. *Figuring Jasper Johns*. Reaktion Books, 1994.
- Orwell, Miles. *The Real Thing : Imitation and Authenticity in American Culture, 1880-1940*. Chapel Hill: University of North Carolina Press, 1989.
- Osterweil, Ara. “A Body Is Not a Metaphor: Barbara Hammer’s X-Ray Vision.” *Journal of Lesbian Studies* 14, no. 2 (2010): 185–200. doi:10.1080/10894160903196533.
- Otis, Edward. “The Soldier and Tuberculosis.” *Medical Record* 94, no. 2 (July 13, 1918): 47–49.
- Ottolengui, Rodriguez. “Feats of the Camera.” *The Junior Munsey*, 1901.
http://books.google.com/books?id=e95MAAAAMAAJ&dq=%22x-ray%22+hand+morton&source=gbs_navlinks_s.
- Owens, Craig. “The Spectacular Ruse; or The Medusa Effect.” In *Barbara Kruger: We Won’t Play Nature to Your Culture*, 5–11. London: Institute of Contemporary Arts, 1983.
- Pacini, A.J. “A Concept of X-Ray Pathology.” *Medical Record* 99 (February 19, 1921): 311–16, 348–51.

- . "Roentgen Ray Anthropometry of the Skull." *Journal of Radiology* 3, no. 1 (January 1922): 230–38.
- . "Roentgen Ray Anthropometry--(The Skull [Abstract])." *Journal of Radiology* 3, no. 1 (January 1922): 418–26.
- Palmquist, Peter E. *Elizabeth Fleischmann: Pioneer X-Ray Photographer*. Berkeley, Calif.: Judah L. Magnes Museum, 1990.
- Parker, Anabel. "Curious Electrical Forms: As Shown in Mr. T. Burton Kinraide's Recent Photographs of Electrical Discharges." *Century Illustrated Magazine* LXIV, no. 3 (July 1902): 376.
- Parkinson Zamora, Lois. "Quetzalcoatl's Mirror: Reflections on the Photographic Image in Latin America." In *Image and Memory: Photography from Latin America, 1866-1994*. Austin: University of Texas Press, 1998.
- Pastan, Amy. *Diego Rivera: The Detroit Industry Murals*. Scala, 2006.
- Pasveer, Bernike. "Representing or Mediating: A History and Philosophy of X-Ray Images in Medicine." In *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*. Hanover: Dartmouth College Press, 2006.
- Pauwels, Luc. "A Theoretical Framework for Assessing Visual Representational Practices in Knowledge Building and Science Communications." In *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*. Hanover, NH: Dartmouth College Press, 2006.
- . "Introduction: The Role of Visual Representation in the Production of Scientific Reality." In *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*. Hanover, NH: Dartmouth College Press, 2006.
- , ed. *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*. Hanover, N.H: Dartmouth, 2005.
- Peiss, Kathy. *Cheap Amusements: Working Women and Leisure in Turn-of-the-Century New York*. Reprint edition. Philadelphia: Temple University Press, 1986.
- . *Hope in a Jar: The Making of America's Beauty Culture*. Philadelphia: University of Pennsylvania Press, 2011.
- Peiss, Kathy Lee. *Cheap Amusements : Working Women and Leisure in Turn-of-the-Century New York*. Philadelphia: Temple University Press, 1986.
- Peña, Carolyn Thomas de la. *The Body Electric : How Strange Machines Built the Modern American*. New York: New York University Press, 2003.
- Pendergast, Tom. *Creating the Modern Man: American Magazines and Consumer Culture, 1900-1950*. Columbia, Mo: University of Missouri, 2000.
- Pepper, William. "Skiagraphy in the Diagnosis of Aortic Aneurism." In *University Medical Magazine*, 237. A.L. Hummel, 1897.
- Perloff, Marjorie. *Frank O'Hara: Poet Among Painters*. University of Chicago Press, 1977.
- . "Watchman, Spy, and Dead Man: Johns, O'Hara, Cage and the 'Aesthetic of Indifference.'" *Modernism/ Modernity* 8, no. 2 (2001): 197–223.

- Petersen, Julie K. *Understanding Surveillance Technologies : Spy Devices, Their Origins & Applications*. Boca Raton, FL: CRC Press, 2001.
- Phillips, Reed. "Truth and the Politics of Knowledge." *Dynamic Chiropractic* 21, no. 8 (April 7, 2003).
