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The Lab and the Land: Overcoming the Arctic in Cold War Alaska

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The Lab and the Land

Overcoming the Arctic in Cold War Alaska

*By Matthew Farish**

ABSTRACT

The militarization of Alaska during and after World War II created an extraordinary set of new facilities. But it also reshaped the imaginative role of Alaska as a hostile environment, where an antagonistic form of nature could be defeated with the appropriate combination of technology and training. One of the crucial sites for this reformulation was the Arctic Aeromedical Laboratory, based at Ladd Air Force Base in Fairbanks. In the first two decades of the Cold War, its employees conducted numerous experiments on acclimatization and survival. The laboratory is now best known for an infamous set of tests involving the application of radioactive tracers to indigenous Alaskans—experiments publicized by post-Cold War panels established to evaluate the tragic history of atomic-era human subject research. But little else has been written about the laboratory's relationship with the populations and landscapes that it targeted for study. This essay presents the laboratory as critical to Alaska's history and the history of the Cold War sciences. A consideration of the laboratory's various projects also reveals a consistent fascination with race. Alaskan Natives were enrolled in experiments because their bodies were understood to hold clues to the mysteries of northern nature. A scientific solution would aid American military campaigns not only in Alaska, but in cold climates everywhere.

Militarily we can look to the Arctic as an area for strategic operations, as a training area,
and as a test laboratory. All three are important.

—Col. Robert H. Safford, Chief of Staff, U.S. Army Alaska, 1961

We need to take a view of labs that includes their natural settings.

—Robert E. Kohler

* Department of Geography and Program in Planning, University of Toronto, 5047-100 St. George Street, Toronto, Ontario M5S 3G3, Canada.

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ON 3 OCTOBER 1995, President Bill Clinton publicly accepted the report of the Advisory Committee on Human Radiation Experiments (ACHRE).¹ While he did not acknowledge a reporter named Eileen Welsome, she was largely responsible for the formation of the committee. In a series of articles for the *Albuquerque Tribune* that earned her a Pulitzer Prize in 1994, Welsome had profiled five of eighteen hospital patients who had been injected with plutonium between 1945 and 1947. These tests had previously received intermittent scrutiny, but it was the illumination provided by biographies that earned Welsome's stories attention. The emergence of additional victims, coupled with Clinton's demand that relevant records be declassified, revealed the scope of the scandal. As Welsome concluded in her book *The Plutonium Files* (1999), "the story was much bigger than anyone had imagined. It turned out that thousands of human radiation studies had been conducted during the Cold War."²

Part of a vast industry that grew rapidly out of the Manhattan Project, these radiation studies were closely related to the much more dramatic experimental detonation of nuclear weapons—primarily at the Nevada Test Site, but also in the Marshall Islands and several other American states, including Alaska. Both forms of testing affected certain sites and societies more than others, but the lands of indigenous peoples, from the South Pacific to the American West, were targeted with a particular intensity.³

Alaska is featured in two sections of the ACHRE report. Chapter 11 contains a brief discussion of Project Chariot, an attempt to create an Arctic seaport near the village of Point Hope through the use of nuclear explosions. A component of the physicist Edward Teller's Project Plowshare, Chariot's program of "geographical engineering" was canceled in 1962, but not before a number of preliminary environmental studies had been conducted in the area, including one series involving "the intentional release of small quantities of radioactive materials." While the Atomic Energy Commission (AEC)—and later the Department of Energy—expressed satisfaction that risks to the local population were minimal, concerns over health and secrecy were still raised by Inupiat spokespeople during ACHRE-sponsored public meetings in 1995.⁴

Alongside discussions of uranium miners in the American West and Marshall Islanders exposed to fallout, ACHRE turned again in Chapter 12 to radiation studies conducted on members of the indigenous population of Alaska. This was research, as the committee appropriately termed it, "conducted with a view to the *natural laboratory* in which the subjects were set." Between August 1955 and February 1957, scholars from the U.S. Air Force's Arctic Aeromedical Laboratory (AAL)—housed at Ladd Air Force Base in Fairbanks—used iodine-131 (I-131) to evaluate the "role of the thyroid gland in accli-

¹ For the epigraphs see Col. Robert H. Safford, "Look to the North," *Army*, Oct. 1961, pp. 66–70, on p. 66; and Robert E. Kohler, "Labs: Naturalizing the Lab," *History of Science*, 2002, 40:473–501, on p. 473.

² Eileen Welsome, *The Plutonium Files: America's Secret Medical Experiments in the Cold War* (New York: Dial, 1999), p. 7. For Welsome's critique of ACHRE's limited judgments see pp. 459–468.

