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# 1 When the Scientific Vantage Is Not Enough\*

Michael C. Newman

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Superficiality to me is untruth....

—W. Eugene Smith, *Minamata*

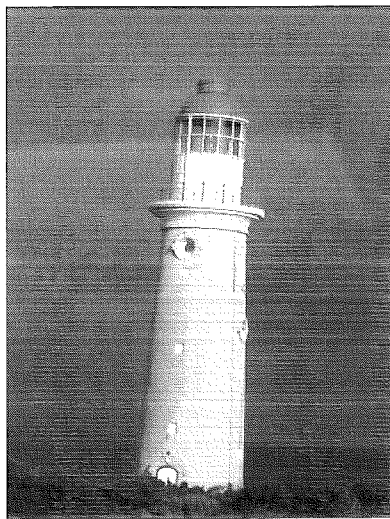
## INTRODUCTION

Initially intending to write an introductory chapter for this book about our collective experience with mercury from a scientist's vantage, the familiar way for me to proceed would be to explain the ease with which mercury atoms share outer orbital electrons with other elements. This characteristic makes conversion of mercury to methylmercury easy for sulfate-reducing bacteria in sediments. The typical scientific treatment would next explain how readily methylmercury enters organisms and increases in concentration from one creature to the next in a food web until it reaches harmful concentrations in predators. Referring back to the ease with which mercury shares electrons, I would point out that this same tendency gives rise to damage in tissues, especially nervous tissues, after mercury enters the body. The resulting essay would lay out facts and details while avoiding the scientific sin of subjectivity; it would also fail wholly to describe our human experience with mercury.

What vantage might I take as a scientist and educator to convey meaningful insight if not the comfortable one involving electrons, covalent bonds, oxidative stress, and neurotoxicity? One possible, but unfamiliar, approach suggested itself

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\* An earlier version of this article originally was published in the catalogue, *Unbearable Beauty: Triumph of the Human Spirit. Photographs by W. Eugene Smith and Aileen M. Smith*, on the occasion of the exhibition by the same name held at the Muscarelle Museum of Art at The College of William & Mary in Virginia, April 24–June 20, 2010.



**FIGURE 1.1** The Cape du Couedic Lighthouse, Kangaroo Island, Australia (M.C. Newman).

after a personal experience. Recently my wife and I took a tour of Australia, including a cold, rainy day trip to Kangaroo Island on the southern side of the continent. One point of interest was the Cape du Couedic Lighthouse (Figure 1.1).

Built in 1909 on an isolated point of the island, this lighthouse became home for a succession of lighthouse keepers and their families. Dangerous surf and sea cliffs restricted visits, so food and essentials for keeper families were hoisted up the sea cliffs by rope and pulley every three months. Each night keepers tended the light, diligently polishing kerosene soot from its optics—optics that revolved smoothly above a reflective pool of mercury. Gossip accumulated about entire families going slowly insane from loneliness at the lighthouse. Scientific analyses have since shown that, while these families might have been lonely, the cause of the insanity was likely mercury poisoning. Staring through the rain at the Cape du Couedic Lighthouse, I tried to imagine the prolonged suffering that must have emerged in each isolated family as father, mother, and perhaps even elder children suffered the disorientation, paranoia, convulsions, and eventual dementia typical of mercury poisoning. This suffering was occurring simultaneously at the Cape Willoughby Lighthouse, elsewhere on Kangaroo Island. Indeed, similar mercury poisonings were occurring in all lighthouses using that particular Fresnel lens design. Objective speculation about mercury's binding affinities and neurological effects was not this scientist's first response. Such a line of thought would have utterly missed the significance of this human experience.