<http://www.dynamicchiropractic.com/mpacms/dc/article.php?id=9129>.
- "Photographing the Unseen: A Symposium on the Roentgen Rays." *The Century Magazine*, May 1896.
- "Photography of Unseen Substances." *Literary Digest*, January 25, 1896.
- Phulari, Basavaraj Subhashchandra. *Orthodontics: Principles and Practice*. JP Medical Ltd, 2011.
- "Physicians See Esophagus Act in New Movie." *Washington Post*, May 7, 1937.
- Pizzitola, Louis. *Hearst Over Hollywood: Power, Passion, and Propaganda in the Movies*. Columbia University Press, 2002.
- Pliego Quijano, Susana, and Hilda Trujillo Soto. *Man at the Crossroads: Diego Rivera's Mural at Rockefeller Center*. Trilce Ediciones, 2015.
- "Poisoned by Roentgen Rays." *Washington Post*. October 20, 1896.
- "Police Bar X-Ray Skirt." *New York Times*. August 23, 1913.
- Pomper, Philip. *Trotsky's Notebooks, 1933-1935: Writings of Lenin, Dialectics and Evolutionism*. iUniverse, 1998.
- Porta, Giambattista della. *Magiae Naturalis*. London: T. Young and S. Speed, 1658.
- Posada, José Guadalupe, Julian Rothenstein, and England) Museum of Modern Art (Oxford. *Posada, Messenger of Mortality*. Mt. Kisco, N.Y.: Moyer Bell Ltd., 1989.
- Post, Houston. "To Her X Ray Photograph." *Washington Post*, April 12, 1896.
- Pottage, Alan. "Architectural Authorship: The Normative Ambitions of Le Corbusier's Modulor." *AA Files* 31 (Summer 1996).
- Potter, Patrick. *Banksy: You Are an Acceptable Level of Threat and If You Were Not You Would Know about It*. Pro-Actif Communications, 2014.
- "Premature Internment." *The Argus*, October 10, 1896.
- Press, Associated. "TSA to Drop X-Ray Airport Scanners by June because of Privacy Concerns; Other Scanners Staying." *The Washington Post*, January 19, 2013, sec. Business. http://www.washingtonpost.com/business/technology/tsa-to-drop-x-ray-airport-scanners-by-june-because-of-privacy-concerns-other-scanners-staying/2013/01/19/a52c3d0a-6200-11e2-81ef-a2249c1e5b3d_story.html.
- "Prohibits X-Ray Skirts." *New York Times*. August 20, 1913.
- ProPublica, Michael Grabell, Nov 1, 2011, and 12:06 P.m. "U.S. Government Glossed Over Cancer Concerns As It Rolled Out Airport X-Ray Scanners." *ProPublica*, November 1, 2011. <http://www.propublica.org/article/u.s.-government-glossed-over-cancer-concerns-as-it-rolled-out-airport-x-ray>.
- "Protégé of Edison Killed by X-Rays." *Post Standard*. October 4, 1904.
- Putnam, David. *Movies and Money*. Random House LLC, 2011.
- "Quick_start_guide [Zotero Documentation]." Accessed April 24, 2012.
http://www.zotero.org/support/quick_start_guide.
- "Radiograph of Skull," ca. 1920s. Carl Van Vechten Papers. New York Public Library Manuscripts and Archives Division.
- "Reflected X Rays." *The Electrical Journal* 1, no. 22 (April 15, 1896): 440.

- Reiser, Stanley Joel. *Medicine and the Reign of Technology*. Cambridge; New York: Cambridge University Press, 1978.
- Rexer, Lyle. *The Edge of Vision: The Rise of Abstraction in Photography*. Aperture, 2013.
- Richardson, John. "Rauschenberg's Epic Vision." *Vanity Fair Magazine*, April 30, 2008. <http://www.vanityfair.com/magazine/1997/09/rauschenberg199709>.
- Rivera, Juan Coronel, Fausto Ramirez, William H. Robinson, Dawn Ades, and Paul Karlstrom. *Diego Rivera, Art & Revolution*. Mexico: Conaculta, 1999.
- Roach, Mary. *Stiff*, n.d.
- _____. *Stiff: The Curious Lives of Human Cadavers*: W. W. Norton & Company, 2003. <http://www.amazon.com/Stiff-Curious-Lives-Human-Cadavers/dp/0393324826>.