³ Dean W. Kohlhoff, *Amchitka and the Bomb: Nuclear Testing in Alaska* (Seattle: Univ. Washington Press, 2002); Barbara Rose Johnston, "'More Like Us Than Mice': Radiation Experiments with Indigenous Peoples," in *Half-Lives and Half-Truths: Confronting the Radioactive Legacies of the Cold War*, ed. Johnston (Santa Fe, N.M.: School for Advanced Research Press, 2007), pp. 25–54; and Valerie Kuletz, *The Tainted Desert: Environmental Ruin in the American West* (New York: Routledge, 1998).

⁴ *Final Report of the Advisory Committee on Human Radiation Experiments* (Washington, D.C.: Government Printing Office, 1995), www.hss.energy.gov/HealthSafety/ohre/roadmap/achre/index.html (accessed 20 May 2012) (hereafter cited as *ACHRE Report*), Ch. 11; and Native Village of Point Hope, "Atomic Energy Commission Offenses against the Inupiat of Point Hope," press release, 17 Oct. 1992, <http://arcticcircle.uconn.edu/VirtualClassroom/Chariot/pthopeprotest.html> (accessed 20 May 2012). On Chariot see Dan O'Neill, *The Firecracker Boys* (New York: St. Martin's, 1994).

matizing humans to cold.” Two hundred tracer administrations of I-131, a radioisotope that collects in the thyroid, were given to 120 subjects: “19 Caucasians, 84 Eskimos, and 17 Indians.” Although the partial historical record made evaluation of this program difficult, ACHRE did conclude that “the potential for misunderstanding and exploitation was significant. . . . There has been no evidence that any attempt was made to explain the military purpose of the study to the Indians or Eskimos.”⁵ I-131 has no general medical benefits, although participants may have assumed that they or their communities would receive medical care in return for cooperation.⁶

In its summation of the AAL experiments, ACHRE borrowed from the work of another group concurrently investigating the case in a much more sustained manner, including visits to two Alaskan villages and a public hearing in Fairbanks. After the I-131 study was mentioned at a 1993 conference on Arctic contamination held in Anchorage, leading to news stories that “outraged Alaskans,” Congress granted the National Research Council (NRC) \$150,000 to investigate. As with the retrospective assessment of Project Chariot, the NRC group—officially called the Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹—concluded in January 1996 that while the experiments probably “caused no physical harm,” Alaskan participants “were wronged,” particularly because they were “not fully informed about the nature and risks of the research.”⁷ This was despite the presence of a policy at the AEC—the source of the tracers—requiring volunteers in its radioisotope programs to be briefed on both the “intent of the study and the effects of radiation.”⁸

Five years after Clinton accepted the ACHRE report, Secretary of the Air Force F. Whitten Peters formally apologized to the Alaskan subjects of the AAL experiments. A total of \$7 million was awarded in compensation, “including payments of \$67,000 to each study participant or his or her descendants as compensation for perceptions of health risk associated with an oral dose of I-131, especially the anxiety and stress caused by learning of the radioactive dosage.” A further \$1.36 million was given to the North Slope Borough to compensate for “the community experience of hosting a medical survey team whose presence implied health care treatment rather than research objectives.”⁹

While these post-Cold War inquiries and apologies generated media and scholarly interest, the specific environmental and social contexts of the Aeromedical Laboratory’s

⁵ *ACHRE Report*, Ch. 12 (emphasis added). The number of “Eskimos” in the study has also been listed as 85, resulting in a total of 121 subjects. This reflects a difference between the text and the tables of the key AAL report: K. Rodahl and G. Bang, *Thyroid Activity in Men Exposed to Cold*, Technical Report 57-36 (Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, 1957). The “19 Caucasians” were a “control group” featuring six servicemen from the Army and thirteen from the Air Force. See *Report on Search for Human Radiation Experiment Records, 1944–1994*, Vol. 1 (Washington, D.C.: Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs, June 1997), p. 46, <http://www.defense.gov/pubs/dodhre/index.html> (accessed 20 May 2012).

⁶ I-131 was also part of the fallout produced by above-ground nuclear weapons tests in Nevada and elsewhere, and it was deliberately released from Washington State’s Hanford Nuclear Reservation in the secret Air Force “Green Run” experiment of 1949. For background on the latter see *ACHRE Report*, Ch. 11.

⁷ “Feds Probe Radiation Testing on Natives,” *Alaska Magazine*, May/June 1994, p. 12; and Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹, *The Arctic Aeromedical Laboratory’s Thyroid Function Study: A Radiological Risk and Ethical Analysis* (Washington, D.C.: National Academy Press, 1996), p. 62.

⁸ The AEC’s February 1956 “Recommendations and Requirements” is quoted in *ACHRE Report*, Ch. 12. On the AEC’s radioisotope initiatives see *ibid.*, Ch. 6; and Angela N. H. Creager, “Nuclear Energy in the Service of Biomedicine: The U.S. Atomic Energy Commission’s Radioisotope Program, 1946–1950,” *Journal of the History of Biology*, 2006, 39:649–684.

