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Heliotropes

Solar Ecologies and Pacific Radiations

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The Age of Ecology began on the desert outside Alamogordo, New Mexico on July 16, 1945, with a dazzling fireball of light and a swelling mushroom cloud of radioactive gases.

—Donald Worster, *Nature's Economy*

Nothing “is more friendly to man, or more necessary to his well-being than the sun. From the sun you and I get . . . the energy that gives life and sustains life, the energy that builds skyscrapers and churches, that writes poems and symphonies.”

—David E. Lilienthal, Chair of the Atomic Energy Commission

Like heliotropes, we turn to the sun and its emissary rays to locate the cause and solution for ecological crisis. The solar radiation that determines life on earth has become part of our conversation about a planetary greenhouse whose temperatures are rising. To address the energy crisis and increasing planetary irradiation, we turn to solar solutions. To trope is to turn, and human technology is heliotropic as it turns to the sun to harness its solar energy and to protect the climate from excessive radiation. Solar panels follow the path of the sun, wind farms harness the sun's energy, hydrogen fuel is derived from the sun's constitutive elements, and we replicate solar energy (fusion) on earth through the global expansion of nuclear power “plants.”

Physicist David Whitehouse has observed that the sun “is everywhere; in our past, present, and future” (5). Yet for a figure so ubiquitous and

determinative, the solar is rarely considered when discussing concepts of the globe, which understandably take on an earthly tenor. The increased consciousness of the globe as an interconnected whole has been tied to radical social, environmental, and economic changes since the 1960s. This rise in global thinking has been associated with the increased ecological awareness inspired by the image of the planet as a fragile island dating from the *Apollo* space mission photographs of 1968–69,¹ which were widely utilized to promote the first Earth Day (1970). This ecological turn catalyzed the organization of the United Nations Conference on the Human Environment in Stockholm (1972), which sought to establish a territorial mandate for global environmental sovereignty, and later the World Charter for Nature (1982), which critiqued nuclear militarism and its devastating environmental impact. While these movements all contributed to a radical shift in bringing together globalism and ecology, I want to trace their precursors farther back in time. I argue that the modern concept of global ecology derives from the literal fallout of the Cold War, and position solar and military forms of radiation as key traces of globalization.

The Age of Ecology, as Donald Worster suggests in the epigraph, is simultaneous with the Atomic Age, registered as a dual threat to the planet in terms of nuclear annihilation (the explosive event) as well as radioactive fallout (the aftermath). In American Cold War propaganda, these weapons of mass destruction were naturalized by likening them to harnessing the power of the sun, and their radioactive by-products were depicted as no less dangerous than our daily sunshine. The militarization of the environment became so naturalized that the American public casually blamed any inclement weather on the atomic bomb.² Reporters suggested that the military change the globe by setting off nuclear weapons in the Arctic to melt the ice caps and thereby “give the entire world a moister, warmer climate” (quoted in Boyer 111).³ This request went unheeded, but the two thousand and more nuclear weapons detonated on earth have changed our environment by radically increasing our levels of militarized radiation. The modern understanding of our planet as an ecosystem writ large is attributable to our consciousness of at least two forms of radiation: the solar rays that warm our global climate, and the radioactive fallout that has permeated the earth since the first detonation of the hydrogen bomb in 1952. In invisible ways, the history of worldwide military irradiation has been an important material and symbolic precursor of our current articulations of global warming.

Well before the development of the hydrogen bomb, the Manhattan Project reporter William Laurence described atomic energy in 1946 as a “promise” to “bring the sun down to earth as its gift to man” (“Atomic Energy” 90), a promethean metaphor that echoed President Truman’s announcement of the atomic bombing of Hiroshima as a mere harnessing of solar power.⁴ When nuclear radiation became a global concern, the Atomic Energy Commission (AEC) and its allies utilized solar analogies to

conflate man-made weapons with natural energy from the sun. In 1947 AEC Chair David E. Lilienthal likened atomic energy to solar energy, arguing that nothing “was more friendly to man or more necessary to his being than the sun” . . . “In its rays is the magic stuff of life itself” (335). These metaphors invoked the sun’s power in a way that deliberately “confused” the public, as President Eisenhower demanded, about different types of radiation and their risks.⁵

The solar analogies and ecologies I explore in this essay are fraught with erasures, understandably so when we consider that the sun’s affects, light and radiation, are invisible. Accordingly, Jacques Derrida has called the heliotrope “the father of all figures of speech,” which is “the most natural” and simultaneously the most unrepresentable (“White” 44). The sun is the “essence of that which is,” and yet we cannot look at it (43). He bases this on Aristotle’s failure to find a word to describe the sun’s casting forth rays of light as sowing is to the casting forth of seed. In this failure of language Derrida locates the sun’s radical alterity. While I make no claims to fill this semantic gap, I suggest that the closest modern signifier of this alterity is radioactive fallout, and that the persistent use of solar metaphors for understanding nuclear weaponry have been vital to naturalizing global militarization.

In pursuing this complex relationship between Cold War ecology and radiation, I examine the solar metaphor—the heliotrope—and its by-product, radiation, as traces of modernity, figures for alterity, and the material legacy of the militarization of the Pacific Islands. Foregrounding the solar turn or heliotrope has important consequences for rethinking the material boundaries of ecocriticism as well as implications for understanding how postcolonial writers have reconfigured an alternative vision of solar ecopoetics. A number of indigenous Pacific writers including Witi Ihimaera, Albert Wendt, and Chantal Spitz have inscribed what Paul Virilio calls the “wars of light” as the most recent phase in the military globalization of the region. This concern might be traced back to the work of Maori poet Hone Tuwhare, whose earliest poems sought to denaturalize the heliocentrism of military “nukespeak.” In exploring how the history of nuclear radiation has contributed to consciousness of a global ecosystem, this essay foregrounds the grammar of solar ecologies, placing indigenous writers of the Pacific at the forefront in questioning the military logic of heliocentric metaphors.