- Robins, E. A. "The New Light: Apparatus for Rontgen Work." *The Photogram* 3, no. 27 (March 1896): 73.
- Robison, Roger F. *Mining and Selling Radium and Uranium*. Springer, 2014.
- "Roentgen and Bertillon." *Chicago Daily Tribune*, February 10, 1896, 6.
- "Roentgen Society of London. "Archives of the Roentgen Ray." *Archives of the Roentgen Ray.*, 1897.
- Roig-Franzia, Manuel. "What Will Become of Trayvon's Hoodie, the Latest Piece of Iconic Trial Evidence?" *Washington Post*, August 2, 2013.
http://www.washingtonpost.com/lifestyle/style/what-will-become-of-trayvons-hoodie-the-latest-piece-of-iconic-trial-evidence/2013/07/30/0882de30-f951-11e2-afc1-c850c6ee5af8_story.html.
- Rollet, Patrice. "Magician and the Surgeon: Film and Painting." In *The Visual Turn: Classical Film Theory and Art History*. New Brunswick, N.J.: Rutgers University Press, 2003.
- "Rontgen Work for Profit." *The British Journal of Photography*, July 10, 1896, 434–35.
- "Rontgen's X-Ray Photography." *Anthony's Photographic Journal* 27, no. 4 (April 1896): 107.
- Roosevelt, Theodore. "The Strenuous Life." *Voices of Democracy: The U.S. Oratory Project*, 1899. <http://voicesofdemocracy.umd.edu/roosevelt-strenuous-life-1899-speech-text/>.
- Ross, Lee E., and Simon Adetona Akindes. "In Search of Probable Cause: U.S. Customs, Racial Profiling, and the Fourth Amendment." In *Crime Control and Social Justice: The Delicate Balance*. Greenwood Publishing Group, 2003.
- Roth, Moira. "The Aesthetic of Indifference." In *Difference/ Indifference: Musings on Postmodernism, Marcel Duchamp and John Cage*, 33–47. Amsterdam: G+B Arts International, 1998.
- Rothbart, David. *A Soldier's Journal: With the 22nd Infantry Regiment in World War II*. ibooks, 2005.
- Rowland, Sydney. "Archives of Clinical Skiagraphy." *Archives of Clinical Skiagraphy*, 1896.
- Russell, Lawrence K. "Lines on an X-Ray: Portrait of a Lady." *Life*, March 12, 1896.
- Saggese, Jordana Moore. *Reading Basquiat: Exploring Ambivalence in American Art*. University of California Press, 2014.
- "San Francisco's Twentieth Century Witch." *The Sunday Call*, February 10, 1901.

- Sappol, Michael. *A Traffic of Dead Bodies : Anatomy and Embodied Social Identity in Nineteenth-Century America*. Princeton, N.J.: Princeton University Press, 2002.
- _____. *Dream Anatomy*. Government Printing Office, 2006.
- Sappol, Michael, National Library of Medicine (U.S.). History of Medicine Division. Exhibition Program, and National Library of Medicine (U.S.). *Dream Anatomy*. Bethesda, Md.; Washington, D.C.: U.S. Dept. of Health and Human Services, National Library of Medicine, National Institutes of Health ; For sale by the Supt. of Docs., U.S. G.P.O., 2006.
- Saven, H. Lyman. "X-Rays in the Army." *The Electrical World*, November 5, 1898.
- "Says X Rays Are Not New: Views of Dinshar Pestonjee Ghadially, the Indian Scientist." *New York Times*, March 11, 1896.
- "SCENE I. A Churchyard." Accessed April 6, 2016.
<http://shakespeare.mit.edu/hamlet/hamlet.5.1.html>.
- Schattner, Elaine. "The X-Rays of Others." *Huffington Post*, June 25, 2010.
http://www.huffingtonpost.com/elaine-schattner/marilyn-monroe-x-rays-auc_b_625014.html.
- Schatzki, Stefan. "John Sloan's 'X-Rays.'" *American Journal of Radiology* 156 (March 1991): 554.
- Schiebinger, Londa L. *The Mind Has No Sex?: Women in the Origins of Modern Science*. Harvard University Press, 1991.
- Schmolders, Claudia. *Hitler's Face: The Biography of an Image*. Translated by Adrian Daub. Philadelphia: University of Pennsylvania Press, 2009.