⁹ Johnston, “More Like Us Than Mice” (cit. n. 3), p. 35.

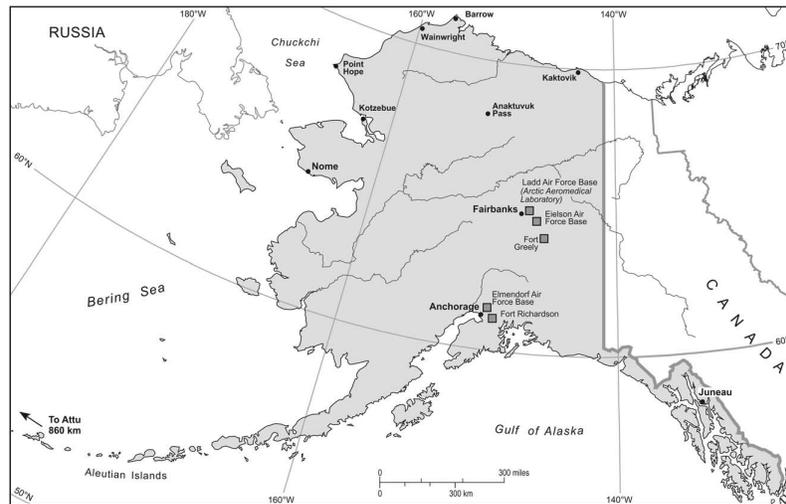


Figure 1. Alaska, 1959. Map by Mariange Beaudry, GIS and Cartography Office, University of Toronto.

Cold War work have never garnered attention from historians. This disregard reflects the lack of consideration, beyond Project Chariot, that has been paid to the initiatives that collectively turned Alaska into a “natural laboratory” for the armed forces, from survival schools and winter warfare exercises to advanced radar and communications networks (see Figure 1). Sandwiched between the World War II defense of the Aleutian Islands and the 1970s construction of the Trans-Alaska Pipeline, and overshadowed by events such as statehood in 1959 and the Good Friday earthquake of 1964, the mundane militarization of the 1950s was nonetheless of definitive significance for the territory. The frenzy of wartime construction had passed, leaving considerable new infrastructure (including, of course, the Alcan/Alaska Highway), but much of it was hurriedly built. Only revived and more durable military investment saved the territory from sliding “into another era of doldrums.”¹⁰ A 1961 guide titled *This Is Alaska* claimed that “almost everything the state has today it owes to military spending.”¹¹ The list may have included statehood itself, because incorporating Alaska “into the American body politic was an integral part of the extension of a permanent military defense perimeter thousands of miles into the far north”—an extension driven by the certification of Alaska’s extraordinarily strategic position in a nascent Cold War.¹²

¹⁰ Walter R. Borneman, *Alaska: Saga of a Bold Land* (New York: HarperCollins, 2003), p. 387. On the environmental and social significance of the Alaska Highway see Kenneth Coates, ed., *The Alaska Highway: Papers of the Fortieth Anniversary Symposium* (Vancouver: Univ. British Columbia Press, 1985); and P. Whitney Lackenbauer and Matthew Farish, “The Cold War on Canadian Soil: Militarizing a Northern Environment,” *Environmental History*, 2007, 12:921–950.

¹¹ Quoted in Laurel J. Hummel, “The U.S. Military as Geographical Agent: The Case of Cold War Alaska,” *Geographical Review*, 2005, 95:47–72, on p. 58.

¹² John Whitehead, “Alaska and Hawai’i: The Cold War States,” in *The Cold War American West, 1945–1989*, ed. Kevin J. Fernlund (Albuquerque: Univ. New Mexico Press, 1998), pp. 189–201, on p. 192. Initially, President Dwight Eisenhower was reluctant to support statehood because such status might “hamstring the military’s strategy for defending Alaska”—namely, a gradual abandonment of the territory’s “hinterlands.” The compro-

In this essay, I argue that the understudied work of the AAL is critical to a fuller understanding of both Alaska's history and the history of Cold War science, as well as the intersection of these subjects with environmental histories and histories of race and racialization. What draws these fields together in this instance is the recognition that a history of the laboratory is also a history of landscapes. "Landscape," as cultural geographers have long argued, is a word that captures a "way of seeing" as much as it suggests a physical space. The midcentury militarization of Alaska had profound consequences for the residents of the territory and the environments in which they lived. But it also produced and promoted certain forms of knowledge about the north, knowledge that in turn contributed to particular definitions of Alaska's cultural and natural qualities.¹³ In the I-131 study and dozens of additional initiatives, the laboratory perpetuated the presentation of Alaska—a synecdoche for a larger Arctic region—as a hostile environment distinct from the more comfortable south. Underpinning its various experiments and trials was the consistent premise that Alaska was an excessively, dangerously natural realm that *confronted* soldiers who were expected to live and fight across its expanses.