I. TRACING RADIATION ECOLOGIES

The Atomic Energy Commission was not only largely responsible for the radioactive militarization of the planet but also informed the ecological discourse that we use to inscribe it. In popularizing the new term “ecosystem” in 1935, the botanist Alfred George Tansley drew from the field of physics to describe the relationship between organisms and their habitat, arguing that one might employ the ecosystem as a model to study

“the universe as a whole down to the atom” (64). Tansley’s invocation of atomic physics was prescient: within twenty years the American militarization of science would usher in a new era of ecology modeled on nuclear radiation. Few scholars have traced the close relationship between the rise of the Age of Ecology and the Atomic Age, the mutually constitutive relationship between radioactive militarism and the study of the environment. Worster’s foundational book *Nature’s Economy* suggests that nuclearism catalyzed public consciousness about the invisible pollution of the global environment, a new understanding of interconnected space that helped Rachel Carson in 1962 redirect widespread fears of radioactive fallout toward contamination by pesticides (Worster 340).⁶ While he rightly points to science’s paradoxical role in the destruction and conservation of the environment, Worster overlooks how ecosystem ecology was catalyzed by the AEC in its surveys of the radioactive aftermath of its Pacific Island nuclear tests.

Ecology is modeled on the concept of a closed system, so it’s not a coincidence that island colonies were chosen for both the nuclear tests and their radioactive surveys. While often deemed peripheral to modernity, we know that islands have in fact been at the center of the development of modern ecological thought. Richard Grove has demonstrated how tropical island colonies all over the globe served as vital laboratories and spaces of social and scientific experiment in ways that deeply informed seventeenth- and eighteenth-century conservation policy and modernity. I would like to propose a similar relationship between the American island colonies of Micronesia and how they helped constitute atomic modernity as well as the new field of ecosystem ecology.⁷ Joel Bartholemew Hagen provides a compelling history of the “symbiosis . . . between atomic energy and ecosystem ecology,” particularly as it was organized by Eugene Odum, the field’s “founding father” and his brother Howard T. Odum (101). With the rapid expansion of nuclear testing in the Cold War and the subsequent radiological contamination of the planet, the AEC contracted the Odums to study the radioactive fallout in the Marshall Islands (Micronesia). Thus the field of “radiation ecology” began in the Pacific with the Odum’s study of the militarized Enewetak Atoll, a chain of islands that functioned as an AEC laboratory for over forty nuclear weapons tests between 1948 and 1958. As islands were already associated with the contained space of a laboratory, this nuclear testing provided the first opportunity for ecologists to study a complete ecosystem through the trace of radiation. Understood as a “landmark in ecological research” (Hagen 105), Odum and his brother’s work on the irradiation of the coral reefs provided ecologists with a model of a structured, self-regulating ecosystem (105) and the first theorization of shared resource relationships in nature which they termed “mutualism” (104). In turn, AEC-funded research laboratories and programs in radioecology were organized at universities and at nuclear power sites all over the United States, creating an “invisible college” (Golley 74) and catalyzing the institutional development of ecosystem ecology (Hagen 112).

This entanglement between ecology, radiation, and militarization is visible in Eugene Odum's 1957 article, "Ecology and the Atomic Age," which argued that "science advances on a broad *front* . . . It is analogous to the *advance of an army*; a breakthrough may occur anywhere, and when one does it will not penetrate far until *the whole front* moves up. Thus, ecologists need not feel bashful about *attacking ecosystems* so long as they observe the rules of good science" (my emphasis 28). Although Odum is considered a key inspiration to the environmentalist movement because his theories shifted scientific thought away from a mechanistic approach and toward the interdependence of systems (Craigie xix), his Cold War writing demonstrates the militarization of scientific grammar. In bracketing off ethics in this war for knowledge, he encourages the scientist to "attack" ecosystems already devastated by nuclearization.

Odum and his Cold War contemporaries were not merely studying nuclear fallout but also introducing radioactive tracers into the environment to determine how energy was transformed in a contained system. When we consider these events in light of Theodor Adorno and Max Horkheimer's critique of instrumental rationality, published just before the world's first atomic explosion, their articulation of modernity seems prophetic. Arguing in 1944 that the instrumental rationality of the Enlightenment perpetuates its self-destruction, they explained, "the fully enlightened earth radiates disaster triumphant" (3). Although their use of the term "radiates" was metaphoric, their work helps us understand the logic that permitted radiation to become a tool for ecological science without regard to environmental preservation. The invisible Cold War legacy of the irradiated earth demonstrates all too poignantly that "what men want to learn from nature is how to use it, in order wholly to dominate it and other men" (Adorno and Horkheimer 3).

II. "THE FULLY ENLIGHTENED EARTH"

The "fully enlightened earth" has been a primary concern in the Pacific Islands, a region often deemed peripheral to modernity and yet the site of nearly continuous nuclear weapons testing in the fifty-year period from 1946 to 1996. Since their initial contact with Enlightenment-era cartographers, painters, and naturalists, the Pacific Islands have been incorporated into an especially visual economy of colonialism in which the ethnicity of the region's peoples, the exoticism of tropical light, and flora and fauna were studiously mapped, painted, and inscribed for European display and distribution.⁸ By the mid-twentieth century, the region entered an entirely different economy of light when hundreds of nuclear detonations conducted by the United States, France, and the United Kingdom produced a new atomic cartography and a militarized grammar of "radiation atolls" and "nuclear nomads."⁹

Paul Virilio's argument that light and visual media, from the spotlight to the camera lens, illuminate and perpetuate the modern landscape of

