Essay Review

The Many Places of Cold War Science by Alex Wellerstein

Joanna Radin. *Life on Ice: A History of New Uses for Cold Blood*. 305 pp., figs., bibl., index. Chicago/London: University of Chicago Press, 2017. $40 (cloth). ISBN 9780226417318.

David P. D. Munns. *Engineering the Environment: Phytotrons and the Quest for Climate Control in the Cold War*. xxiii + 334 pp., figs., bibl., index. Pittsburgh: University of Pittsburgh Press, 2017. $49.95 (cloth). ISBN 9780822944744.

"Cold War science" has emerged as a burgeoning field in the history of science and technology. Moving on from its earliest days as a stand-in for Big Science and its multifaceted connection to national weapons programs, the historiography of Cold War science has, over the past three decades, shown its subject to be far more nuanced that it might first have appeared. Cold War science is not merely those modern cathedrals like particle accelerators, nuclear reactors, and rocket-research facilities. It is not even "merely" about the rivalry between the United States and the Soviet Union, inasmuch as the geopolitics of the Cold War are, on closer inspection, considerably more complicated than the old bipolar picture suggested. Cold War science is a broad *Zeitgeist* and context, a period with, as always, some marked similarities and other marked differences with respect to the periods that preceded and followed it.[1]

The long Cold War, with its budgets, priorities, tensions, and totalizing mind-sets, touched nearly every aspect of science during the years between the end of World War II and the collapse of the Soviet Union. Some of this contact was explicitly military, like mapping the bottom of the sea or studying irradiated populations, the better to anticipate a future nuclear war.[2] But beyond the direct military influence, the more subtle ideologies and fantasies of total control percolated through the culture. As for computers, so also for the mind: the Cold War scientists' dreams of mastery and exploitation.[3] And the work of science and technology of the Cold War

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[1] Hunter Heyck and David Kaiser, "Introduction: New Perspectives on Science and the Cold War," *Isis*, 2010, *101*:362–366.
[2] Naomi Oreskes, "A Context of Motivation: U.S. Navy Oceanographic Research and the Discovery of Sea-Floor Hydrothermal Vents," *Social Studies of Science*, 2003, 33:697–742; and M. Susan Lindee, *Suffering Made Real: American Science and the Survivors at Hiroshima* (Chicago: Univ. Chicago Press, 1994).
[3] Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, Mass.: MIT Press, 1996); John Krige and Naomi Oreskes, eds., *Science and Technology in the Global Cold War* (Cambridge, Mass.: MIT Press, 2014); and Elena Aronova, "Recent Trends in the Historiography of Science in the Cold War," *Historical Studies in the Natural Sciences*, 2017, 47:568–577.

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itself became a diplomatic instrument, in forms both explicit (technical cooperation offered as a bargaining chip) and subtle (scientific internationalism as an ideological appeal).[4]

Two new volumes seek to expand the locus of Cold War science further. David P. D. Munns's *Engineering the Environment* offers up a history of a little known, but very Cold War, category of facilities known as "phytotrons." Crafted in deliberate homage to the cyclotrons, betatrons, cosmotrons, and other "trons" that were the hallmarks of Cold War technoscience, the phytotron was the botanists' attempt to cash in on both the resources and the mental landscape that physicists had come to stand for. The title of Munns's volume is simultaneously accurate and deceptive: the reader might, as I did, at first mistake the work for a volume on geoengineering or climate modification. But "the environment" here is not meant in that sense; the phytotronists were not seeking to modify the external, ecological environment so much as to render "environmental factors" into a controlled variable. Phytotrons, in their essence, were computer-controlled, very precise modern greenhouses that would allow the scientists who used them to modify a wide variety of environmental influences on plants (light, humidity, heat, etc.) with enhanced precision.

Thus Munns's book uses plant physiology, improbably, as a way to explore the space between the Big Science of the physicists and the control fantasies of the computer scientists. And, like many Cold War stories, it is a rise-and-fall narrative: the phytotrons initially attracted attention and funding but were rapidly overshadowed by other, flashier facilities. And indeed, as Munns chronicles, a recurrent theme is that the government agencies and university presidents whose patronage and attention are required to sustain such costly buildings frequently could not distinguish the phytotrons from the cyclotrons and wondered why they needed to fund both; and so the attempt to establish a linguistic affiliation with physicists could prove a problem as well as a boon.

The first phytotron was born in that Cold War science mecca, Caltech, in the late 1940s, and was viewed with some suspicion from the beginning, but seemingly capable of attracting the attention and monies necessary to get off the ground. A little under a decade later, its initial champion, the plant physiologist Frits Went, had left to accept what he hoped would be a temporary position as the director of the Missouri Botanical Garden, cajoling his new patrons to allow him to build a "Climatron." The Big Science model, though, did not hold: by the early 1960s, interest in such facilities was waning in the United States, and Went became known not as a creator of a new kind of science but "merely" as the discoverer of auxin, a plant hormone. Munns's book catalogues the rise and fall of the phytotron in the United States, as well as its partial dispersion to a non-American (Australian) context. Some of the facilities he profiles still exist; but rather than being seen as the shining beacons of a new form of biology, they appear as hulking, expensive relicts of a Cold War enthusiasm.