The remarkable features that make mercury so useful—and poisonous—have given rise to many stories laid out in rich objective detail. Historical data demonstrate that our use of mercury dates back for millennia (Martinez-Cortizas et al., 1999). For example, mercury mines in Spain were active during the Roman Empire and served as a brutal means of punishing political prisoners. Convicts in the mines died of mercury poisoning within a year or two of arrival. Sir Isaac Newton's 1693

“year of lunacy” can be attributed to his habit of tasting mercury-rich alchemy concoctions (Broad, 1981). More recent stories provide details about the 1971–72 accidental poisoning of thousands of Iraqis, including 459 deaths, with methylmercury fungicide-coated wheat grains (Bakir et al., 1973) and the ongoing poisonings in the Brazilian Amazon from mercury used to mine gold (Malm, 1998). Presentations of facts and numbers impart accurate medical, epidemiological, or historical insight, but the human experience remains obscured in nearly all of these reports. A solely objective detailing of events cannot portray the anguish, confusion, and painful deaths of people experiencing mercury poisoning. An advocate for objectivity in science, I could only conclude that superficial objectivity was a worse sin than subjectivity in matters such as human poisonings. It would be absurd to construct a typical scientific treatment for the subject as an opening chapter of this book. Instead I choose to illustrate the influence of a nonscientific vantage by describing the extraordinarily subjective attempt of W. Eugene Smith and Aileen M. Smith (see Foreword) to communicate a watershed human experience with mercury.

## W. EUGENE SMITH

W. Eugene Smith (1918–78) came of age professionally while photographing humans caught on World War II Pacific island battlefields. His young Midwesterner's world view broadened at a typical rate during his early years as a photographer in New York City, but it expanded abruptly during his wartime experience, giving rise to the extraordinary empathy so obvious in his images from that point onward. As a photojournalist he revealed the aftermath of island battles and premature deaths of young Navy pilots. His twenty-fifth birthday was spent on the carrier, *Bunker Hill*, where he wrote in his diary about his transformation, “My life, from the moment of my beginning photography, should have veered from much of the superfluous that I poorly recorded, and should have been dedicated to making one part of a record of the tragically momentous years dating from around 1930. I should have religiously spent my entire effort on letting deep history fall before my lens” (Hughes, 1989).<sup>\*</sup> On May 22, 1945, his wartime assignment ended in Okinawa when he was wounded by mortar shrapnel. True to form, the mortar blast was captured by his camera. He spent more than a year undergoing painful surgeries and physical therapy on his hand, face, and palate. The famous photograph of his children taken while he convalesced at his Croton-on-Hudson, New York, home demonstrated that his professional transformation fully embraced the humane as well as inhumane. Taken with a still painful and scarred camera hand, it marked his post-war return to an avocation—and his profound transformation. The innocent confidence captured in *The Walk to Paradise Garden*<sup>†</sup> became the capstone of the renowned *Family of Man* collection (Steichen, 2003) and remains arguably the image for which he is best known.

<sup>\*</sup> Unfortunately, this new passion was not the only feature he integrated into his life from the Pacific theater. He began drinking and taking amphetamines (Hughes, 1989). The alcohol remained, and Benzedrine was eventually replaced by Ritalin as he moved through life and into his final Minamata project.

<sup>†</sup> The title for this photograph is often misunderstood to refer to the name of a New York garden in which it was taken. It is the title of an intermezzo from “A Village Romeo and Juliet” (Fredrick Delius, 1907) of which Smith was very fond (Hughes, 1989).

Smith's compulsion was now to depict people responding to inhumane or dehumanizing events of the twentieth century. His post-war projects included photographic exposés about African-Americans of the rural South, industrialized Pittsburgh, New York City dwellers, Albert Schweitzer, and finally victims of industrial poisoning. Some projects celebrated the humane, such as his exposés about Maude Callen, a remarkable nurse–midwife serving the poor of rural South Carolina, and the simple grace of Spanish villagers living under Franco's Fascist regime. Other projects captured starker, yet ultimately affirmative, human responses to the inhumane. During his Pittsburgh project he refined his already remarkable approach by participating actively in the depicted story (Hughes, 1989). In his own words, he was unwilling to “remain merely a ‘seeing’ photographer.” Nowhere was this clearer than in his last project (1971–73) that dealt with the accidental mercury poisoning of Japanese villagers. The Minamata project, a joint undertaking with his wife, is the watershed incident used in this opening chapter to explore our human experience with mercury.

## MINAMATA BAY

The people of Minamata lived for generations as a small fishing and farming community on Kyushu Island. They fished Minamata Bay each day as their community grew from town (1912) to small city (1949) (Figure 1.2).