THE DAWN OF THE NUCLEAR AGE

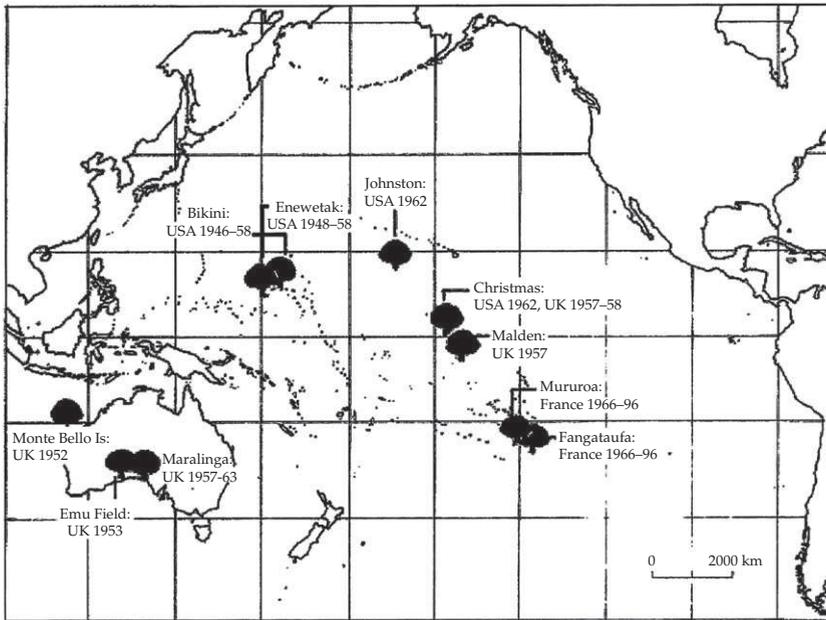


Fig 11.1 Nuclear Map, courtesy of Stewart Firth.

war is especially relevant to the hyper-visibility of the nuclear tests in the Pacific Islands. This excess illumination was a vital tactic of the Cold War in which hundreds of Hollywood photographers and film makers were hired by the U.S. military to produce the spectral aesthetics of violence. This photographic and cinematic archive of the wars of light was distributed worldwide and is now ubiquitous on the Internet.¹⁰ The U.S. military produced postcards of nuclear explosions at Bikini and Enewetak as keepsakes for their soldiers (Weisgall 150), many of whom, like the Marshall Islanders, were already carrying mementos of light in the form of radioactive cesium, iodine and strontium.¹¹ In keeping with the depiction of the weapons as natural as the sun, AEC news reels about the nuclear tests at Bikini Atoll featured the islanders singing “You are my Sunshine” (Weisgall 176, *Radio Bikini*). So irradiated was the marine life at Bikini, as the Odum brothers discovered, that the fish produced autoradiographs, impressing their own images onto photographic plates and film (Boyer 92).

The discourse of what Teresia Teaiwa terms “militourism” (“Reading” 249),¹² the mutual constitution of the military and tourist industries, renders one tropical island as a substitute for any other, suppressing the historical depth and geographic breadth of the militarization of the Pacific. Yet nuclearization has long been a concern for the region’s writers, who have engaged in regional, ecological, and global terms with

the heliocentrism of the “fully enlightened earth.” As theorists have demonstrated, forms of resistance to the violent reach of globalization have included a revitalization of local and indigenous epistemologies, evident in Pacific sovereignty movements that challenge what Virilio refers to as modern “light wars,” which begin with the use of the searchlight and extend to the camera **to** and nuclear weapons (*War and Cinema* 68). Regional activism, including lawsuits against the United States and petitions to the United Nations, demonstrate the mutually **constitutive** relationship between decolonization and denuclearization.

Although the dominant forms of American environmentalism have tended to minimize postcolonial contributions to ecological thought, the Pacific was a vital space of **antinuclear** activism and legislation. Initially annexed as an American Trust Territory, the Republic of Palau drafted the world’s first antinuclear constitution in 1979. Since the advent of the Cold War, the Nuclear Free and Independent Pacific Movement, largely coordinated by women, has actively sought to ban nuclear waste dumping, nuclear testing, and the transit of nuclear-powered submarines.¹³ Although not always successful, these movements make the region distinctive from other postcolonial liberation histories. The profoundly regional basis to Pacific Island decolonization, its largely Christian coalition of support, its long engagement with U.S. militarization, and its early inculcation into the modern wars of light suggest the ecological importance of decolonization and the region’s vital critique of nuclear heliocentrism.

III. PACIFIC LITERATURES OF LIGHT

Since World War II, Pacific writers have engaged with the legacies of the wars of light, critiquing the militarization and destruction of regional ecologies.¹⁴ For instance, in his 1987 novel *The Whale Rider*, Maori author Witi Ihimaera inscribed an ancient pod of ancestor whales, disoriented and beaching themselves after the French detonate hundreds of nuclear weapons in the Tuamotu Archipelago of Tahiti. In Ihimaera’s novel, the whales are the first to notice the marine “contamination seeping from Moruroa,” the increasing “radiation” which brings fearful “genetic effects” on their pod. This is rendered visible as an underwater “lightswarm of luminescence” that is “sparkling like a galaxy.” The whales perceive a “net of radioactive death” and alter their course, ultimately beaching themselves. Although the ancients followed the pathway of the sun to settle Aotearoa (30), the generative movement into Te Ao Marama, the world of light, has been appropriated by the militarization of light. This ecological crisis ultimately facilitates a new generation of female leadership in the community (58). The next generation is thus encouraged to continue the decolonization process by turning to ancestral models of ecological “interlock” (Ihimaera 40).