- Schneider, Gary. *Genetic Self-Portrait*. Syracuse, New York: Light Work, 1999.
- "Science Notes: Limited Use of Chest X-Rays--A New Anti-TB Drug." *New York Times*. November 24, 1957.
- Sconce, Jeffrey. *Haunted Media : Electronic Presence from Telegraphy to Television*. Durham, NC: Duke University Press, 2000.
- "Secrets Revealed by the Camera." *The Watchman*, August 22, 1901, 3.
- Sekula, Allan. "Reading an Archive: Photography between Labour and Capital." In *Visual Culture: The Reader*, edited by Jessica Evans and Stuart Hall. London: SAGE Publications, 1999.
- _____. "The Body and the Archive." *October* 39 (Winter 1986): 3–64.
- "Self Inflicted Injuries Diagnosed by the Roentgen Rays." *Archives of the Roentgen Ray* 4, no. 13 (August 1899).
- Selzer, Richard. *Mortal Lessons: Notes on the Art of Surgery*. Harcourt Brace, 1974.
- Serlin, David. "Engineering Masculinity: Veterans and Prosthetics after World War Two." In *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*. NYU Press, 2002.
- Shanebrook, Robert. "The Curious Case of the Blue-Green X-Ray Images from Fitzsimons Army Medical Center," December 14, 2007.
www.oandplibrary.org/assets/.../The_curious_case_of_blue_green_X.pdf.
- Siegel, Elizabeth E. "'Miss Domestic' and 'Miss Enterprise.'" In *The Scrapbook in American Life*, edited by Susan Tucker, Katherine Ott, and Patricia Buckler. Temple University Press, 2006.
- Simon, Linda. *Dark Light : Electricity and Anxiety from the Telegraph to the X-Ray*. Orlando: Harcourt, 2004.

- Skull of Carl Van Vechten*, December 1927. Manuscripts and Archives Division. New York Public Library.
- Sledge, Michael. *Soldier Dead: How We Recover, Identify, Bury, and Honor Our Military Fallen*. Columbia University Press, 2007.
- Smith, Mrs. Laban Edward. "In Old Gray Sanctuaries." *Godey's Magazine* 134, no. 799 (January 1897): 68–72.
- Smith, Norris, and Lynn Messina. *Homeland Security*. Bronx, NY: H.W. Wilson Co., 2004.
- Smith, Shawn Michelle. *At the Edge of Sight: Photography and the Unseen*. Durham: Duke University Press Books, 2013.
- _____. *Photography on the Color Line: W. E. B. Du Bois, Race, and Visual Culture*. Durham: Duke University Press Books, 2004.
- Smith, George Albert. *The X-Ray Fiend*. British Film Institute, 1897.
- "Smugglers Trapped by X-Ray." *Broad Axe*. January 2, 1902.
- Snyder, Joel. "Visualization and Visibility." In *Picturing Science, Producing Art*. New York: Routledge, 1998.
- "Societies: Massachusetts Institute of Technology." *American Architect and Building News* 64, no. 1220 (May 13, 1899): 55.
- Sognnaes, Reidar F., and Ferdinand Strom. "The Ontological Identification of Adolf Hitler: Definitive Documentation by X-Rays, Interrogations and Autopsy Findings." *Acta Odontologica Scandinavica* 31 (1973): 43–69.
- Solomon, Deborah. "But Is It Art?" *The New York Times*, October 4, 1998, sec. Magazine. <http://www.nytimes.com/1998/10/04/magazine/but-is-it-art.html>.
- Solove, Daniel J. *Nothing to Hide: The False Tradeoff between Privacy and Security*. New Haven Conn.: Yale University Press, 2013.
- Solveig, Julich. "Seeing in the Dark: Early X-Ray Imaging and Cinema." In *Moving Images : From Edison to the Webcam*, by Fullerton, John, Stockholms Universitet. Filmvetenskapliga Institutionen, and Söderbergh-Widding, Astrid. Sydney, Australia: John Libbey & Co., 2000.
- "Spies Exposed By X-Ray." *Washington Post*, January 19, 1915.
- Spooner, Peter. "David Wojnarowicz: A Portrait of the Artist as X-Ray Technician." In *Suspended License: Censorship and the Visual Arts*, edited by Elizabeth C. Childs. University of Washington Press, 1998.
