

IN THE MIDST OF DAMAGE

HOW SHOULD WE REACT TO THREATS TO LIFE ON EARTH?

Soldiers are sometimes prepared for war by being asked to enter virtual battles over and over until their hearts no longer race. Their trainers hope to produce humans for whom deadly violence has no emotional charge. For those who reject such a mandate, this example can suggest the exotic forms we humans are able to assume. Our species is capable of many strange reactions to violence and damage. To study culture and history is to immerse oneself in this strangeness.

Historian Kate Brown tells one man's story, and yet it is a familiar one for all of us raised within the contradictions of modernity, so optimistic for the future and yet so cruel in its realization. Aleksandr Kupny crawled under the charred reactor at Chernobyl to see the ruins of the nuclear accident. It was an adventure, a chance to see for himself the power of the atom unleashed. His adventure, however, was not just his own, as Brown explains; it was made from the materials of the greater nuclear adventure, which started from the discovery of radium and has taken us now into a world in which nuclear power—and feral radiation—is everywhere. Kupny imagined himself as a “partisan,” a fighter for the nation. In the Cold War, modernization, including nuclear power, was the prize, and every fighter brought us closer. Yet now we rename the very goals the Cold War brought us toward as “Anthropocene,” the time of environmental endangerment. Brown takes us to the heart of this irony.

Anthropologist Deborah Bird Rose also traffics in cruel optimism. Describing an attempt to wipe out endangered flying foxes in a small white town in Australia, she writes, “Man is the only animal that shoots other creatures with paintball guns, and when the creatures flap around in terror or fall to the ground injured and in shock, man is the only animal that cheers.” But Rose has another lesson she wants to teach. Among Aboriginal people of Northern Australia, flying fox pollination of eucalyptus flowers is part of the “shimmer of life.” Shimmer draws us into multispecies worlds. It shows us unexpected coordinations, such as those that bring flying foxes to eucalyptus flowers across a surprisingly wide swath of country. “We are called into recognition. . . . In the midst of terrible destruction, life finds ways to flourish, and . . . the shimmer of life does indeed include us.” •



MARIE CURIE'S FINGERPRINT NUCLEAR SPELUNKING IN THE CHERNOBYL ZONE

Kate Brown

IT IS HARD TO IMAGINE entering a rabbit hole under the charred Chernobyl No. 4 reactor. Aleksandr Kupny did just that many times. He showed me photos he took during his expeditions underground into the reactor cavern. He would go with a friend on the sly without official permission. The explosion that occurred on April 26, 1986, thirty seconds after the reactor was shut down for an experimental safety test, blew off the building's 4 million pound concrete roof as well as the upper walls and part of the machine room.¹ The fire generated by the eruption burned at greater than two thousand degrees Celsius. The tremendous heat melted iron, steel, cement, machinery, graphite, uranium, and plutonium, turning it all into running lava that poured down through the blown floors of the reactor complex.² The lava eventually cooled into stalactites, black, sparkling, and impenetrable. One stalactite is called the "elephant's leg" for its thickness, gray shade, and deep furrows. In the months following the accident, scientists estimated (because it was too hot to measure directly) that the elephant's leg emitted ten thousand roentgens an hour. To translate that measurement biologically, ten thousand roentgens means thirty seconds spent near the leg would cause dizziness and nausea for the rest of the week. Two minutes and cells would hemorrhage, four minutes would

people a fatal dose.³

In 1989, Kupny worked as a health physics technician at Reactor No. 3, which was paired with Reactor No. 4 and still functioned after the accident. He had volunteered to go to Chernobyl, like tens of thousands of Soviet citizens in the late 1980s, because he believed it was his patriotic duty to help out after the catastrophe.⁴ He was also intrigued professionally. The smoking Chernobyl plant had radiation levels like nowhere else on earth. Chernobyl, Kupny said, "was the Klondike of radiation fields." He approached the blown reactor not with justifiable dread but with a sense of opportunity. Inside the ruined reactor, he had a chance to measure radiation at levels few others could experience. "I didn't look at the Chernobyl sarcophagus with fear. I saw it as a phenomenon. You can't study something you fear."⁵

As the years went by working as a radiation monitor, Kupny had grown more and more curious about the invisible energy he was paid to measure. He wanted to experience firsthand the tremendous power of splitting a nucleus. As a monitor, Kupny had a pass to the hottest areas at the nuclear power plant, including the sarcophagus, the vast concrete tomb built around the smoldering reactor in the months following the accident. The sarcophagus had two entry points, which were cavelike openings used by workers after the radiation levels had cooled to access the crushed control and machinery rooms.