Samoan writer Albert Wendt has inscribed the legacy of the wars of light in his dystopian novel *Black Rainbow* (1992), which depicts a nuclear

doomsday clock that is a continual touchstone to the protagonist and determines the apocalyptic temporality of the text, and, by extension, the Pacific as a region. The novel's title is adapted from Maori artist Ralph Hotere's paintings about French nuclear testing in Moruroa, artworks that the protagonist transports with him in his flight from agents of the homogenizing corporate state.¹⁵ The concept of the "black rainbow" in both Hotere's and Wendt's work nicely demonstrates the paradox of representing nuclear radiation and the annihilation of the normative visual spectrum of light. This connection between artistic production and the history of light is evoked in Wendt's subsequent publication, a Pacific Island anthology described as a "rainbow of poetry and prose" (1) and entitled *Nuanua* (1995), the term in many Oceanic languages for the rainbow. While Wendt emphasizes the rainbow's definition as a symbol of Pacific diversity, one could also foreground its role as a figure for the mediation between the earthly and the divine. This relationship between the material and supernatural has been explored by other Pacific writers and functions as an important historic component of American nuclear discourse, beginning with naming the first atomic detonation "Trinity."

Pacific writers have configured the regional shift to atomic modernity in terms of the desacralization of light and land, what Adorno and Horkheimer had termed the "disenchantment" produced by instrumental rationality. In her depiction of the French wars of light in the Pacific, Tahitian writer Chantal Spitz opens her novel *Island of Shattered Dreams* (1991) with two heliotropic cosmologies. The first, written in Tahitian, inscribes the separation of the earth and sky to create Te Ao Marama, the world of light, a genealogy linking humans with the divine common to many traditions of the Polynesian Pacific. This is followed by a passage from Christian genesis of the divine creation of light and its separation from darkness, including man's decree of dominion "over all the earth" (10). Like Polynesian accounts, the Biblical genesis replicates the movement of formlessness to form, the construction of earthly temporality, and the association of light as a legacy of knowledge of the divine. In juxtaposing these two cosmologies, Spitz highlights the remarkable difference in how this shift of form produces different ecological results: the Tahitian positions the human as a genealogical product of divine nature, while the Christian narrative positions the natural world in terms of its distinction from the human and therefore authorizes dominion. This rupture between divine cosmology and disenchantment is visible in the novel's narrative trajectory, which moves from an epic language of cosmogony, the world of Ra, "the majestic lord of light" (80), toward the temporal discourse of progress and nuclear colonialism. Narratively the novel shifts from allegory to realism once French missiles are housed in the "sacred belly" of Tahitian land. A novel that begins with lyrical inscriptions of its characters as "children of light" shifts to inscribe light in terms of fears that Tahitians will be "burned to a crisp" (85) by nuclear missiles. French physicists introduce the Enlightenment discourse of instrumental rationality, what

Spitz refers to as “the logic of men” (145), changing narrative and history as Tahitians are displaced from a sacred discourse of genealogy into the consumerist and neocolonial “light-filled city” (148) that produces cancer, alienation from ancestral language, and an economic legacy of nuclear dependents.

More recent Pacific texts have emphasized the destructive heliocentrism of the nuclear age. James George’s novel *Ocean Roads* (2006) depicts the flight of nuclear physicist Isaac Simeon to New Zealand after his work for the Manhattan Project. In coming to understand his responsibility for the irradiation of Nagasaki, Hiroshima, and the Bikini Atoll, he describes himself as a “disciple . . . of light” (61), a creator of the scorched earth, an unconscious participant in the modernity of excessive illumination where, as Virilio protests, “nothing is sacred . . . because nothing is . . . meant to be inviolable. This is the tracking down of darkness, the tragedy brought about by an exaggerated love of light” (*Vision Machine* 35). Isaac disobeys his father’s orders not “to look into the sun” (73) and recognizes himself as “more a child of the sun than the earth” (340). The novel, structured in series of flashes and flashpoints of violence, inscribes how diverse figures of light such as nuclear radiation, cinema, radiation therapy, and war photography have all helped to constitute the bodies of history in the Cold War Pacific.¹⁶

Like Spitz, George inscribes the nuclear desacralization of space and how it produces a shift in narrative temporality. He frames his complex novel with a description of the Trinity site, a space of memory for the characters that also signifies the commencement of the Atomic Age and a new way of reckoning time. The AEC’s decision to name a weapon of mass destruction “Trinity” suggests the desacralization of space and time: the apocalyptic powers of militarized light are mystified by reference to Christian frameworks for the mediation between the human and the divine (Rhodes 571-72, Weart 101). As I will explain, this thematic concern can be traced back to Hone Tuwhare’s poetry, which reflects some of the earliest Pacific writing about the heliocentrism of the Atomic Age. Pacific texts have turned to light, radiation and the sun as constitutive elements of a new ecology of modernity, one that reflects the disenchantment when the complexity of cosmological narratives are reduced to the secular wars of light.

I interpret the figure of light as an emissary of the sun as well as the sign of nuclearization and radiation. It is by turning to the figure of the sun and its by-product, radiation, that I register a shift from our material reckonings of globalization to Gayatri Spivak’s concept of planetarity. If globalization is characterized by visuality and illumination, planetarity provides a means to think through—but not necessarily to represent—that which is rendered invisible, that which is thrown into shadow. Planetarity, in Spivak’s definition, is the figure for alterity, generally read in terms such as “mother, nation, God, nature” (*Death of a Discipline* 73). While agencies such as the AEC argued that nuclear radiation “was a familiar part of the

everyday environment" (Boyer 314) and "just one more of the hazards of contemporary living" (Lap 111), the concept of planetarity denaturalizes that familiarity. In contrast to instrumental rationality, it is the process by which the familiar is rendered uncanny, unheimly. It is the "defamiliarization of familiar space" (Spivak 77).