- Squire, Lucy Frank. *Fundamentals of Roentgenology*. Cambridge, Mass: Harvard University Press, 1966.
- Stafford, Barbara Maria. *Body Criticism : Imaging the Unseen in Enlightenment Art and Medicine*. Cambridge, Mass.: MIT Press, 1991.
- Stanlaws, P. "'Girl of Today' Jury Famous for American Types." *New York Times*. December 7, 1913.
- Stanton, Mary Olmstead. *A System of Practical and Scientific Physiognomy: Or, How to Read Faces ...* F. A. Davis, 1890.
- Star, S.L., and A. Strauss. "Layers of Silence, Arenas of Voice: The Ecology of Visible and Invisible Work." *Computer Supported Cooperative Work (CSCW)* 8, no. 1–2 (1999): 10–11.
- "State Press Comment." *The Day*, March 26, 1896.

- Stavans, Ilan. *The Riddle of Cantinflas: Essays on Hispanic Popular Culture, Revised and Expanded Edition*. UNM Press, 2012.
- Stone, Paul. *Legacy of Excellence: The Armed Forces Institute of Pathology, 1862-2011*. Government Printing Office, 2011.
- Strugatch, Warren. "For Some Countries, a Post-Sept. 11 Surge." *New York Times*, November 11, 2001, L16.
- Stryker, Susan. "Multiple Anomalies: Transgender Terror, Ethological Probes, and the Queer Politics of Whole-Body-Image Security Screening," *The Cultural Impact of New Medical Imaging Technologies*, University of Queensland, Brisbane, Aug 30, 2011.
- Stulik, Dusan, and Art Kaplan. *The Atlas of Analytical Signatures of Photographic Processes: Cyanotype*. Los Angeles, CA: The Getty Conservation Institute/ J. Paul Getty Trust, 2013.
- Sturken, Marita, and Lisa Cartwright. *Practices of Looking: An Introduction to Visual Culture*. 1st edition. Oxford ; New York: Oxford University Press, 2001.
- "Stylish Thief Caught. New York Woman with Souvenir Craze Has Mean Act Revealed by X-Ray Light." *Washington Bee*. June 22, 1901.
- Suffering for Science: Reason and Sacrifice in Modern America*, n.d.
- "Summation and Free Discussion." In *Radiobiology at the Intra-Cellular Level*, 181. New York: Pergamon Press, 1959.
- "Suspended License : Censorship and the Visual Arts." Accessed August 30, 2015. <http://web.b.ebscohost.com.proxy.wm.edu/ehost/ebookviewer/ebook/bmxIYmtfXzQyMzg1X19BTg2?sid=8b8a3816-7aee-42c7-82c8-10d1bd265e85@sessionmgr113&vid=0&format=EB&rid=1>.
- Swan, Kate. "First Woman to Have Hear Heart X-Rayed." *New York World*. June 14, 1896.
- Tatham, Campbell. "Double Order: The Spectrum of Black Aesthetics." *Midcontinent American Studies Journal: Perceptions of Black America* 11, no. 2 (Fall 1970): 88–100.
- "Tells of Rejuvenating Women by X-Rays." *New York Times*, February 1, 1921.
- Terrass, R. "The Life of Ed C. Jerman: A Historical Perspective." *Radiologic Technology* 66, no. 5 (June 1995): 291–98.
- Thali, Michael J., B. G. Brogdon, and Mark D. Viner. *Forensic Radiology*. CRC Press, 2002.
- "THE ACETATE NEGATIVE SURVEY - Horvath_AcetateNegativeSurvey.pdf." Accessed December 12, 2015. http://gawainweaver.com/images/uploads/Horvath_AcetateNegativeSurvey.pdf.
- "THE ACETATE NEGATIVE SURVEY - Horvath_AcetateNegativeSurvey.pdf." Accessed December 12, 2015. http://gawainweaver.com/images/uploads/Horvath_AcetateNegativeSurvey.pdf.
- "The Agony Goes On," August 3, 1959. Clippings. Thomas Edison National Historic Park.
- "The Blind May See." *Wheeling Register*, November 17, 1896.
- "The Cabaret Du Neant." *Scientific American* 74 (March 7, 1896): 152.
- "The Customs of This Country, OR What We Are Coming To." *Life* 56, no. 1460 (October 20, 1910): 670.

- "The Fourth of July." *Broad Axe*. July 4, 1901.