Kupny had the necessary equipment—hazmat suits, gas masks, flashlights, and radiation detectors. He also possessed a camera. His friend Sergei Koshelev had a video camera. Kupny and Koshelev had no formal permission to take their cameras and headlights on their days off and crawl into the sarcophagus, but they knew the guards and the workers, and no one stopped them. "We went there as partisans," Kupny explained. "We took on the risk ourselves. The fewer people who knew about it, the better."

The risks were considerable, though Kupny is cavalier about them. The caverns under the reactor are former rooms—the control room, a pump house, the turbine halls—but they are no longer in the same places or in the same order they were in when the reactor was operating. The basement of the turbine generator hall is filled with water. Planks thrown over it serve as flooring. Spilled oil, slimy and slippery, seeps everywhere. The men must step lightly around cables, potholes, and ankle-trapping crevices. "Just walking," Koshelev noted, is "a

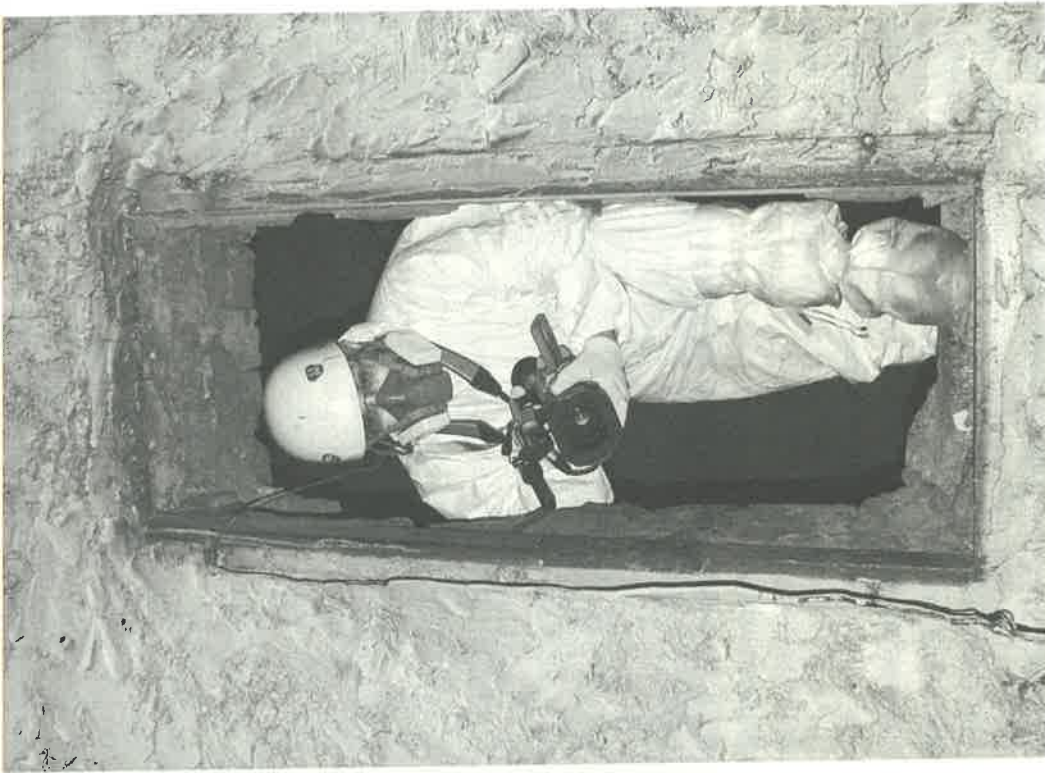


Figure G2.1. Videographer Sergei Koshelev at the entrance to the Chernobyl sarcophagus. Photograph by Aleksandr Kupny.