Spivak asks that literary study "take the 'figure' as its guide," to "disfigure it, read the logic of the metaphor," to foreground the ethics of reading. Tracing the figure of light helps us see how "nukespeak" naturalized military radiation across the planet. This was done by associating man-made radiation with its solar counterpart, and by likening atomic detonations on earth as harnessing the power of the sun. The repeated connection between a military lab product (a nuclear weapon) and its cosmic figure (the sun) thus naturalized atomic weapon production and helped to eclipse hundreds of nuclear detonations set off in the Pacific Islands until 1996, radioactive traces that we carry in our bodies today. Our lack of recognition about our own irradiation is tied to the ways in which the master metaphor, the heliotrope, has been configured as both a natural and unrepresentable figure for global nuclear fallout.

The detonation of the fifteen-megaton thermonuclear (hydrogen) bomb *Bravo* at Bikini Atoll (1954) catalyzed global consciousness about the dangers of military heliocentrism. *Bravo* covered the surrounding islands and eventually the planet's atmosphere with radioactive strontium, cesium, and iodine. It was an ecological and political relations disaster because it exposed thousands of Marshall Islanders to nuclear fallout, contributing to countless miscarriages, leukemia deaths, thyroid cancers, and the kind of chromosome damage that knows no temporal or genealogical limit. Estimated at 1,000 times the force of the bombs dropped on Hiroshima and Nagasaki, *Bravo* has been called the worst radiological disaster in history: fallout was detected in rain over Japan, in lubricating oil of Indian aircraft, in winds over Australia, and in the sky over the United States and Europe (Jungk 310). While the "One World or None" antinuclear movement in 1945 generated some of the earliest global environmentalism (Boyer 76), by the 1960s every person on the planet was in fact globally connected thanks to the absorption of the radioactive fallout from hydrogen weapons detonated in the Pacific.

Bravo and the subsequent two thousand or so nuclear tests on this planet, Eileen Welsome observes, "split the world into 'preatomic' and 'postatomic' species" (299). Radioactive elements produced by these weapons were spread through the atmosphere, deposited into water supplies and soils, absorbed by plants and thus into the bone tissue of humans all over the globe. The body of every human on the planet now contains strontium-90, a man-made by-product of nuclear detonations (Caufield 132), and forensic scientists use the traces of militarized radioactive carbon in our teeth to date human remains.¹⁷ This invokes an invisible and ephemeral trace of what Rob Nixon has called "slow violence": the non-apocalyptic threats to our survival such as depleted uranium weapons,

desertification, and the toxic ecologies that Rachel Carson brought to public consciousness. Radioactive fallout presents us with the most invisible yet pernicious form of the wars of light, one directly tied to the transformation of the human body, and a disturbing sign of our true merger with the environment.

IV. NO ORDINARY SUN

The radiation we carry in our bodies is a form of memory, but why is it so invisible to narrative and to history? I want to suggest that its narrative erasure occurs through dual processes of language—first, the naturalization of nuclear radiation as solar energy by AEC propaganda, and second, the process of transference, diversion, and/or substitution made possible by metaphor itself. Metaphor has been articulated as a form of displacement, a move from one object to another that foregrounds resemblance and renders the invisible visible (Ricoeur 34), just as much as it “eclipses” or subsumes other possible modes of relation (110). Metaphor is also deeply connected to the process by which nonhuman nature is rendered accessible and, following Girard Genette, the way that “language spatializes itself” so that space becomes language and thus articulates itself to us (in Ricoeur 147). Turning to the work of Maori poet Hone Tuwhare, we can see how these functions of metaphor have sought to naturalize nuclearization as the presence of the sun on earth, yet following Spivak, “de-figure” this association so that we can begin to grasp the extent of its erasures.

Tuwhare’s “No Ordinary Sun,” a five-stanza poem written in the late 1950s on the heels of British and American atomic tests in the Pacific, repeatedly negates the solar metaphors accorded to the nuclear bomb that so successfully naturalized the violence of the expanding nation state. While we generally associate natural metaphors with terrestrial matter, such as the trees and soil that are thought to root human relationships to the land, the discourse of military nuclearization has drawn from solar metaphors to naturalize state violence. Before turning to Tuwhare’s poem, allow me to briefly summarize the military context in which he was writing.

Famously, Robert Oppenheimer, director of the Manhattan Project and so-called father of the atomic bomb, borrowed from the *Bhagavad-Gita* to describe the Trinity explosion (1945) as “the radiance of a thousand suns” (quoted in Jungk 201). Nuclear weapons are often described as harnessing the power of the sun, or of releasing the universal power of the Big Bang and therefore replicating the origin of our universe. These analogies provide a neat semantic parallel between an explosive event that generates planetary life, and the violent force of nuclear weaponry which is depicted as a destructive force that ultimately generates its opposite, world peace. To assimilate the supposed peacekeeping nature of the nuclear bomb is to suppress its violence at detonation and to place it unquestionably in a part-for-whole relationship that fabricates a future of world peace. The

use of this supernatural and often religious discourse, including the use of names such as “Trinity” for a mass weapon of destruction, Jeff Smith argues, “obscures the continuities between atomic weapons” and the instrumental rationality of science (Smith 2 *Unthinking the Unthinkable*).¹⁸

The atom has long been imagined in Western philosophy as a synecdoche for the solar system in which electrons or planets orbit a stabilizing nucleus or sun.¹⁹ The pedagogical analogy between the atomic “miniverse” and the solar system was a part of the modern discourse of ecology, as we’ve seen in the new grammar of the ecosystem, and was vital to the public discourse of the nuclear era. For example, nuclear primers produced by the Los Alamos Atomic Bomb Laboratory would begin with the nucleus/sun analogy, and then immediately liken man-made nuclear energy to “the energy which keeps the stars shining” (Marshak, Nelson, and Schiff 12). This “sunny side of the atom,” as Paul Boyer has shown (299–301), was a vital metaphor in garnering public support for atomic weaponry and in minimizing the recognition of the damage caused by the global spread of nuclear radiation (314). Thus AEC physicists could quell public fears of increasing militarized radioactivity by asserting that “radiation is just as much a natural phenomenon as anything else” (Lilienthal in Boyer 308).