Alaskan exceptionalism is a common trope; it "has played well as heritage, but works poorly as history." But the AAL, like a number of institutions established in the same period to aid a global American military presence, was also charged with finding ways to limit the effects of an external nature on military personnel and their technologies. "The military must operate in the Arctic," the *Fairbanks News-Miner* put it plainly in 1959. "Aeromed tells them how to do it most safely and effectively."¹⁴ Indigenous Alaskans were swept up in this campaign precisely because they were seen to live successfully, if primitively, in such a realm. Their bodies collectively comprised a medical mystery that if deciphered would aid those troops who were in Alaska, it seemed, out of necessity.

As the ACHRE report indicates, we should position the activities of the AAL alongside other human subject experiments and tests of military technologies, particularly those involving the combination of "vulnerable" populations (including soldiers) and "remote" environments. From this perspective, with its ineluctable echoes of colonialism, Alaska's Cold War history closely parallels those of the American Southwest and the Marshall Islands.¹⁵ Drawing these three locations together mirrors the geographic triad of arctic,

mise was a line that refined one Eisenhower had drawn on a map in 1954. Known as the PYK Line, after the Porcupine, Yukon, and Kuskokwim Rivers, it granted the president powers to take control of a vast portion of the new state. The line was enshrined in Section 10 of the Statehood Act and is still technically in effect. As Senator Ted Stevens put it later, "it is a special law that only applies to Alaska," reflecting the way in which the state has long been uniquely seen as a distant and largely empty potential battleground. David Whitney, "Seeking Statehood, Stevens Bent Rules to Bring Alaska into the Union," *Anchorage Daily News*, 10 Aug. 1994, p. A1; and Dwight D. Eisenhower, "Statement by the President upon Signing Alaska Statehood Bill," 7 July 1958, <http://www.presidency.ucsb.edu/ws/index.php?pid=11117#axzz1vNuJU3zV> (accessed 16 May 2012).

¹³ A useful sketch of the consequences of militarization is Hummel, "U.S. Military as Geographical Agent" (cit. n. 11); for the broader context see J. R. McNeill and Corinna Unger, eds., *Environmental Histories of the Cold War* (Cambridge: Cambridge Univ. Press, 2010). On Cold War Arctic knowledge in the physical environmental sciences see Ronald E. Doel, "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945," *Social Studies of Science*, 2003, 33:635–666; and Doel, "Quelle place pour les sciences de l'environnement physique dans l'histoire environnementale?" *Revue d'Histoire Moderne et Contemporaine*, 2009, 56:137–163.

¹⁴ Stephen W. Haycox, "The View from Above: Alaska and the Great Northwest," in *The Great Northwest: The Search for Regional Identity*, ed. William G. Robbins (Corvallis: Oregon State Univ. Press, 2001), pp. 145–157, on p. 155; and "Looking Back in Fairbanks—Dec. 27," *Fairbanks News-Miner*, 26 Dec. 2009, www.newsminer.com (accessed 19 Jan. 2011) (electronic reprint of the 1959 article).

¹⁵ For background see Barton C. Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947–1974* (Berkeley: Univ. California Press, 1994). For the West see Kuletz, *Tainted Desert* (cit. n. 3); Rebecca Solnit, *Savage Dreams: A Journey into the Landscape Wars of*

desert, and tropic that defined American military research on “natural environmental settings” during the twentieth century, even after the Cold War. Similarly, the case of the AAL should not be held apart from comparable examples in Canada, Greenland, and beyond, where militarization has also been an important impetus for indigenous political mobilization.¹⁶ An account of the AAL, moreover, complements and adds to the extensive literature on science and the Cold War. I draw particular inspiration from work in this realm that draws connections and blurs the boundaries between seemingly contained sites such as laboratories and external “experimental landscapes” that they study and shape.¹⁷ Laboratories, Scott Kirsch notes, “have traveled . . . as methods; that is, as experimental technologies and epistemologies adapted to the field.”¹⁸ And for all of its emphasis on a hostile Alaskan environment, the AAL’s equivalent obsession with racial difference, coupled with the concern of its most prominent employee for degenerating indigenous culture, meant that laboratory staff and their research subjects were somewhat unlikely participants in the Cold War modernization initiatives that captivated many scholars during the 1950s and 1960s.¹⁹ The Arctic is a realm where such historical connections can be usefully made, not least because place-based Cold War histories have been slow to travel north.²⁰ But the case of Alaska as *seen* through the work of the laboratory is also unique. The overarching definition of the territory as both strategically significant and vulnerable after World War II meant that the intimate experiments of the AAL were given urgency by and contributed to a powerful geopolitical

