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The Last Sink: The Human Body as the Ultimate Radioactive Storage Site

Living in Chelyabinsk, Russia, while researching a closed nuclear city, I got distracted by the supposedly hidden secrets of the security zone. It took an old woman and her scarred body to get me to see the real secrets. She taught me that a bigger story was right before me, on the bodies of the people I met. These were secrets so close I could reach out and touch them.

I was in Chelyabinsk to find out more about Ozersk, a pretty little city in a northern birch and pine forest surrounded by lakes. Ozersk, home to Russia's first plutonium plant, is a closed town surrounded by a tall cyclone fence topped with barbed wire and patrolled by guards at gateposts. I wasn't able to enter Ozersk, or even get close to it. In the summer of 2010, I took up residence in nearby Kyshtym, a small city of heavy log houses on an isthmus between two lakes. An Ozersk-based human rights lawyer connected me to several dozen pensioners of the plutonium plant who were willing to come to Kyshtym and tell me their story.

Most of the people who came to talk to me were elderly women. I wanted to hear from them about the security arrangements of the early nuclear security state. But to my chagrin, their business was not state secrets, but secret body parts: their genetic legacies, reproductive histories, and physical maladies. They kept pressing on me dog-eared sheets of paper—medical reports and legal petitions—but I was not interested in their records. Instead I wanted them to tell me what it felt like to be locked up in a zone, cut off from the larger world. I asked questions along those lines.

Luibov Kuzminova started talking. Kuzminova began work as an agronomist in Metlino in 1946, the year the Soviet construction enterprise broke ground on the Mayak plutonium plant, seven kilometers distant. In 1949, having run out of underground storage containers, plant engineers began to dump all the plant's waste, including a highly radioactive slurry, into the Techa River. If ingested in micro-quantities, the radioactive waste was fatal. The Techa pooled into ponds, lakes, and swamps along its soggy course.

Parts of this essay were published in my book *Dispatches of Dystopia: Histories of Places Not Yet Forgotten* (Chicago: University of Chicago Press, 2015).

Metlino was the first hydrological way station downstream from the plant. “We didn’t know.” Kuzminova recalled, “We drank and washed. We didn’t know it was all dirty.”

Kuzminova narrated her biography like a medical and reproductive record: “I was married in 1956. We had trouble conceiving. Finally I managed to get pregnant but had first a miscarriage, then a stillborn. Eventually I gave birth to three children in 1959, 1960, and 1963. The first child died of leukemia at a year and a half. The other two survived. They are sick a lot. My husband worked in the lab at the plant. He died in his fifties. I have female problems, and I have had a lot of operations.”

From 1949 to 1951, Soviet engineers dumped 3.2 million curies of high-level waste into the Techa. After several years of drinking and washing with contaminated water, villagers fell ill. Plant doctors examined 7,900 people in the downstream communities and clandestinely diagnosed over 900 cases of what they called chronic radiation syndrome (CRS). The symptoms of CRS include chronic fatigue, loss of appetite, severe anemia, premature aging, aching joints, brittle teeth and bones, immune disorders, and heart and digestive track diseases. Many of the 28,000 people who had also been exposed but not tested might also have had CRS (Thompson 2012; Degteva 2012).

Kuzminova also held tattered medical records, which she pushed toward me to examine. I had little interest in the documents. I did not know how to read the numbers in her records. I had no training in medicine. Seeing my indifference, Kuzminova put her papers aside, stood up, and before I could stop her, unbuttoned her shirt to show me the scars on her belly. Unlike the medical records, these markings finally drew my attention. She lifted her shirt to reveal thick chalk lines of the surgeon’s knife scrawling a crosshatch, left and right, up and down, on her abdomen. The marks looked as if they were graphically attempting to void her torso. I did not know if the cause for those many surgeries was the isotopes from the plant, but her pain, recorded in those bodily etchings, was simply, exhaustingly there. I could no longer doubt it, but confronted with this rendering of a body in pain, I wished it would go away.

Kuzminova wanted me to see her body in order to grant her a diagnosis of CRS so that she could claim compensation as a victim, but the CRS diagnosis was a moving target. In the 1990s, after a release of information about the Techa River disaster, a furious debate flared up around the bodies of people who claimed they were sick from the plant’s

radioactive waste. In those same years, US agencies started to fund and direct many post-Soviet research projects in nuclear installations, and US researchers did not have a medical equivalent of CRS. To them it was a doubtful diagnosis. Instead, US scientists were focused on a few cancers and thyroid disease as effects of exposure to radioactive isotopes. In the US tradition of toxicology, from which radiation biology or "health physics" emerged, only a link between a quantifiable exposure (i.e., a certain dose of radioactive iodine) with a known physiological effect (thyroid cancer or disease) constituted an occupational illness. US researchers correspondingly focused on "dose"—how much a person was probably exposed. If they had a dose over a "threshold" and a corresponding illness, then they were likely sick from plant exposure. As a consequence, US researchers monitored local landscapes and work places, focusing health physics on environments rather than bodies (Nash 2003; Sellers 1994).

CRS never became a diagnosis in the US medical tradition in part because it would never hold up in court.[1] There was no way, in the US medical-juridical understanding of occupational illness, to separate the complex of symptoms describing CRS from other illnesses with similar symptoms, such as heart disease, hepatitis, rheumatism, and tuberculosis. US research was focused on notions of stand-alone diseases from singular entities, like germs producing tuberculosis or singular toxins or radioactive isotopes causing cancer. Except for a few geneticists working in the late 1940s, I have found no evidence that US researchers thought in terms of radioactive isotopes assaulting and weakening multiple organs and immune systems, causing a multiplex of debilitating symptoms. Most researchers just didn't think that way. Their focus was on exposures, not on bodies and their symptoms, as researchers recorded long lists of estimated doses and depositions in isolated organs. To an amazing degree, in the studies that emerged from US nuclear installations, bodies of patients and certainly bodies in pain are wholly invisible.