- "The Glowing X-Ray Art That Sets This Street Artist Apart." *The Huffington Post*. Accessed April 18, 2015. http://www.huffingtonpost.com/jaime-rojo-steven-harrington/shok1-street-art_b_5032094.html.
- "The Letters Of Bernard Berenson And Isabella Stewart Gardner, 1887-1924: With Correspondence by Mary Berenson: Rollin Van N. Hadley: 9780930350895: Amazon.com: Books." Accessed May 30, 2016. <http://www.amazon.com/Letters-Bernard-Berenson-Isabella-1887-1924/dp/0930350898>.
- "The Lure of the Smuggling Game: True and Thrilling Attempts to Outwit Customs Officers." *Washington Post*. July 27, 1913.
- "The Medusa Effect: Representation and Epistemology in Victorian Aesthetics (SUNY Series in Psychoanalysis and Culture) (SUNY Series in Psychoanalysis and Culture (Paperback)): Thomas Albrecht: 9781438428680: Amazon.com: Books." Accessed May 29, 2016. <http://www.amazon.com/Medusa-Effect-Representation-Epistemology-Psychoanalysis/dp/1438428685>.
- The Memory Palace of Isabella Stewart Gardner Museum*. Hol Art Books, 2007.
- The New Light and the New Photography. : A Special Issue of The Photogram*, February, 1896. London: Published for The photogram Limited, by Dawburn & Ward, Limited, London, 1896.
- "The New Light: Our Own Investigations." *The Photogram* 3, no. 27 (March 1896): 73.
- "The Sign of Death: It May Readily Be Detected by Means of the X-Ray." *New York Evangelist*, August 27, 1896.
- "Theatrical Gossip." *New York Times*, February 18, 1896, 16.
- The Warehouse Gallery, Syracuse University. "Gary Schneider: Genetic Self-Portrait." Syracuse, NY, November 15, 2007. http://suart.syr.edu/wp-content/uploads/2015/06/Gallery_guide.pdf.
- "The World Beyond Our Senses." *Harper's Monthly Magazine*, June 1903.
- "The X Rays in the Custom House." *Scientific American* 27, no. 6 (August 7, 1897): 88.
- "They're Keeping Eyes on It." *The Commercial Appeal*, February 13, 1896.
- Thompson, Mrs. Jane Smeal Henderson, and Helen Gertrude Thompson. *Silvanus Phillips Thompson, D.Sc., LL.D., F.R.S.: His Life and Letters*. T.F. Unwin, Limited, 1920.
- Thompson, Robert Farris. *Flash of the Spirit: African & Afro-American Art & Philosophy*. Knopf Doubleday Publishing Group, 2010.
- . "In Search of the Essence of Meaning: Translating Basquiat's Art." In *Jean-Michel Basquiat*, edited by Larry Gagosian. New York, NY: Gagosian Gallery, 2013.
- Thompson, Craig. "Sound Films Made of Body's Interior." *New York Times*, September 13, 1937.
- . "X-Rays 'Make Babies Possible;' Dr. Kaplan Describes Treatment." *New York Times*, September 17, 1937.
- Thomson, Elihu. "Roentgen Rays Act Strongly on the Tissues." *The Electrical Engineer* 23, no. 447 (November 25, 1896): 534.
- "To Catch Smugglers with an X-Ray." *San Francisco Sunday Call*, March 3, 1907.
- "To Whiten Black and Yellow Races." *Literary Digest*, November 23, 1929.

- "Top British Counter Spy Enlisted Against Diamond Smuggling Ring." *New York Times*, August 15, 1954, F1.
- Tousey, Sinclair. *Medical Electricity and Rontgen Rays*. W.B. Saunders, 1921.
- Trotsky, Leon. "In Defense of October." Copenhagen, Denmark, November 1932. <https://www.marxists.org/archive/trotsky/1932/11/oct.htm>.
- _____. "The Death Agony of Capitalism and the Tasks of the Fourth International," 1938. <https://www.marxists.org/archive/trotsky/1938/tp/tp-text.htm#op>.
- Tumblety, Joan. *Remaking the Male Body: Masculinity and the Uses of Physical Culture in Interwar and Vichy France*. OUP Oxford, 2012.
- Turner, Professor Bryan S., and Bryan S. Turner. *Regulating Bodies: Essays in Medical Sociology*. Routledge, 2002.