hazard."⁶ In the heavy darkness of the cavern, it is easy to stumble over rubble and cables, to pitch into a ditch, break a leg or arm. Heavy doors could swing shut and jam, trapping them below until help came, if it did. Flashlight batteries are not reliable when exposed to radioactive decay, and they give out, not gradually, but suddenly with no warning. In a pitch of total blackout, the men would then have to feel

spent exposed. The heavy hazmat suits are hot and make moving cumbersome. The lighter suits made of fabric easily tear, exposing skin and organs to the intense fields of radioactive isotopes. Gamma rays go through both kinds of suits. There are no methods for stopping gamma rays unless the men were to wear seventy-pound lead diving suits, and then they would hardly be able to move at all. All of this means that trip after trip, a body accumulates doses of radioactivity.

They had a half hour, forty minutes max, to stoop, crawl, and wriggle into the underground chambers, take pictures, and get back aboveground before they were overexposed. Despite the risk, the men did not bother with a radiation detector. "The radiation fields do not change much," Kupny remarked. "I knew what spots recorded single digits, and I knew where the numbers spiraled into the tens and hundreds."

I asked Kupny why he did that, why he went down there. Was it the same motivation that drives people to climb Mount Everest, to go places where few have gone before?

Kupny bristled. "I don't do it to put a flag down and beat my chest. I went under to figure out what happened. I see nuclear energy as a natural force. I want to understand this force; the immense power behind the accident. You can start to understand the power by seeing how the reactor fell apart. Unless you go there, you can't understand it."

Kupny is not your usual disaster tourist, one who hopes to snap a photo of ruin and destruction as a metaphor for the larger folly of human societies. For Kupny, crawling into the belly of the burned-out reactor was as close as he could get to entering a mushroom cloud to see how nuclear power works. His life's work has been to visualize and map this scarcely sensible phenomenon. He placed himself before a barrage of hazardous radioactive isotopes because he sought to grasp decaying radioactive isotopes as the elemental force burning at the center of the universe, the energy that gives life and can snatch it away.

It might seem strange to see the Chernobyl accident as a "natural force," but Kupny has a point. When, in the nuclear power plant, Soviet engineers created isotopes not found in nature—strontium, cesium, plutonium—these isotopes, once born, continued living their own "life," following the "natural" properties of radioactive decay, as observed by humans. Like other forces of nature, there is no stopping



Figure G2.2. Sergei Koshelev in the ruin of Reactor No. 4, Chernobyl. Photograph by Aleksandr Kupny.

them until they have run their course. Most artists in the twentieth century concerned with the catastrophic and utopic promises of nuclear energy deployed the powerful visual stimulus of splitting atoms as metaphor. In his photography, however, Kupny does not dwell in the realm of metaphor. Instead, decaying isotopes *are* the raw material of his photography. Kupny is like the geologists of the future who, one thousand years from now, will be able to trace the beginning of the Anthropocene, the epoch in planetary history in which humans dominate, by locating in the earth's strata the first man-made radioactive isotopes, dating from about 1942. Kupny captures on his film what geologists will locate in sedimentary rock and soil, the same decaying particles, still beating strongly thousands of years from now. For Kupny, a man who came of age and lived most of his life as a loyal Soviet citizen, the power of decaying atoms still holds so much promise.

Kupny is not unusual. He comes from a long line of scientists and technicians who have venerated nuclear power, while silently calculating how best to avoid being destroyed by it.

And that tradition has a particular history. It grew roots at the end of World War II and flourished in the heavily fertilized soil of the Cold War arms race. Without the Cold War, civilian nuclear power reactors like Chernobyl would never have made sense. The technology for civilian nuclear power generation was borrowed from bomb-producing reactors, yet, even with free designs and blueprints, the reactors were not cheap to build, and they were extremely risky to operate. In fact, constructing power reactors to produce slow chain reactions for electricity at a time when oil was flowing cheaply and voluminously from reservoirs in the Middle East makes no sense unless you factor in the Cold War contest, in which each side of the Iron Curtain rushed to assert the supremacy of capitalism over communism (or vice versa). The big bomb producers, in other words, needed a peaceful atom as an antidote to the skin-melting horrors nuclear war presented.