Industrial activity also emerged in Minamata with Nippon Nitrogen Fertilizer Company (later renamed Chisso Company) beginning acetaldehyde production by



**FIGURE 1.2** *Fishing in Minamata Bay, ca. 1972* (W. Eugene Smith, Center for Creative Photography, University of Arizona; W. Eugene Smith Archive/Gift of Aileen M. Smith).

mercury catalysis in 1932. Typical of the times, Chisso released waste mercury into Hyakken Harbor where it found its way to Minamata Bay. Industry and fishing continued side by side in apparent harmony until 1956. The solution to pollution was dilution.

The first signs that something peculiar was occurring came from Minamata's cats. Cats were acting oddly, displaying loping gaits. Some appeared unhinged and leapt into the sea to drown as apparent suicides. Folks gossiped about the “strange” or “waltzing cat” disease as Minamata's cats became scarce. This curious collection of events warranting only quizzical gossip then coalesced into human tragedy. In 1956, young children began arriving at hospital with symptoms of severe neurological damage. Some were unable to walk or to speak coherently. Others convulsed uncontrollably. Explanations were desperately sought as the number of stricken children increased. Uncertainty about how contagious the disease was prompted ostracism of families with afflicted children, adding to their misery. The Smiths (Smith and Smith, 1975) relate a typical instance of ostracism of one couple as they returned home from the Minamata hospital:

They had been denied all other means of transportation. They walked along the railroad tracks. ... Mr. Egoshita walked a few steps ahead. On his back he carried the autopsied body of his daughter.

That same year, Dr. H. Hosokawa, a medical doctor working for Chisso, linked a fish-rich diet to the disease and also conducted experiments with cats that implicated waste mercury from Chisso as a possible cause. Soon sales of fish from the area were restricted, curtailing generations of a fishing livelihood for many families. Suspicions about the role of Chisso's mercury waste in this outbreak created conflict between those vested in fishing and those employed by the Chisso Company. Conflict eased for a period when Chisso Company paid modest compensation to a small group of those afflicted, but a similar mercury poisoning event in Niigata stirred the growing number of diagnosed Minamata victims back to civil action. By 1968 mercury released by Chisso and consequent methylmercury accumulation in seafood was identified officially as the cause of what became known worldwide as Minamata Disease. As activists, lawyers, and government regulators began to dominate the process, families were left to cope with the human dimensions of this industrial “mistake.”

In 1971 Eugene Smith and his soon-to-be wife, Aileen Mioko Sprague, left their New York loft after eviction notification. By that time Smith's compulsive behavior and addictions had created an intermeshed series of successes and tragedies in his career, health, and personal life. Their plans to visit Japan seemed an attempt to leave behind an overburden of professional and personal issues (Hughes, 1989). Eugene and Aileen went to Japan to hang the photography exhibit, *Let the Truth Be the Prejudice*, in a prominent Tokyo department store. While they prepared to leave for Japan, Mr. Kazuhiko Motomura suggested that they consider photographing the human tragedy unfolding at that time in Minamata. Desirous of a new life and focus for Eugene's energy, the nearly destitute Smiths rented a dirt-floored Minamata house and joined the fisher community (Hughes, 1989). Eugene and Aileen spent what was

to become three years documenting the anguish and courage of the Minamata victims. They did so fully engaged in the community, even caring for young victims during brief periods of parental absence.

## MINAMATA'S VICTIMS

The first and most obvious victims were children poisoned in their mother's womb. Mercury in seafood eaten by mothers had passed across the placenta and into cells destined to become nerves of the developing children. Hundreds of babies were born with irreparable damage to their nervous systems. Eugene Smith recollected about their first visit to one young victim's home "We were driving to the village of Akasaki, and dreams flickered in my mind of buying a home here. The illusion ended when we entered the home of Takako Isayama, who was born wrenched from normality, condemned to convulsions and to helplessness" (Smith and Smith, 1975; Figure 1.3).\*

As Takako lay "twisted on the floor," the Smiths listened to her parents explain the legal nuance according to which their daughter might not be considered a victim because she was born in 1961. The official stance locked the number of victims at the first 121 diagnosed by setting 1960 as the year that the poisonings ended.† Their daughter was placed onto the unofficial list of those referred to as the lost victims (Smith and Smith, 1975). It is difficult to imagine the emotions that her parents must have felt as they dealt simultaneously with such legal absurdities and the unrelenting needs of their daughter.