Much of the language that connected the nuclear bomb with the power of the sun can be attributed to the *New York Times* journalist William Laurence, whose consistent cosmic hyperbole about the power of atomic explosions was copied, often verbatim, by countless other reporters and politicians (Weart 104).²⁰ Laurence wrote President Truman’s speech which likened the bombing of Hiroshima to “harnessing . . . the basic power of the universe” and the “force from which the sun draws its power” (quoted in Weart 103). In his popular book *Dawn over Zero*, Laurence described one atomic bomb at Bikini as “a gigantic white sun” (280), which harnessed the “awe of a new cosmic force” (284). While successfully conflating political with universal (and therefore natural) power, these direct analogies between the atomic bomb (a fission device) and the power of the sun (primarily fusion) were inaccurate. Moreover, this begs the question as to how natural it was to unleash a militarized and lab-created miniature of the sun’s fusion power on a planet that sustains life through its protective *distance* from the sun. This discourse, Robert Jungk explains, created a public “helplessness in the face of natural forces” (247). So successful were these solar metaphors that the government named their top secret “body snatching” investigation, which collected body parts and cadavers to measure global radiation levels, “Operation Sunshine.”²¹ The name of the study suggested a heliotropic ecology; it was derived from the analogy between the sun and nuclear radioactivity because after these tests: “fall-out, like sunshine, covered the globe” (Welsome 299).

Atomic Age discourse consistently aligned the bomb with the trope of a new dawn, a rising sun, and the birth of a new world.²² In keeping with the supernatural tropes that inscribed the bomb as the product of a new kind of divinity arose the image of the nuclear cloud as a tree of knowledge.

Observing Test Baker, Laurence famously described the cloud as “a giant tree, spreading out in all directions, bearing many invisible fruits deadly to man—alpha particles, electrons . . . gamma rays . . . fruits of the tree of knowledge, which man must eat only as his peril” (*Dawn* 280). As with the analogy to the Big Bang, American nuclearization of the globe seems predestined: ordained by nature, the cosmos, and divinity.

This association of the sun with cosmic metaphors of radiance and (nuclear) radiation is vital to understanding Tuwhare’s poem, which pairs it with the tree, a natural metaphor of human presence on the planet.

“No Ordinary Sun”

Tree let your arms fall:
raise them not sharply in supplication
to the bright enhaloed cloud.
Let your arms lack toughness and
resilience for this is no mere axe
to blunt nor fire to smother.

Your sap shall not rise again
to the moon’s pull.
No more incline a deferential head
to the wind’s talk, or stir
to the tickle of coursing rain.

Your former shagginess shall not be
wreathed with the delightful flight
of birds nor shield
nor cool the ardour of unheeding
lovers from the monstrous sun.

Tree let your naked arms fall
nor extend vain entreaties to the radiant ball.
This is no gallant monsoon’s flash,
no dashing trade wind’s blast.
The fading green of your magic
emanations shall not make pure again
these polluted skies . . . for this
is no ordinary sun.

O tree
in the shadowless mountains
the white plains and
the drab sea floor
your end at last is written. (23)²³

The title, “No Ordinary Sun,” frames the poem with a simultaneous creation and destruction of metaphor. On the one hand, the sun can never

be “ordinary” because it is our source of life on the planet. There is no such thing as an “ordinary sun,” the poem seems to say, and it negates the rendering of any discourse that would normalize it. To make the life-generating center of our heliotropic system an “ordinary sun” demands a comparison—it can never function as a singularity; it exists only in relation and in a hierarchy of value. The process of comparison demands two discursive moves which are rendered spatially. First, a sun can become “ordinary” by comparing with other stars and galaxies—this presses the limits of our own earth-bound knowledge. The second way to create a solar comparison is from within our planet, turning to that figure so often depicted as the sun on earth: the nuclear bomb. The opening “no,” the negation of the ordinariness that naturalizes the bomb, is rejected even as the poet relies on the metaphorization of the bomb to establish an allegory about the sun and tree.

The unnamed speaker begins with an imperative: “tree let your arms fall.” The personification of the tree’s limbs doubles the man-made military “arms” that make this metaphor possible (23). The rest of the opening stanza develops the anthropocentrism of the tree and the supernaturalism of the sun, placing the two in unequal relation. The speaker presumes intimacy with the tree and warns it not to raise its arms “in supplication / to the bright enhaloed cloud,” foregrounding a spatial hierarchy between earth and sky and the discursive process of mediation that facilitates this connection, even as language supplants the mediating “arms” of the tree. While some have suggested the allegorical mode is overdetermined by the weight of tradition, Tuwhare’s emphasis that this is *not* the well-known violence of the “axe” or “fire” suggests a lack of continuity in the narrative of nature. These opening lines inscribe reverence for the supernatural (the sun) in spatial terms, but insist this traditional reverence between the earth and the cosmic should be resisted—this new form of violence is outside of nature. The poem identifies an interpretive gap between the natural earth and the cosmic sun and reveals a rupture in history and nature, even as this gap is mediated by metaphor, the poet, and language.

The second and third stanzas again signal a break in the meditative function between the natural and the supernatural, between the microcosm and the macrocosm. The tree’s “sap shall not rise again/to the moon’s pull,” marking the end of the gravitational relation between the earth and the cosmos. Gravity reflects an invisible and yet determinative curvature of space-time, a nonnarrative marker of cosmic history. Yet the heliocentrism signaled by gravity is arrested by the poet’s voice. Developing the analogy of the tree as human body, the speaker advises against our heliotropism: we should let our “arms fall.” Moreover, the figures that mediate between the strata such as gravity, the wind, and birds, which are generative to the action of this stanza (the rising sap, inclining head, the tree’s stirring), are “no more,” called to a halt by discursive mediation.