the American West (Berkeley: Univ. California Press, 2000); Jonathan D. Moreno, “In the Wilderness,” in *Undue Risk: Secret State Experiments on Humans* (New York: Routledge, 2001), pp. 189–238; and A. Costandina Titus, *Bombs in the Backyard: Atomic Testing and American Politics*, 2nd ed. (Reno: Univ. Nevada Press, 2001). For the Pacific see Jack Niedenthal, “A History of the People of Bikini Following Nuclear Weapons Testing in the Marshall Islands: With Recollections and Views of Elders of Bikini Atoll,” *Health Physics*, 1997, 73:28–36; Jeffrey Sasha Davis, “Representing Place: ‘Deserted Isles’ and the Reproduction of Bikini Atoll,” *Annals of the Association of American Geographers*, 2005, 95:607–625; Johnston, “‘More Like Us Than Mice’” (cit. n. 3); Mansel G. Blackford, *Pathways to the Present: U.S. Development and Its Consequences in the Pacific* (Honolulu: Univ. Hawai’i Press, 2007); and the documentary films *Half-Life* (1986) and *Radio Bikini* (1988).

¹⁶ W. Chris King *et al.*, “Identifying Optimum Locations for Tropical Testing of United States Army Materiel and Systems,” *Singapore Journal of Tropical Geography*, 2004, 25:92–108, on p. 93 (quotation); Lackenbauer and Farish, “Cold War on Canadian Soil” (cit. n. 10); O’Neill, *Firecracker Boys* (cit. n. 4); and Franklyn Griffiths, ed., *Arctic Alternatives: Civility or Militarism in the Contemporary North* (Toronto: Science for Peace, 1992).

¹⁷ Scott Kirsch, “Ecologists and the Experimental Landscape: The Nature of Science at the U.S. Department of Energy’s Savannah River Site,” *Cultural Geographies*, 2007, 14:485–510; and Rebecca Lemov, *World as Laboratory: Experiments with Mice, Mazes, and Men* (New York: Hill & Wang, 2005), pp. 147–221. A pioneering account linking laboratory science to the Cold War security state is Michael Aaron Dennis, “‘Our First Line of Defense’: Two University Laboratories in the Postwar American State,” *Isis*, 1994, 85:427–455. A collection of papers on science and the Cold War, marking the extension of historical inquiry well beyond an earlier focus on physics, can be found in *Isis*, 2010, 101:363–411.

¹⁸ Scott Kirsch, “Laboratory/Observatory,” in *The SAGE Handbook of Geographical Knowledge*, ed. John A. Agnew and David N. Livingstone (Thousand Oaks, Calif.: SAGE, 2011), pp. 76–87, on p. 80. This is a useful guide—written, notably, by a historical geographer—to the extensive and varied field of laboratory historiography. For an equally valuable perspective from the history of science see Robert E. Kohler, “Lab History: Reflections,” *Isis*, 2008, 99:761–768.

¹⁹ See David C. Engerman *et al.*, eds., *Staging Growth: Modernization, Development, and the Global Cold War* (Amherst: Univ. Massachusetts Press, 2003); and the special issue of *Diplomatic History* (2009, 23[3]) on “Modernization as a Global Project.” For an Arctic example see Matthew Farish and P. Whitney Lackenbauer, “High Modernism in the North: Planning Frobisher Bay and Inuvik,” *Journal of Historical Geography*, 2009, 35:517–544.

²⁰ Exceptions, with respect to North American histories, include Hummel, “U.S. Military as Geographical Agent” (cit. n. 11); O’Neill, *Firecracker Boys* (cit. n. 4); Stephen Bocking, “A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960,” *Technology and Culture*, 2009, 50:265–290; Keith R. Benson and Helen M. Rozwadowski, eds., *Extremes: Oceanography’s Adventures at the Poles* (Sagamore Beach, Mass.: Science History Publications, 2007); and Richard Powell, “Science, Sovereignty, and Nation: Canada and the Legacy of the International Geophysical Year, 1957–58,” *J. Hist. Geogr.*, 2008, 34:618–638.

logic. Bob Bartlett, one of the new state's first two senators, described Alaska as "a shield against air and missile attack from Russia" and "a sword ready to strike back." As such, the laboratory study of populations, whether soldiers or indigenous peoples, was inextricable from considerations of territory, sovereignty, and defense—considerations that were certainly not as pressing at the Nevada Test Site or Bikini Atoll.²¹