- Tvisian, Yuri. "Media Fantasies and Penetrating Vision: Some Links between X-Rays, the Microscope, and Film." In *Laboratory of Dreams : The Russian Avant-Garde and Cultural Experiment*, by John E Bowlt and Olga Matich. Stanford, Calif.: Stanford University Press, 1996.
- Twain, Mark. "Three Thousand Years Among the Microbes." In *The Devil's Race-Track : Mark Twain's Great Dark Writings : The Best from Which Was the Dream? And Fables of Man*, by John Sutton Tuckey and Mark Twain, 251–53. Berkeley: University of California Press, 1980.
- Tyler, Parker. *The Divine Comedy of Pavel Tchelitchew: A Biography*. Weidenfeld & Nicolson, 1969.
- Tyler, Ronnie C., Library of Congress, Amon Carter Museum of Western Art, and Colorado Springs Fine Arts Center. *Posada's Mexico*. Library of Congress, 1979.
- Udall, Sharyn. "Frida Kahlo's Mexican Body: History, Identity, and Artistic Aspiration." *Woman's Art Journal* 24, no. 2 (Autumn -Winter 2004 2003): 10–14.
- "Untitled." *The Standard*, March 31, 1900.
- U.S. Department of Commerce. *X-Ray Protection: Handbook, Bureau of Standards*, No. 15. Washington, DC: Government Printing Office, 1931.
- "U.S. Government Glossed Over Cancer Concerns As It Rolled Out Airport X-Ray Scanners - ProPublica." Accessed March 22, 2015. zotero://attachment/572/.
- Utley, Gertje. *Picasso: The Communist Years*. Yale University Press, 2000.
- Veblen, Thorstein, and Stuart Chase. *The Theory of the Leisure Class; an Economic Study of Institutions*,. New York: Modern library, 1934.
- "Visions' Seek Box Secret: Mediums and Latest Rays of Science Will Attempt to Penetrate Mystery of Southcott Chest." *Los Angeles Times*, May 2, 1927.
- Volberding, Paul. *Global HIV/AIDS Medicine*. Elsevier Health Sciences, 2008.
- Wagener, Otto. *Hitler--Memoirs of a Confidant*. Yale University Press, 1985.
- _____. *Hitler--Memoirs of a Confidant*. Yale University Press, 1985.
- War Department. *Compilation of War Risk Insurance Letters: Treasury Decisions and War Department Circulars, Relating to War Risk Insurance from December 21, 1917, to April 1, 1919*. Washington, DC: U.S. Government Printing Office, 1919.
- Warner, Arthur H., and Kenneth Crist. "X-Ray---Master of Magic." *Los Angeles Times*, October 7, 1934.
- Warren, Samuel, and Louis Brandeis. "The Right to Privacy." *Harvard Law Review* 4, no. 5 (December 15, 1890).

- Washington, Harriet A. *Medical Apartheid : The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present*. New York: Doubleday, 2006.
- Watson, James S, Lowell Thomas, and Inc Moviecraft. *Highlights and Shadows*. Orland Park, IL: Moviecraft, 1995.
- "We Are Sick of the Roentgen Rays." *Pall Mall Gazette*, March 1896.
- Wellen, Michael. "Paranoia and Hope: The Art of Juan Batlle Planas and Its Relationship to the Argentine Technological Imagination of the 1930s and 1940s." *Journal of Surrealism and the Americas* 3, no. 1–2 (2009): 94–95.
- "What the X-Ray Shows in Plants." *Los Angeles Times*, August 22, 1937.
- "Who Owns Your X-Ray Picture?" *Literary Digest*, December 19, 1931.
- Wiener, Marcus. "Letter to Mr. Grover Whalen," April 17, 1939. New York World's Fair 1939 Papers. New York Public Library Manuscripts and Archives Division.
- Wilbur, Cressy, and Department of Commerce, Bureau of the Census. *Mortality Statistics 1912: Thirteenth Annual Report*. Washington, DC: Government Printing Office, 1913.
- Williams, Heather. *Mallarme's Ideas In Language*. Oxford ; New York: Peter Lang Pub Inc, 2004.
- Williamson, Bess. "Getting a Grip: Disability in American Industrial Design of the Late Twentieth Century." *Winterthur Portfolio* 46, no. 4 (2012): 213–36.
doi:10.1086/669668.