In this third stanza, the life-ending cause, “the monstrous sun,” is finally named. This key figure of alterity is placed in the center of the poem,

deemed “monstrous,” a word closely associated with irregularity of form, with the unnatural, and often with the unacceptable product of the merger between humans and nature. This introduction of the sun generates a new role for the tree, which now shifts from the anthropomorphic to the arboreal, a (failed) but protective intermediary between the sun and the “unheeding” human “lovers” below whose “ardour,” literally, a term for burning, needs cooling. The poet makes an interesting choice here, and perhaps a critique, of the failure of these “unheeding” humans to apprehend their own demise. In this failure of communication between poet and human lovers, it may be that the tree is no longer a trope for the human, but, simply, a tree. To trope is to turn, and these unheeding human figures are heliotropic, oblivious to their burning under the monstrous sun.

The introduction of these unheeding lovers marks a shift in the following (and longest) stanza. While the speaker continues to address the tree in the imperative, the diction becomes self-conscious and even archaic—and increasing in the use of assonance, alliteration, and introducing the first and only full rhyme (fall / ball). In switching narrative codes, this stanza undermines the kind of Romantic nature poetry that draws upon natural tropes for representing the organic development of human illumination. Tuwhare’s use of adjectives such as “gallant” and “dashing” to personify nature calls attention to their artifice. Thus a “gallant monsoon” is as incongruous as the nuclear metaphor it is made to bear, its “flash.” Similarly, the antiquated language of the “dashing trade wind” jars against the modern warfare “blast.” This calls attention to the *unnaturalness* of the nuclear as well as the failure of language to represent natural phenomena. The “magic emanations” of the tree will no longer “make pure again / these polluted skies,” a figural juxtaposition of utopian metaphors of nature alongside a dystopian modernity that calls attention to the uneven process by which metaphor transmutes meaning. The ellipses after “polluted skies . . .” reiterate this gap between knowledge and representation, between metaphor’s propensity for resemblance and diversion. The repeated negations of this stanza—“*nor* extend entreaties,” “*no* dashing trade wind,” “*not* make pure again” (my emphasis 23)—suggest the metaphor-negating title of the poem and indeed this particular stanza ends, “this / is no ordinary sun.”

The fifth and final stanza of the poem literally destroys its own metaphors and leaves the poet with no earthly landscape to transform beyond language. The stanza begins with a Romantic call, “O tree,” turning to the geography of the earth that refuses to yield the metaphors so desperately needed by the poet. As such, the very process by which human language gains its meaning—through its rootedness in natural, earthly metaphor—is eradicated. The speaker turns to the mountains, usually a space of contrast and spatial depth, but finds they are now “shadowless” (23). Similarly, the “plains” are now “white” and the sea floor is “drab.” Here nuclearization leads not to a planet determined by darkness, a lack of light, but total light. To return to Adorno and Horkheimer, this “fully enlightened earth

radiates disaster triumphant." The sea floor, representing the farthest depths of earthly existence yet also space that is completely unfathomable to human knowledge, is not "revealed" or "illuminated" by the atomic sun, it is simply "drab." These last five lines of the poem also lack color, contrast, and personification of nature, the vehicles that kept this poem in narrative tension.

Lawrence Buell has argued that "apocalypse is the single most powerful master metaphor that the contemporary environmental imagination has at its disposal" (*Environmental Imagination* 285). Given its nuclear topic, the structure of Tuwhare's poem is oddly antiapocalyptic, if by apocalypse we mean inscribing the catastrophic event itself. Unlike almost every other visual and narrative account of nuclear detonations, which capitalize on the stunning visual effects of nuclear explosions and produce an aesthetic of violence, Tuwhare recounts a nuclear apocalypse in which the actual detonation and blast are not inscribed. This is a poem of witness that does not inscribe the act of violence itself. The poem uses the very figures most associated with apocalypse, yet this is not a narrative of sacrifice or renewal, as accounts of destruction often suggest in Maori and Christian traditions. This is a world of total light, but illumination does not follow—this world is "shadowless" and "drab" (23). Tuwhare has chosen to avoid what Fernand Braudel calls the "eventist" model of history, the visual aesthetics of violence that mark the kind of apocalyptic thinking that detracts from our recognition of the *longue durée* of radiation.²⁴ Thus Tuwhare ends his poem with total radiation, an unrecognizable landscape that resists our domesticating metaphors, one utterly suffused by the violence of the heliotrope, our total illumination.

V. PACIFIC HELIOTROPES

As I suggested at the start of this essay, the **literature of** Pacific solar ecologies has drawn from European and indigenous traditions. As is evident from this poem, there are at least two cultural traditions that inflect Tuwhare's poetry: first, he grew up speaking Maori and was exposed to a formal oratory in which one addresses so-called inanimate beings such as trees, animals, and features of the landscape, utilizing language to establish humanity's genealogical connections to the earth; and second, Tuwhare's father read the Bible to him as a child to help develop his English. In its first book printing (1964), "No Ordinary Sun" was juxtaposed to a poem entitled "A Disciple Dreams," which questioned the leadership of the church in an era of perpetual war. Given Tuwhare's concern with the meditative function of language and light, we might read this poem as an allegory of Christ and his failures to protect humanity from the hubris of instrumental rationality. Or the tree and its unheeding lovers may reflect the Tree of Knowledge in which light, a cipher for Lucifer, becomes the awful illumination of atomic power in ways that resonate with Lawrence's declaration "that alpha particles . . .

and gamma rays (represent) . . . fruits of the tree of knowledge" in the nuclear age.