Although congenital mercury poisoning was the first acknowledged manifestation of the outbreak, young and old also experienced mercury's impact. Methylmercury poisoned Minamata residents by insidiously destroying already formed nervous tissue including that of the brain itself. Poisoning occurred at a slower pace but with similarly destructive consequences. Mature brain cells were altered irreparably. Ion transport mechanisms crucial for nerve impulses of mature brain cells were damaged. The molecules of which nerve cells are made were destroyed by oxyradicals generated by mercury. Mercury even confused the normal signaling within cells, causing many nerve cells—like Minamata's cats—to commit suicide (Reardon and Bhat, 2007).

Nerve damage and cell death manifested themselves in many ways including muscle weakness, tremors, inability to walk or move normally, damage to vision and hearing, disorientation, and death. The Smiths visited once-healthy young children who became what they referred to as "still-born adults." Mature adults became afflicted too. Yahei and Natsue Ikeda, shown in a series of the Smiths' 1972 photographs (Figure 1.4), were designated official Minamata victims in 1971.

\* Eugene Smith himself was attacked physically and temporarily blinded by angry factory workers for his intense persistence in depicting the tragic truths of the Minamata victims. The last period of his time in Minamata was filled with his own physical pain due to these injuries. Aileen quickly learned to capture remarkable images when it became too painful for Eugene to operate his cameras (Hughes, 1989).

† A water treatment "Cyclator" was installed by Chisso in 1959, although it is questionable whether it was functional at installation (Smith and Smith, 1975). Further, enough mercury had been released into the bay by 1959 that it would have taken a very long time for the bay to return to normality.



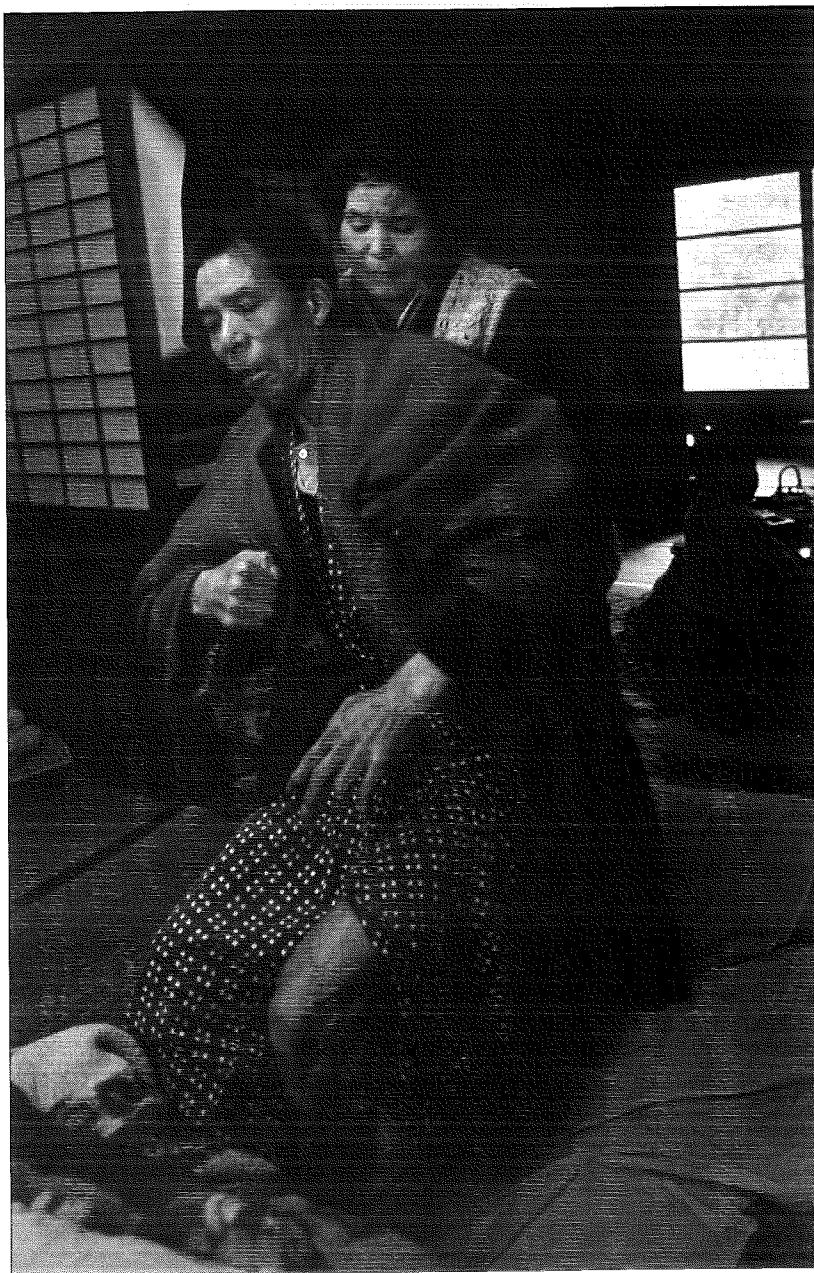
FIGURE 1.3 *Takako Isayama and Her Mother*, ca. 1972 (W. Eugene Smith, Center for Creative Photography, University of Arizona; W. Eugene Smith Archive/Gift of Aileen M. Smith).