From the first days of the war's end, American propagandists, led by the atom-enthusiast William Laurence of the *New York Times*, denied the fact of radiation-related health effects in Japan and worked to rebrand the destructive "atom" into peaceful "nuclear" power that would generate the "white city" with clean, abundant energy.⁷ Promoting nuclear power's benefits for science, medicine, and technology became the chief vehicle for purification of the image of the United States as a nation bent on reducing the globe to an irradiated ruin.

In pursuit of this cause, one of the first two films Hollywood distributors sent to occupied Japan in 1946 was an MGM biopic called *Madame Curie*. The fact that U.S. occupation officials chose to show *Madame Curie*, about the first scientist to grasp the power of radiation and celebrate it, in Japan, the first country to suffer en masse from the radioactive effects of nuclear warfare, says as much about U.S. officials' desire to repurpose the atomic bomb as about their insensitivity to survivors. The film, made in 1943, issues an innocence and naivety that became more difficult to sustain after August 1945. It shows the Curies in their ramshackle lab at the moment of discovery. In a soft focus shot, Pierre Curie looks at the empty space behind Marie's shoulder and evokes the now limitless metaphysical horizon: "If we can prove the secret of this new element, then we can

of the world."

The deep secret at the center of the atom was power, raw and unvarnished. Civilian nuclear reactors became the key to harnessing and utilizing that power. In 1953, after the public started to question the safety of fallout from accelerating nuclear bomb tests, the U.S. National Security Council resolved that "economically competitive nuclear power" must become "a goal of national importance."⁸ President Dwight Eisenhower, genuinely alarmed himself by the quick tempo of the nuclear arms race, unveiled the Atoms for Peace program, dedicated to using nuclear power for medicine and to generate electricity "too cheap to meter." In his speech, Eisenhower offered to share American nuclear technology with other countries.⁹ With that salvo, a race began between the Cold War superpowers to outproduce each other not only in bombs but also in civilian nuclear power plants. American companies, prodded on by generous federal subsidies, geared up. General Electric led in building up a "nucleonics" division with fourteen thousand employees in the late 1950s. By 1957, U.S. officials had signed forty-nine agreements with countries and had plunked down twenty-nine small research reactors abroad, some in states that had trouble providing general education and medical care to their populations.

Soviet leaders gamely joined the race with the Americans. In 1954, Soviet engineers plugged in the world's first nuclear power-generating reactor in Obninsk, a nuclear research city near Moscow. The reactor produced all of five megawatts for the grid, but the propaganda value of juxtaposing the peaceful Soviet atom against the martial American atom was immeasurable. In the decades to follow, Soviet engineers built reactors outside of major cities and in countries of their East European allies, and in the late 1970s, they started gearing up for a major reactor complex north of Kiev to service the western sections of the country. Soviet society welcomed nuclear power and accepted the idea, blasted from billboards, that the "Soviet atom was a worker, not a soldier."

Selling the idea of nuclear power in Japan, however, was not as seamless. In 1954, an American test in the Bikini Atoll went disastrously wrong and contaminated a Japanese fishing vessel, the *Lucky Dragon*, with a thick coating of black fallout. By the time they reached port in Japan, the ship's sailors were already suffering radiation

catch was making its way through Japanese fish markets. A few months later, the antinuclear film *Godzilla* hit Japanese theaters. Nine million Japanese paid to see the sci-fi horror film depicting a deep-sea prehistoric monster awakened by oceanic nuclear tests.¹⁰ The confused and angry beast pulverized Japanese cities with his radioactive breath in ways that looked much like the atomic bomb-flattened Hiroshima. As protests against nuclear testing erupted in Japan, Japanese and American leaders quickly settled in closed-door meetings on a deal to transfer U.S. nuclear designs and fission products to Japan. Among Japanese leaders, who were eager to secure an independent power source for industrial expansion, the choice between the two competing visions of nuclear power—that of *Madame Curie* or of *Godzilla*—was easy.