In the first section of this essay, I introduce the concept of landscape and show how the scientific treatment of Alaska as a hostile environment, given additional valence by the territory's geopolitical position, was solidified during the 1940s and 1950s. By detailing the AAL's organizational history and the scope of its research activities I also argue, second, that its importance was premised on an extension of laboratory conditions to encompass the entirety of Alaska. This extension brought military scientists into close contact with Alaskan residents, and in the essay's third section I turn to the laboratory's consideration of racialized subjects, emphasizing the role of an AAL figurehead, the Norwegian physician Kaare Rodahl. Rodahl's military work, in addition to two popular-audience books summarizing his northern exploits, is evidence of a powerful attempt to intervene in the lives of indigenous Alaskans, an intervention pursued in the name of science but one that was also inextricable from the Cold War. Finally, I explore critical responses to such interventions, reactions that began to coalesce, by the late 1960s, in indigenous demands for self-representation and control over territory. As more recent events suggest, the role of the AAL, a component of a broader quest to understand and overcome northern threats, was not easily forgotten by those who fell under its purview. The lengthy, ongoing struggle to document and protest the consequences of militarization in Alaska can thus be understood, in part, as an attempt to counter a particular landscape representation produced by agencies such as the AAL.

In the conclusion, I link this case to the broader historical relationship between science and American military globalism. The AAL is merely one on a long list of American laboratories and related facilities established to aid operations in hostile environments. We know too little about how these sites were *built*—the ways in which certain places and peoples became objects of scrutiny. The example of the Arctic Aeromedical Laboratory demonstrates that this process was premised on a conflation of racial and environmental difference, a dual geographic categorization given sober sustenance by the "scientific" mandate of laboratory research.

A "LANDSCAPE AS SEEN BY THE MILITARY"

In 1941, a peripatetic writer named John Brinkerhoff (J. B.) Jackson was sent to the Military Intelligence Training Center at Maryland's Camp Ritchie. The training he received there, he recalled, did not address "the relationship between the environment and man":

We learned to assume that the occupants of that environment were animated by one very clear purpose: to hold on to it as long as they could. We learned to study the environment only insofar as it might help or hinder the carrying out of that purpose. One reason it was easy to

²¹ Major General J. H. Michaelis, "Alaska: The Best Place to Solve Problems of Future Wars," *Army, Navy, Air Force Journal and Register*, 31 Mar. 1962, pp. 24–25, 34, on p. 24 (quoting Bartlett); and Stuart Elden, "Governmentality, Calculation, Territory," *Environment and Planning D: Society and Space*, 2007, 25:562–580.

ignore the environment was that it was all too familiar. While the make-believe tactical situations were constantly changed, the terrain was always the same fragment of the Blue Ridge Mountains.²²

Had Jackson been assigned to Alaska a decade later, he would have encountered a different set of circumstances. While academics, intelligence analysts, and think tanks elsewhere in the United States were debating the “capabilities” of a Soviet enemy, research and training in Alaska, although spurred by this confrontation, was focused on another antagonist: nature. And Alaskan nature was treated as unknown and unfamiliar, a challenge for scientists and soldiers alike.

By the 1950s Jackson had become an authority on the sites and scenes of American life. His writing was distinguished by an attention to contemporary society, but also by his search for the symbolic aspects of landscapes, alongside their physical or artifactual qualities. This recognition paved the way for a subsequent generation of geographers to explore questions of cultural meaning. They frequently remarked on the quintessentially visual qualities of landscape; it was understood not just as a space that one walked across or drove through but also as a “way of seeing,” in the manner of landscape art, with its attendant conventions. Such modes of representing the world, and the “material conditions which overdetermine” them, were not Jackson’s concern, but his legacy remains resilient. While he was aware of landscape’s visual character, his interpretations were not confined to the inert iconography of a painting but instead emphasized “routines that produce and reproduce actual living landscapes.”²³ Jackson reminds us, then, that a landscape seen by the military, to borrow the title of one of his essays, is also a landscape *experienced and made* by the military.

A particular landscape idea can operate as an “instrument of cultural power,” turning one impression of a place into a seemingly inevitable, natural interpretation.²⁴ This is clear in the case under consideration. From World War II to the 1960s, no institution was more significant in the transformation of Alaska than the Department of Defense (or, as it was known before 1947, the Department of War). And this redefinition occurred across the many ways in which we consider landscapes, from material to symbolic, from representation to experience, just as the human and ecological diversity of Alaska was integrated into a single environment for military contemplation. Military perspectives, of course, have always been intertwined with other ways of seeing Alaska.²⁵ My aim is to show how one powerful view of northern geography was forged by American military scientists and to document both its specific consequences and its wider connotations.

Historians have acknowledged the persistent discussions surrounding Alaska’s geopolitical significance from the time of its acquisition by the United States in 1867. For instance, Galen Perras has outlined the opinions of strategists such as General William (Billy) Mitchell, the controversial air power advocate who repeatedly campaigned for the militarization of the North Pacific after World War I. Although Mitchell’s vigorous

²² John Brinkerhoff Jackson, “Landscape as Seen by the Military,” in *Discovering the Vernacular Landscape* (New Haven, Conn.: Yale Univ. Press, 1984), pp. 131–137, on p. 133.