Joanna Radin's *Life on Ice* probes Cold War science in a different mode altogether. There is no central facility or singular scientific discipline profiled in Radin's book, other than the fact that its subject involves the deep cooling of biological samples, primarily blood. Radin traces the impulse for keeping chilled blood samples from a pre–Cold War context, but the idea really hit its stride in the 1950s. Where the pre–Cold War research motivations at times involved mystical sounding notions about the benefits of slowed-down life, the post-nuclear impetus was simultaneously more concrete and fantastical: blood samples kept appropriately chilled would help create a genetic reservoir that would allow a post-fallout society to reconstruct an uncontaminated human sample, as well as preserve biological evidence of rapidly dwindling indigenous populations.

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[4] John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, Mass.: MIT Press, 2006); and Krige, *Sharing Knowledge, Shaping Europe: U.S. Technological Collaboration and Nonproliferation* (Cambridge, Mass.: MIT Press, 2016).

Cold War frozen blood, Radin argues, "came to function as a literal and figurative connective tissue for reweaving the relationship between various disciplines within the sciences as well as between the United States and various colonial and newly postcolonial regions" (p. 6). Radin's book has both the advantages and the disadvantages that come with studies that refocus their historical narrative around the scientific subject as opposed to scientists or institutions: they cover a lot of ground, but the narrative threads must be made to work together despite their tendency to pull in all directions. *Life on Ice* manages to make it work, in a wide-ranging narrative that somehow unites extremely disparate characters and places, from the biophysicist and Catholic priest Basile Luyet, whose interests in "latent life" led him to pursue projects involving the low-temperature preservation of biological materials, to the calls for a "decolonization of the freezer" (p. 176) after the Cold War, when the indigenous populations whose blood had been catalogued in the 1960s and 1970s began to demand the return of their biological heritage in the face of its commercialization and in the context of a growing disdain for colonial enterprises.

The Cold War is not Radin's explicit subject—rather, it is part of the context of the work. Along with the motivation for preservation, it also provided funding under the guise of American scientific diplomacy. Perhaps this is the inevitable future of the historiography of Cold War science: once its warping influence is accepted as the norm, the Cold War ceases to be something that needs to be called out and identified every time it rears its head in the research work of the mid-to-late twentieth century. And as Radin's book makes clear, this allows the Cold War context simultaneously to exist with and overlap the multiple other potential contexts and framings that surround the work of the time, such as the colonial, the postcolonial, and the indigenous.

Both Munns's and Radin's volumes highlight, in their own ways, the limits of the Cold War as well. Munns's phytotronists attempted to hitch botany to the gravy train of Big Science. Though they succeeded in the beginning, by the 1970s they lost out, not because funding bodies lost faith in large scientific endeavors but because the control of environmental parameters for plants, despite its ideological resonances with other Cold War notions, was displaced by another guiding metaphor and ambition: the biological "code" of molecular biology, which promised even greater control. Within the discipline of biology, the Cold War proved something of a zero-sum game: the phytotronists and the geneticists could not both benefit. The latter decidedly won.

In Radin's book, the colonial ghosts of the Cold War haunt the final chapters. The troubled legacy of the United States with indigenous people in its Third World beneficiary states caught up with it in the late twentieth century, and subsequent shifts in ideas about the rights of said people meant that many frozen samples, intended to be kept suspended in a life without death, were demanded by the indigenous populations they had been taken from; upon their return, they were ceremoniously buried as human remains. In this story, as feelings toward the Cold War soured, the science it once aided became ideologically tainted.

That the Cold War was a context, and not really a time, place, or event (at least not in any specific sense), seems clear enough once one gets beyond the crude ideas of the Cold War as a simple conflict of ideologies or arms, as the field of history has managed to do, especially in the years since the fall of the Soviet Union. What both of these two new studies do exceptionally well is to understand that sense of context in a broad, nonlinear sense, as it applies to the development of science: context is not just an arrow of influence that drags all around it toward its will; it is, rather, a subtle intellectual resource, one that could be mobilized by the various historical actors and subjects, a resource whose power functioned both positively (i.e., aligning with Cold War values brings rewards) and negatively (i.e., that same alignment became a liability) over time. And gone, it appears, are the old debates about corruption: that the scientists were taking advantage of their context to further their aims, and the aims of their funders, seems, at least in this twenty-first-century moment, entirely obvious and uninteresting, worth pointing out only if anyone still maintained some idealistic notion of science as somehow set aside from the context in which it functions.