Aleksandr Kupny came of age in this intellectual and social current. He grew up in the shadow of civilian reactors. His father was a nuclear engineer who rose to become the director of a large nuclear complex in the Russian Urals and then later in southern Ukraine. Kupny didn't study well in school and never managed to get a university degree, but he knew reactors. He settled into a series of blue-collar jobs as a radiation monitor in reactor cities throughout the USSR. I met him in a leafy café terrace in Slavutych, Ukraine, the city built to house nuclear plant operators and cleanup workers after the abandonment in 1986 of the city of Pripiat next to the Chernobyl power plant. He moved to Slavutych the year it was founded, in 1989, after volunteering to work on the cleanup. Kupny, in short, spent his career in intimate contact with the mysterious and elusive power of radioactive decay. It had been his lifetime study.

I teased him, "How can you study something you can't sense?"

"The most common truism about radiation is that humans cannot sense it," Kupny replied, "but that is not true. With a dosimeter, you can hear radiation. With a camera, you can see it. If the levels are high enough, you can taste it on your tongue. It tastes metallic."
"And feel it?"

Kupny nodded in affirmation. After forty years in radioactive fields, he said, he can sense decaying atoms.

The photos Kupny snapped inside the sarcophagus look like an episode from *Planet of the Apes*. Wrecked machinery and dated equipment lie upended amid peeling paint and rusting, twisted steel. Clouded, frozen control room dials rest amid wires dangling from fuse boxes.

Scattered everywhere are Kupny's already-haunting photos is the snowfall of tiny crystalline flakes that float through every scene of silent ruin, lending the photos a deep-sea feel. In one photo, two tiny, streaking comets mysteriously light up the corner of a room that Kupny experienced as cast in total darkness.

The tiny orange flecks and flashing lights are not an aberration in Kupny's film. As Kupny snapped photos, the multitude of photons of radioactive energy swarming around him imposed their image on his film. Imperceptibly, as he pressed his shutter button, the effervescence of the decaying reactor fuel jeweled the atmosphere in the buried chamber, lighting it up like an elaborate, spidery chandelier. These points of light are not representations. They are energy embodied. The specks are none other than cesium, plutonium, and uranium self-portraits.



Figure G2.3. Points of light. Radioactive energy imprinted on an image of ruins of Reactor No. 4. Note the sparks of light in the upper right corner. Photograph by Aleksandr Kupny.

roads, sliced open a puffer fish he caught in the warm waters of the Bikini Atoll a few days after American generals used the chain of islands and coral reefs as a nuclear testing ground. Bradley had pulled the fish from an irradiated lagoon, and after cutting it open, he placed the fatty tissue down on a photographic plate in a darkroom. He was reproducing an 1896 experiment by Antoine Becquerel, who accidentally burned an image of a copper cross onto a glass plate he had left in a drawer with rock containing a uranium sulfur compound. Inadvertently, Becquerel captured uranium's energy in the form of light illuminating the cross's outline. Bradley sought to have the puffer fish, which he figured absorbed an appreciable dose of radiation, serve the same function of radioactive source as had uranium in Becquerel's test.

He returned to the darkroom several hours later to find that the fish's contaminated bones, organs, and not-yet-digested last meal had burned their images onto the photographic paper to create what art historian Susan Schuppli calls "a new kind of photo-synthesis." Schuppli relates the puffer fish's radioautograph to the silhouettes of residents of Hiroshima and Nagasaki that were etched into concrete and stone after the August 1945 blasts. To leave the world as a shadow meant that the bodies of the victims, not their family members, crafted their own, last memorial. Schuppli believes that radioautographs undercut the idea that humans have a monopoly on image making. They show that matter can write its own history by generating knowledge of itself.¹¹

But that can only happen when bodies switch places in the darkroom drawer with specimens of uranium. A radioautograph is the opposite of an x-ray, with radioactive energy emanating out of rather than into a body. The work that goes into retrieving uranium from underground depths, isolating it, refining it, and setting up the conditions for sustained and controlled or explosive and uncontrolled chain reactions that then emanate energy that is then absorbed into bodies is behind both the self-portrait of the puffer fish's skeleton and the raw, pure crystals of light in Kupny's photographs. Marie Curie knew that work intimately. Over the course of five years, she and her husband-collaborator Pierre distilled eight tons of pitchblende down to a few grams of radium. They did so by boiling and condensing the pitchblende, a uranium compound, in huge vats. The indefatigable Marie Curie would stay at the lab late into the night to stir the mixture with poles taller than she. She breathed in the vapors. Her clothes became

soaked in it. She neaved buckets, pouring and sometimes spinning compounds on her hands, where burns developed. Over time and through her labor, her body and that of the isotopes in the pitchblende joined.