- Wing, Samuel B. (Samuel Brackett). *The Soldier's Story : A Personal Narrative of the Life, Army Experiences and Marvelous Sufferings since the War of Samuel B. Wing*. Phillips [Me.] : Phonograph Steam Book and Job Print, 1898.
<http://archive.org/details/soldiersstoryper00wing>.
- Wojnarowicz, David. *Close to the Knives: A Memoir of Disintegration*. Open Road Media, 2014.
_____. *David Wojnarowicz: Brush Fires in the Social Landscape*. Aperture, 1994.
- Wolfe, Bertram David. *Diego Rivera, His Life and Times*. Alfred A. Knopf, 1943.
- "Wonders of X-Rays." *The World*, May 1, 1897.
- Wood, John. "The Art of the Cyanotype and the Vandalous Dreams of John Metoyer." In *The Photographic Arts*. Iowa City: University of Iowa Press, 1997.
- Woodbury, Frank T. "Recruiting for the Military Service." *The Military Surgeon: Journal of the Association of Military Surgeons of the United States* XL (June 14, 1917).
- Wyckoff, Harold O., and Lauriston S. Taylor. *National Bureau of Standards Handbook: X-Ray Protection Design*. 50. Washington, DC: U.S. Department of Commerce, 1952.
- "X Ray in Boston Society." *New York World*, April 5, 1896.
- "X Rays for Smugglers." *Chicago Daily Tribune*, August 1, 1897.
- Xenia. "Our Fighting Radiographers." *Radiography: The Journal of the Society of Radiographers* 7, no. 74 (February 1941): 94–95.
- "X-Ray Barbecue." *Life Magazine*, April 17, 1950.
- "X-Ray Detection." *St. Louis and Canadian Photographer* 27 (March 1903): 135.

- “X-Ray Discovery Sparked 19th-Century DIY Craze | Wired Science | Wired.com.” *Wired Science*. Accessed August 9, 2012.
<http://www.wired.com/wiredscience/2008/11/xrays/>.
- “X-Ray Dress Will Be Worn by Miss Claire Simpson in ‘The Suffragettes.’” *Tuscon Daily Citizen*. September 4, 1913.
- “X-Ray Electrocutions.” *St. Paul Globe*, December 6, 1896.
- “X-Ray Eyes for Borderline Cases.” *Reader’s Digest* 51 (1973): 73.
- “X-Ray in Sandow’s Foot.” *New York Journal*, March 16, 1896.
- “X-Ray Items: X-Ray of a Woman.” *The Phonoscope*, November 1896.
- “X-Ray Martyr.” *Time*, August 3, 1959. Clipping. Thomas Edison National Historic Park.
- “X-Ray Shows Jack Johnson to Be Almost Bullet Proof.” *The Evening World*, March 22, 1911.
- “X-Ray Sought for Use in Customs Inspection.” *Washington Post*, November 5, 1924.
- “X-Ray-Proof.” *Time* 2, no. 17 (December 24, 1923): 23.
- “X-Rays.” *American Amateur Photographer* 8, no. 9 (September 1896): 395.
- “X-Rays as a Means to Detect Smuggled Goods.” *The Jewelers’ Circular* 34, no. 23 (July 7, 1897): 19.
- “X-Rays for Everybody.” *Boston Evening Transcript*. March 14, 1896.
- “X-Rays in A Dry Goods Store.” *Electrical Engineer*, 1896, 356.
- “X-Rays Killing Expert: Burns Received in Practice Killing Physician.” *Washington Post*, July 12, 1910.
- “X-Rays: National Archives at St. Louis.” Accessed April 5, 2016.
<http://www.archives.gov/st-louis/civilian-personnel/x-rays.html>.
- “X-Rays Offered As Alternative to Strip-Searches.” *Washington Post*, November 27, 1998.
- “X-Rays on Sandow’s Foot.” *Kansas City Star*, March 18, 1896.
- “X-Rays to Fool Smugglers.” *Washington Post*, April 14, 1907.
- Yosifon, David, and Peter N. Stearns. “The Rise and Fall of American Posture.” *American Historical Review* 103, no. 4 (October 1998): 1057–95.
- Zabel, Barbara. *Assembling Art: The Machine and the American Avant-Garde*. Jackson: University Press of Mississippi, 2004.
- Zolotow, Maurice. *Marilyn Monroe*. Rev Sub. Harper Collins, 1990.