Historian Christopher Sellers situates a form of this "body blindness" in the early US environmental movement of the 1960s. The first activists, failing in court to draw a line between the assemblage of vague human health effects associated with a chemical sensitiv-

1 The National Academy of Sciences's Biological Effects of Ionizing Radiation (BEIR) VII Committee concluded in 2005 that "there is no threshold of exposure below which low levels of ionizing radiation can be demonstrated to be harmless," and that in addition to cancer "other degenerative health effects have been demonstrated" from low dose exposure. Yet these insights have not been incorporated into regulation or lawsuits.

ity to DDT, turned instead to proving in court damages to animals and birds as "property" and natural resources. Winning these early court cases over contaminated environments, activists established the Environmental Defense Fund, but in so doing, Sellers argues, they turned their back on the humans threatened by environmental disasters.

In the early 1990s, the US Department of Energy declassified thousands of documents detailing the colossal volume of radioactive waste dumped into the interior American West during the Cold War. When Americans in eastern Washington State claimed that they had acquired a range of illnesses from living near the Hanford plutonium plant, the Department of Energy's response is revealing: the researchers whom they funded to conduct large-scale health studies used "dose estimates" from environmental monitoring, rather than examining actual human bodies. These figures, calibrated from decades of ambient readings of radioactive isotopes, estimated the doses residents received, then they compared those numbers against estimated exposures of Japanese survivors of the Hiroshima and Nagasaki bombings to come up with the probability of the cancers and thyroid disease reported by the "downwinders" (Richardson, Wing, and Stewart 1999).

Studies by the Atomic Bomb Casualty Commission (ABCC) remain the gold standard for US juridical panels in determining probable causalities of illness from radiation exposure (Greenland 2012). Of course, the one-off explosions in damp and coastal Japan differed greatly from the slow drip of exposures of a different cocktail of radioactive isotopes on the volcanic soils of the arid and continental Columbia basin. Yet researchers made models estimating doses across landscapes and their effects on bodies that considered the contexts of Japan and the United States as interchangeable.[2] This is remarkable considering all that had been discovered in four decades of research by hydrologists, ichthyologists, meteorologists, and soil scientists about the locally contingent pathways of radioactive isotopes. Using the ABCC studies, US government officials eventually determined that the Hanford Nuclear Reservation required a multi-billion dollar cleanup; at the same time, however, they decided that people exposed nearby were largely unaffected.

2 In the Hanford Environmental Dose Reconstruction (HEDR) case, researchers set out to reconstruct the doses that people living downwind from the plant might have received over the decades. The study focused on environmental monitoring as a way to estimate dose exposure. Using HEDR's estimates and computer programs, scientists of the Hanford Thyroid Disease Study (HTDS) examined 3,440 people from the seven exposed counties. The study found cases of thyroid cancer and thyroid disease among the participants, but determined based on HEDR dose estimates that the risk was about the same regardless of radiation doses (Center for Disease Control 2002).

These rulings indicate the moment when the bodies of exposed people disappeared, dissolved into the heavy physical and mental labor of making sense of the isotopes. That is what had long puzzled me as I read through the medical studies of long-term, low-dose exposure. The people—how they felt, their complaints, what they experienced as pain or illness—were nowhere to be found in these records. Just counts of differing isotopes, dose estimates, and various probabilities of the emergence of cancer in numerous organs extracted from a statistically configured composite body.

Invisibility takes a lot of work. The medical studies of the 1990s in the United States and then later in Russia did just that, ignoring or rendering invisible the bodies exposed to the Soviet and American plutonium plants' radioactive waste. This is not just a problem in the nuclear industry. Employers and insurers worldwide are notoriously reluctant to consider human bodies as evidence. In the early 2000s, Zhang Haichao, a migrant worker in China, was exposed to silica dust at the Zhendon Abrasion Proof Material Company in the Henan Province. He contracted silicosis, but the occupational disease hospital repeatedly refused to certify him, diagnosing Zhang instead with tuberculosis, which called for no compensation. To prove his case, Zhang had to go to extremes, persuading a doctor to perform a live lung biopsy to confirm his silicosis, although a simple x-ray had already shown the disease clearly (Pandita 2014). A failure to see bodies and to use them as archival maps of exposure helps explain the emphasis on cures rather than the environmental causes of a growing number of debilitating and deadly diseases. As I had pushed Kuzminova's medical records away, I too exhibited this same body blindness. Unable to judge, I did not know what to do with her and others' vague complaints. When Kuzminova raised her shirt to show me her scars, I wanted nothing more than to make her body go away.

There ought to be a new frontier of scholarly inquiry, one that learns to read bodies as historical texts so as to re-create historically voided bodies living on contaminated landscapes in a way that does not dismiss bodies in pain.[3] For the landscape most overlooked on the panorama of nuclear sacrifice zones is the landscape of the body. Human bodies—porous, renewing, and transforming—are as much a repository, a dump of man-made waste products, as are rivers, ground water, soils, plants, and

3 A new field of narrative medicine is emerging to incorporate biography and narrative in healing processes (Klosterman 2009). The field of medical anthropology has been exploring the question of the relationships between landscapes, health, and bodies for some time (See Biehl 2005; Johnston and Barker 2008; Iversen 2012).

animals. The last stop of the tour of nuclear sacrifice zones should be reflective: a tour of human bodies, for they are the long-haul truckers of the vast transformations of human history on geology, ecology, and biology. Human history, in other words, is changing human bodies. Yet this bodily archive has scarcely been accessed. In the search for nuclear secrets, the mysteries are right here with us.

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