²³ Tim Cresswell, “Landscape and the Obliteration of Practice,” in *Handbook of Cultural Geography*, ed. Kay Anderson *et al.* (London: SAGE, 2003), pp. 269–281, on pp. 272, 274; D. W. Meinig, ed., *The Interpretation of Ordinary Landscapes: Geographical Essays* (New York: Oxford Univ. Press, 1979); and John Wylie, *Landscape* (London: Routledge, 2007).

²⁴ W. J. T. Mitchell, quoted in Cresswell, “Landscape and the Obliteration of Practice,” p. 277.

²⁵ For a cheery depiction see W. Robert Moore, “Alaska, the Big Land,” *National Geographic*, June 1965, pp. 776–807.

arguments were initially dismissed by Army planners, they took on new significance as diplomatic relations with Japan grew strained in the 1930s. It was in this context that Mitchell made his most famous comment on Alaska: in front of the House Committee on Military Affairs, he described the Alaska Territory as “the most important strategic place in the world.”²⁶

Still, enthusiasm for Alaskan defense remained tepid until the eve of World War II. The very day before Pearl Harbor, Colonel Everett Davis, Alaska’s Air Force chief, described his troops as incapable of defending “the territory against any attack in force.” Still, he did acknowledge that his small “cadre” might prove useful by “gathering information of the geography” and “developing a technique of cold-weather operation.” Four days earlier, Ruth Gruber, a journalist serving as Special Assistant to Secretary of the Interior Harold Ickes, had reported from Anchorage that the “question of morale” among soldiers posted to Alaska was “acute” and that both soldiers and civilians in Alaska “ought to know the importance of Alaska, and of the whole Arctic, in times of peace and war.”²⁷ Three features of these prescient remarks are intriguing: the linkage of Alaska with the “whole Arctic”; the identification of morale as a problem for further study; and the role of the military as a producer of geographic knowledge. All coalesced quickly but were not granted scientific importance until after 1945.

Gruber’s reports also paralleled those of U.S. Army Air Corps Chief H. H. (Hap) Arnold, who had toured Alaska in 1940. In a summary for the large readership of *National Geographic*, he noted that whereas the United States had long held garrisons in “the Tropics . . . we have had meager experience in military operations in the Frigid Zone.” Alaska was a “high priority” for Arnold, who recognized that as northern bases were established to transport Lend-Lease material overseas, American military officials needed to “know considerably more than we did” about the territory, especially because “the salient principles held true for all Arctic regions.” He demanded preparation of a manual-sized version of the explorer Vilhjalmur Stefansson’s fifteen-volume report on Arctic aviation—itsself commissioned by Arnold’s predecessor Oscar Westover. But Arnold’s main concern was “men who had lived in the Arctic” and the knowledge they could provide on living and warring there.²⁸

Arnold’s anxieties gained urgency when the Aleutian Islands became another World War II front in 1942. Although the Army’s Office of the Surgeon General had initiated field studies on clothing and other aspects of Arctic operations that year, hundreds of “unnecessary” cold injuries on the island of Attu in 1943 exposed military inadequacies. On the eve of the war, the descriptions in military manuals of appropriate cold-weather equipment and measures to prevent cold-weather injuries were “superficial.” Notable northern adventurers such as Stefansson, Bradford Washburn, and Hubert Wilkins were recruited by the Army’s Quartermaster Corps (QMC) to craft a “comprehensive research and development program capable of meeting the fighting man’s needs in both mountain

²⁶ Galen Roger Perras, *Stepping Stones to Nowhere: The Aleutian Islands, Alaska, and American Military Strategy, 1867–1945* (Vancouver: Univ. British Columbia Press, 2003), p. 30 (quoting Mitchell). See also John J. Teal, Jr., “Alaska, Fulcrum of Power,” *Foreign Affairs*, 1948, 27:86–95, esp. p. 89.

²⁷ Perras, *Stepping Stones to Nowhere*, p. 53 (quoting Davis). Gruber’s dispatch is quoted in Ruth Gruber, *Witness: One of the Great Foreign Correspondents of the Twentieth Century Tells Her Story* (New York: Schocken, 2007), p. 36. See also Perras, *Stepping Stones to Nowhere*, p. 52.