This recognition followed thirteen years of increasingly severe illness and debilitation of Yahei. Natsue was able to help him about their home but lost this ability soon after the 1972 images were captured (Smith and Smith, 1975). Since the Ikedas were initially very vocal in their skepticism of neighbors who claimed to be poisoning victims, their suffering extended outward into the community. "Not only did the poison corrode living cells, it insinuated itself into relationships between neighbors" (Smith and Smith, 1975).

Soon there were families in which several or all members were poisoning victims. The Smiths report that, as public awareness of the Minamata tragedy grew, homes of victims such as the Ikedas' became regular stops in "the parade of politicians and government environmentalists" (Smith and Smith, 1975). Interactions between the Minamata victims and the Chisso Company became so unsatisfactory that a Central Pollution Board was established in 1970 to decide issues, especially those pertaining to the lost victims (Figure 1.5). A few board decisions seemed to closely reflect the opinions of Chisso, and this further divided the community (Smith and Smith, 1975).

Some victims decided to pursue legal liability claims outside of the framework crafted by the board. A Fishermen's Union became involved with the confrontation. Families even brought their stricken members to the board meetings to remind board members of the real issue being confronted in Minamata. The stream of reporters and photographers into Minamata was constant and heavy.

Factions formed within the Minamata community. Reading the Smiths' Minamata book reveals labels such as the "old victims," "lost victims," "leave it up to others," and "make Minamata brighter" groups. The victims seemed to become secondary



**FIGURE 1.4** *Mr. and Mrs. Ikeda*, ca. 1972 (W. Eugene Smith, Center for Creative Photography, University of Arizona: W. Eugene Smith Archive/Gift of Aileen M. Smith).



**FIGURE 1.5** Members of the Central Pollution Board 1972 (W. Eugene Smith, Center for Creative Photography, University of Arizona: W. Eugene Smith Archive/Gift of Aileen M. Smith).

to causes and group opinions as disparate interests jockeyed for position and litigation dragged on. The head of one victimized family commented, “All this idealism about crusading ‘for the world,’ and so on. ... Hell, I took Chisso to court because this disease wrecked my family” (Smith and Smith, 1975).

As the Minamata situation drew international attention, the Smiths’ focus remained steadfastly on individuals. The 1972 picture of Shinobu Sakamoto and her mother, taken as they waited for a train on their way to a United Nations meeting on the environment, exemplified the commitment to the personal tragedy (Figure 1.6). Shinobu’s dress carries a protest message intended for the public; however, in Smith’s photograph, this message is dwarfed by that conveyed in Shinobu’s facial expression and posture—and her mother’s handkerchief.