The film *Madam Curie* made a big impression on Japanese audiences. It triggered a widespread interest in nuclear science and in the scientist herself. After Curie died from aplastic anemia, a blood disease often brought on by exposure to doses of radiation, Japanese collectors purchased some of her papers, which ended up in a Tokyo library. In the early twenty-first century, manga artist Erika Kobayashi went to take a look at one of Marie Curie's notebooks. It was not exceptional, just a sketchpad for her notes and observations. But in the library, Kobayashi pulled out a Geiger counter and held it close to the notebook. She watched the needle rise. Kobayashi was amazed to find that, seventy years after her death, Marie Curie's radioactive fingerprint still registered. Curie never visited Japan, but the touch of her finger emits energy in Japan, the only country in the world to experience the disasters of both martial and peaceful atoms.¹² Without images, we have a hard time imagining disaster. Marie's radioactive fingerprint ended up precisely where nuclear disaster played out in human history in spectacular and visual form. But Marie wasn't thinking about catastrophe and destruction when she left her fingerprints on her notebook. Her dream was to create a source of energy that would heal wounds and relieve human want and misery.

What Curie began, the hopes she invested in achieving a pure source of radiant energy, Kupny carries along. He lives just outside the abandoned Chernobyl Zone, which is a vast wasteland generated by global economies hungry for energy and global political powers craving ideological preeminence. Kupny believes that a lot went wrong at the Chernobyl nuclear power plant, but what he has in mind when he discusses mistakes is not the accident but its aftermath. He argues vehemently that the remaining Chernobyl reactors should never have been shut down in 2002. They were perfectly safe and still had many years in them, he believes. He disagrees with the decision to halt the construction of reactors that were being built when Reactor No. 4 blew. And he wrote a series of articles about how the new French-built stainless steel shelter going up over the aging sarcophagus is wasting money and will not work.

Kupny is convinced that nuclear plants offer an acceptable and minimal health risk. I asked him how much of a dose did he think

Matter records its
own history.
Hiroshima

as received during the springing captivities into the sarcophagus.

Kupny said he didn't know.

"The first few times we went below," Kupny said, "I recorded my dose and wrote it down, but then Sergei [Koshelev] asked me why I did that. 'What good will it do you to know? The less you know, the better you will sleep.'"

"I thought about it and stopped recording my dose," Kupny continued. "Any health problem I got, I would question, 'was it because of my dose?' That is how people do it. They know they were exposed and they want to pin every illness or injury they have on that fact." Kupny pointed to his head. "Those who are sick a lot—it comes from the mind. They torture themselves."

Certainly exposure to radiation doesn't seem to have been a problem for Kupny personally. At age sixty-eight, he is a decade past the average male life expectancy in Ukraine. Nor does he look anywhere close to the grave. He appears to be ten years younger, is lithe and agile, with a brisk step and quick mind.

"As it does with food," he told me with a smile, "radiation works on me like a preservative."

Kupny's intellectual influences follow a straight line directly from the nuclear industry where he spent his career. Officers, especially in nuclear navies, where sailors live in close contact with tiny submarine reactors, frequently refer to "hormesis," the idea that exposure to radiation or a toxin in small doses has favorable biological effects. Scientists working for nuclear agencies often focus on psychological stress as the chief health concern for civilian populations exposed to low doses of radiation. Populations show higher rates of disease, these researchers believe, because of worries over exposure, not from the exposures themselves. These ideas are controversial, and a great deal of evidence suggests that small doses of radioactive isotopes and toxins are more, rather than less, dangerous than large doses, and that low-dose exposure to radiation can cause a host of nonmalignant diseases.¹³ The concepts of hormesis and radiophobia work well, however, as long as a person is healthy. You can then believe, as Kupny suggested, that those who were anxious brought on their poor health.