To position this work in a Maori cosmology, we might consider this poem in relation to the genealogies of light that inform much of Tuwhare's poetry. Tane-Mahuta, the deity of the forest represented by the tree, creates Te Ao Marama, the world of light, by separating the sky deity and the earth mother, bringing light (and life) to the earth. Tane, like the figures of rain, wind, and birds of this poem, is an emissary between earth and sky. The poet's call to cease this intermediary function thus focuses on the failure of mediation itself. The "wa"—the space between—in Maori epistemology represents the potent space of becoming, the space of language, the mediating function of metaphor.²⁵ As such, the poet inscribes a rupture in the mediating role of light in both indigenous and Christian cosmologies. This rupture in the function of metaphor has great implications for our ability to apprehend and articulate the crisis of planetary irradiation.

Tuwhare's poem anticipates Derrida's observation that we are unwillingly drawn "by the movement which turns the sun into metaphor or attracted by that which turns philosophical metaphor towards the sun" ("White" 51). The power of Tuwhare's poem lies in its resistance to figurative and cosmological readings that would naturalize nuclearization as the sun, would link it to life-generating events such as the Big Bang, or would transmute the atomic era into a cosmological origin narrative. The sun, which is "always turning, thus appearing and hiding itself," is, in Derrida's words, a "bad metaphor which gives only improper knowledge" (52). As such, Tuwhare calls attention to this eclipse in knowledge, and by de-figuring the naturalization of the nuclear, anticipates the dis-figuring of metaphor that Spivak locates as central to shifting from instrumental rationality to ethical responsibility. And this ethical prerogative to disfigure the naturalizing metaphors of militarization has vital implications for both ecocriticism as a field of study and in illuminating our own human history of global irradiation, the most recent of which is reflected in our discourse about climate change.

The tree's "magic / emanations shall not make pure again/these polluted skies"; the power of transmutation that lies in the natural and figurative use of the tree has failed, just as the poet's ability to illuminate the earth after nuclear devastation results in merely a "drab" and "shadowless" landscape. The last words of the poem, the staccato, "your end at last is written," represents one of the few lines that do not assert a negation; this is a positive assertion as well as epitaph. The doubling of the "end at last" underlines the circumscribed powers of the poet and the process of inscription itself. In other words, the demise of the tree is simultaneous with the emergence of writing. The poet's elegiac powers emerge, only through the loss of the landscape from which language gains meaning. This is a small triumph of metaphor in the wake of our planetary irradiation.

NOTES

1. See Cosgrove 257-262.
2. See Smith, H. Alley 89-90.
3. Others argued that atomic weapons could be used to "tidy up the awkward parts of the world" (quoted in Boyer 113).
4. Truman announced the bombing of Hiroshima "as a harnessing of the basic power of the universe. The force from which the sun draws its power has been loosed against those who brought war to the Far East" (quoted in Weart 103).
5. See Boyer 188.
6. See also Lutts.
7. Overtly using the islands as laboratories of radiological experiment, AEC films such as *Operation Greenhouse* (1951) surveyed the Marshall Islands from an airplane, remarking on these "individual test islands [like] . . . a giant lab in the middle of an ocean."
8. See Bernard Smith and Paul Lyons.
9. See Firth, *Nuclear Playground*; Firth and Von Strokkirk, "A Nuclear Pacific."
10. See *Hollywood's Top Secret Film Studio*; the films *Radio Bikini* and *Half-Life* document these events. Photos and films of the tests are available widely; see sites such as at <http://www.vce.com/> and <http://nuclearweaponarchive.org>.
11. For more on the nuclearization of the Pacific see Boyer, Firth, and Weisgall.
12. She adopts the term from Louis Owens ("Reading" 91).
13. See Firth, *Nuclear Playground*, Teaiwa, "Microwomen."
14. Important war narratives that predate the nuclear tests include the autobiography of Cook Island author Florence Johnny Frisbie, who inscribed the American militarization of the Pacific in *Miss Ulysses from Puka Puka*, and Vincent Eri, who depicted radical changes to Papua New Guinean village life with the arrival of Australian and American troops and forced labor recruitment.
15. See also the Pacific collection edited by Hall, *Below the Surface: Words and Images in Protest at French Nuclear Testing on Moruroa*. Robert Barclay's *Melal: A Novel of the Pacific* (2002) depicts the American militarization of Kwajalein in particular.
16. George's novel and the alterity of light are explored in my article "Radiation Ecologies."
17. See "Forensics: Age Written in Teeth by Nuclear Tests."
18. See Rhodes for Oppenheimer's naming of Trinity which he explained derived from a Donne poem that articulates the vexed relation between humanity and the divine (571-2).
19. Scientific uses of metaphor, as scholars have demonstrated, not only connect two disparate entities but validate and naturalize this new relationship and thus are crucial to constructing new paradigms of knowledge. See Boyd, "Metaphor and Theory Change," and Kuhn, "Metaphor in Science."
20. Later that year Philip Morrison, a Manhattan Project scientist, described the Hiroshima bomb to the 1945 U.S. Committee on Atomic Energy as "a small piece of the sun . . . If you are near the sun, you must expect to get burned" (quoted in Welsome 107).
21. Children who drank milk between the years 1955-65 demonstrate much higher levels of strontium 90 in their bones due to the atmospheric nuclear tests of that era (Stephenson and Weal 131).
22. Weart describes radiation's association with the rays of life associated with life force, the growth of crops, sexuality, and divine illumination (41). See also Chernus, Rosenthal, and Teaiwa "bikinis".

23. My thanks to Rob Tuwhare for allowing me to reproduce his father's poem in its entirety. This analysis of Tuwhare appeared in my article "Solar Metaphors: 'No Ordinary Sun.'"

24. See also Masco, who makes this important point, and who draws upon Adorno and Horkheimer for different ends.

25. See Heim's "Breath as Metaphor of Sovereignty and Connectedness in Pacific Island Poetry," forthcoming from *New Literatures Review*.