Shinobu was born in 1956, the same year her three-year old sister, Mayumi, died from mercury poisoning. Shinobu herself showed symptoms of *in utero* mercury poisoning within months of birth. Adding to her unresolvable difficulties and discomfort, she became to the press what the Smiths called “the maimed-but-struggling victim.” Equally discomfiting to victims such as Shinobu was the uncertainty about what would happen when the public’s gaze inevitably shifted elsewhere to leave them alone with their handicaps (Smith and Smith, 1975).

I went to Stockholm because I wanted everyone to know. Many people have never seen someone like me. ... I’m glad I went. Many people stared at me too, but I think the people understood a bit. My mother said so too. She told me so crying.

**Shinobu Sakamoto (1972), Quoted in Smith and Smith (1975)**



**FIGURE 1.6** Shinobu and her mother preparing to leave the Minamata train station for the United Nations Environmental Conference in Stockholm, Sweden, 1972 (W. Eugene Smith, Center for Creative Photography, University of Arizona; W. Eugene Smith Archive/Gift of Aileen M. Smith).

## THE TRUTH ABOUT MINAMATA

Along with Rachel Carson's *Silent Spring*, the Smiths' Minamata images wrenched our collective attention away from the benefits of giddy industrialization, revealing the blatantly unacceptable human consequences of pollution. The Smiths ended their Minamata volume speculating:

Historians might find in Minamata ... —if humankind ever decides to assume true responsibility for its stewardship of this planet—that they are looking back into a kind

## When the Scientific Vantage Is Not Enough

of soul-force of courage, a force that might save our children from the plunders that began with the first industrial revolution.

Smith and Smith (1975)

Such idealistic musings skirt the human truth of Minamata. The Smiths' images documented with subjective clarity the wretched lives and wrecked families caused by mercury.

The Smiths' short marriage broke apart under the intense effort and stress associated with finishing the Minamata collection. Eugene Smith's health deteriorated, and three years after the volume's publication he died at the age of fifty-nine. He never witnessed the transformative impact of his images, nor did he live to understand his contribution to creating our present environmental ethos. He could not have known that this ethos would give rise to new fields of environmental science and extensive pollution legislation. However, unquestionably, he understood the human truth about Minamata.

## THE INTENT OF THIS SHORT BOOK

Hopefully this brief exposé about Eugene and Aileen Smith's Minamata photojournalism makes clear that our experience with mercury is much broader than our scientific knowledge of its chemistry and biological effects. It is the goal of this book to purposely step out of the conventional scientific framework for treating mercury pollution and to explore the wider human experience with mercury. As expressed in the opening quote for this chapter, to produce a technically rich book that only superficially mentions other features of our experience with mercury would result in an untruthful exploration of this important issue.

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# MERCURY POLLUTION

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Summary: "Mercury is the gravest chemical pollutant problem of our time, and this is the first publication that has undertaken holistic coverage of this truly global issue. This book is an outstanding product of the innovative Global Inquiry Groups (GIG) process of interdisciplinary collaboration, which brings together the physical sciences, social sciences, and the humanities including the study of media, visual, and literary arts, uniquely enabling us to look at and understand mercury from the many perspectives needed in order to grasp the problem in its totality. This book clarifies how we are all connected to mercury, how we take it in through the food we eat and the air we breathe, and how we release it as a consequence of our lifestyle. It tells us about the relationship people have had with mercury from ancient to modern times. It tells us how people have given artistic expression to the ravages of mercury, touching our emotions and changing us. It refers to the social injustice of mercury pollution. This book is an attempt to communicate beyond the walls of academia to a larger audience. Therefore, on behalf of the authors of chapters within this book and the mercury group, I invite you to explore metal mercury from the varied perspectives of history, science, sociology, government, writing, and art. Each chapter represents a disciplinary thread from the GIG. Our goal was to weave these interdisciplinary threads into a tapestry that presents a more complete picture of the effects of mercury pollution and to provide new ways to think about the environment and our individual responsibility toward each other and our earth"-- Provided by publisher.

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