Kupny speaks for a lot of people locally who would choose the risk of possible contamination down the road in exchange for jobs and energy independence in the short term. In fact, in 2014, few

Ukrainians thought much about the Chernobyl accident or the Zone it left behind. In Ukraine, in the midst of a civil war, people were worried instead about a drastic drop in the value of the Ukrainian hryvnia, about the uncertainty of the national government, and about renewed incursions from their Russian neighbor. Anxieties about invisible, intangible radiation were luxuries only foreigners could afford. That's what foreigners do: they go to the Chernobyl Zone to imagine disaster. They pay money to do that.

Kupny took the risk of crawling under the sarcophagus for the cause as a "partisan." Partisans fought during World War II and sacrificed to defend the Soviet Union. As a radiation monitor, Kupny was a member of the working class. At a nuclear power plant, radiation monitors do not do heavy lifting like construction crews, plumbers, or janitors, but their jobs are nonetheless "dirty." Radiation monitors responded to emergencies. They were called in for suspected spills or leaking pipes. They inspected barrels, jumped down into trenches, and canvassed the edges of cooling ponds. Monitors were, in other words, on the front lines, patrolling and securing the borders of human contact with radioactive isotopes. After spending a lifetime trying to visualize and map radiation, it makes sense that Kupny fell a bit in love with his subject and wanted to get closer to know more. By calling himself "a partisan," Kupny was also signaling that he was a Soviet man who had faith in the socialist version of high modernism generally and, specifically, in the regenerative force of nuclear power.

Kupny's respect for the Soviet project is not unusual. He is a well-known local writer and artist in Slavutych. His ideas are shared commonly among his fellow citizens for reasons that are not mysterious. In Kupny's lifetime, Soviet socialist modernization delivered a great deal. It put an end to illiteracy, epidemics, and famine, while cleaning up daily life with indoor plumbing, public bathhouses, and central heating. Socialism also enriched life with pensions, paid vacations, affordable housing, free health care and education, and an impressive network of libraries, theaters, concert halls, and clubs. The socialist state lavished this attention foremost on trained, urban, blue-collar workers like Kupny, while outwardly focusing political rhetoric on equality and the ascendance of the working class. The contrasts in 2014 with the past were stark. In postsocialist, post-shock-capitalism society, working classes have been left to chronic poverty and joblessness, while pensions have evaporated, paid vacations are a nostalgic

Hiroshima

Figure G2.4. Flash of light, radioactive decay, in reactor underground.
Photograph by Aleksandr Kupny.

Hiroshima

memory, and equanimity—well, no one thinks about equality anymore. On this panorama, the achievements of the Soviet technocratic planning state look better and better.

Kupny's faith in the socialist version of high modernism, in the ability of man to invent machines to continually improve life, ecology, the animal world, and virtually everything else, is particularly striking because he witnessed firsthand the worst missile the technomodernist experiment tossed at the globe. The Chernobyl disaster took apart faith not only in nuclear safety but in convictions about risk management, disaster relief, and the capacity of states that are powerful and organized enough to produce nuclear reactors but too weak, indecisive, and financially strapped to contain them or clean them up afterward.¹⁴ Yet even after watching Chernobyl unravel, Kupny maintains confidence in human ingenuity, which, as much as it makes a mess of things, goes in search of new technologies to clean up, move on, and, hopefully, improve. I had imagined that kind of optimism was reserved for the young, but not in Kupny's case. Though it would be easy to despair, he does not shrink from hope. Choosing the good atom, the worker atom, over the destructive, soldier atom is one way he maintains that hope.

There is another way that Kupny is a "partisan." Partisans were loyal Soviet subjects. From the first steps into preschool, Soviet citizens were exhorted to act as role models for others in the Soviet Union and around the world. As the fortunate minority to be part of a socialist society, they had a duty to sacrifice themselves to keep socialism going, to see that it was strong and spreading to others less fortunate. Partisans, at the same time, were not regular army. They did not take directions from superior officers or wait for orders. They acted on their own. Sneaking into the sarcophagus like a burglar is a bit like carrying out a raid. He took a portion of radiation, which he didn't measure, much like a factory worker who pockets some metal to make a toy to bring home to his child. This kind of creative, spontaneous labor, for which Kupny, the artisan, takes no payment, announces his freedom.¹⁵ In Marxist terms, he is taking ownership of the means of production, for nothing in a nuclear reactor is so essential to production as the spinning, bouncing, decaying isotopes Kupny brought home on his film. Kupny is self-activated to understand his world, grasp its source of power, and he does so in the context of a society that has turned its back on the accident and on the promises of a society that saw nuclear

power as the solution to most social problems. He redirects our attention to the source. He wants us to visualize those flickering, falling leaves of energy lit with autumnal light as a way of seeing his lost world of socialism with all its possibilities and promises.

Prize-winning historian **KATE BROWN** offers landscape biographies through which we might recover the lost histories of modernist wastelands. Her recent book *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* is the first definitive account of the great plutonium disasters of the United States and the Soviet Union. She is professor of history at the University of Maryland, Baltimore County.

Notes

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9. Craig Nelson, "The Energy of a Bright Tomorrow: The Rise of Nuclear Power in Japan," *Origins: Current Events in Historical Perspective* 4, no. 9 (2011), <http://origins.osu.edu/article/energy-bright-tomorrow-rise-nuclear-power-japan>.
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SHIMMER

WHEN ALL YOU LOVE
IS BEING TRASHED

Deborah Bird Rose

ANGIOSPERMS FORM THE GREAT FAMILY of flowering plants, and their way of life is to entice. They invite, or lure, others through their dazzling brilliance of color, scent, and shape, and they reward their visitors—birds, mammals, insects—with nutrients. In their desire to attract others whom they need for pollination, they have brought forth a worldwide multispecies potlatch. The bling of life owes much to this exuberant, alluring family. In this chapter, I focus on relationships in Australia between angiosperms and one of their important symbiotic partners, flying foxes (of the genus *Pteropus*). I aim to explore a matrix of power, desire, and lures and to move across several species and cultures to draw our attention to the brilliant shimmer of the biosphere and the terrible wreckage of life in this era that we are coming to refer to as the Anthropocene.

I best learned about the shimmer of life from Aboriginal people in the Victoria River region of Australia's Northern Territory, a place to which I have been returning for more than thirty years. I use the concept of shimmer to frame this chapter because I believe it is susceptible to a "reciprocal capture" with Western thought.¹ For philosopher Isabelle Stengers, "reciprocal capture" is "an event, the production of new, immanent modes of existence" in which neither entity transcends the other or forces the other to bow down.² It is a process of encounter and transformation, not absorption, in which different ways of being and doing find interesting things to do together.

11. William M. Tsutsui and Michiko Ito (New York: Macmillan, 2006), 42.
12. Susan Schuppli, "Dirty Pictures: Toxic Ecologies as Extreme Images," paper presented at the Radioactive Ecologies Conference, Montreal, March 15, 2015; Schuppli, "Radical Contact Prints," in *Camera Atomica*, ed. John O'Brian, 277–91 (London: Black Dog, 2014).
13. Marie Curie's papers in France's Bibliothèque Nationale are stored in lead-lined boxes. Researchers have to sign a waiver to work on her papers. Eoin O'Carroll, "Marie Curie: Why Her Papers Are Still Radioactive," *Christian Science Monitor*, November 7, 2011.
14. The best synthesis of work on nonmalignant health effects from Chernobyl radiation is A. V. Iablokov et al., *Chernobyl: Consequences of the Catastrophe for People and the Environment*, Annals of the New York Academy of Sciences 1181 (Boston: Blackwell on behalf of the New York Academy of Sciences, 2009).
15. For the state's failures in cleaning up nuclear disasters, see Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford: Oxford University Press, 2013), 282–338.
16. Owen Hatherly, *Landscapes of Communism* (London: Penguin, 2015), 532.