²⁸ Major General H. H. Arnold, “Our Air Frontier in Alaska,” *Nat. Geogr.*, Oct. 1940, p. 488; and Arnold, *Global Mission* (New York: Harper, 1949), pp. 211–212. The fifteen-volume report is in the Stefansson Collection at the Air Force Historical Research Agency, Maxwell Air Force Base, Alabama (hereafter **AFHRA**). See also Vilhjalmur Stefansson, “Routes to Alaska,” *For. Affairs*, 1941, 19:861–869.

and cold weather environments.”²⁹ But while wartime Alaska “seethed with activity,” most of the more formal cold-climate military research was initiated elsewhere, at facilities such as Fort Knox and the QMC’s new Climatic Research Laboratory in Lawrence, Massachusetts. Concurrently, a group of explorers, scientists, and bureaucrats formed the Arctic Institute of North America as a clearinghouse for northern advocacy and scholarship—including inquiries backed by Canadian and American military funding.³⁰

While World War II certainly prompted a number of crucial investigations into cold-weather operations, it should be stressed that military interest in northern knowledge hardly dissipated with the end of the conflict. In 1946 Arnold’s successor Carl Spaatz stated that “the development of the Arctic front is our primary operational objective.” And within a year, substantial military research on this “front” was being conducted *in* Alaska; recruitment of indigenous Alaskans for such research was under way by the end of the decade. Long a “forgotten corner,” John J. Teal, Jr., wrote in a 1948 issue of *Foreign Affairs*, Alaska’s location “near the center of the earth’s land mass” had been brought into focus by a global war and the age of air power. Teal claimed that the newly established Alaska Command (ALCOM) would be unable to prevent a single battalion from tipping the territory into enemy hands. But both invaders and defenders, he acknowledged, would have to contend with the special challenges of northern warfare.³¹

Teal’s doubts appear to have been hastily formed.³² The creation of ALCOM in 1947 guaranteed the standing of the Army’s Fort Richardson and the Air Force’s Elmendorf Air Force Base, both just outside of Anchorage, and ensured “the future of Alaska’s largest city as a military headquarters.” Military personnel were deployed north once more. By 1952, the Department of Defense employed over half of the territory’s workforce, including many civilians. Around Fairbanks, this meant the expansion of Ladd Air Force Base (called Ladd Field before September 1947) and Eielson Air Force Base, a Ladd satellite enlarged to accommodate long-range bombers. While mining and fishing industries slumped, economic growth was driven by a huge infusion of military money—an average of \$250 million per year from 1949 to 1954. One result was the intensification of settlement along the central “railbelt” between Anchorage and Fairbanks, housing for a new generation of “urban-industrial” residents who sought “southern” amenities and lifestyles.³³ But as the anthropologist Diamond Jenness noted, the militarization of Alaska

²⁹ Michael Sfraga, *Bradford Washburn: A Life of Exploration* (Corvallis: Oregon State Univ. Press, 2004), pp. 99, 101. This biography also contains a lengthy discussion of Washburn’s repeated use of Alaska’s Mt. McKinley (Denali) as a laboratory for geographic experimentation—often at the behest of or aided by the military. Regarding clothing and cold injury in World War II see Col. Tom F. Whyne, “Clothing,” in *Preventive Medicine in World War II*, Vol. 3: *Personal Health Measures and Immunization*, ed. Ebbe Curtis Hoff (Washington, D.C.: Office of the Surgeon General, Department of the Army, 1955), <http://history.amedd.army.mil/booksdocs/wwii/PrsnHlthMsr/chapter3.htm> (accessed 20 May 2012).

³⁰ Diamond Jenness, *Eskimo Administration*, Vol. 1: *Alaska*, Technical Paper 10 (Montreal: Arctic Institute of North America, July 1962), p. 39. On research at Fort Knox and Lawrence see *Symposium on Military Physiology* (Washington, D.C.: Research and Development Board, Dec. 1947). Regarding work at the Arctic Institute see Richard Foster Flint, “Arctic Institute of North America,” *Science*, 29 Sept. 1944, pp. 291–293.

³¹ Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945–1960* (Washington, D.C.: Office of Air Force History, 1990), pp. 57–58 (quoting Spaatz); and Teal, “Alaska, Fulcrum of Power” (cit. n. 26), p. 86.

³² Thomas O. Blakeney, “The Security of Alaska and the Tundra Army,” *Military Review*, 1952, 32:3–12; and George W. A. Beyer, “Alaska—Barrier or Gateway?” *ibid.*, 1953, 33:35–44.

³³ Whitehead, “Alaska and Hawai’i” (cit. n. 12), pp. 195–198; William R. Hunt, *Alaska: A Bicentennial History* (New York: Norton, 1976), p. 114; Claus-M. Naske and Herman E. Slotnick, *Alaska: A History of the Forty-ninth State*, 2nd ed. (Norman: Univ. Oklahoma Press, 1987), p. 131; Haycox, “View from Above” (cit. n. 14), p. 147; and Blackford, *Pathways to the Present* (cit. n. 15), p. 102.

also “provoked a grave upheaval in the Eskimo settlements,” whether in the restriction of mobility or the opportunities and challenges presented by new forms of wage employment. In sum, when a forty-ninth star was added to the American flag in 1959, it represented the country’s first “defense state.”³⁴

Cold War Alaska boosters invoked a tradition of northern exploration while simultaneously contrasting such individual pursuits with the systematic effort that was required to include the territory, and the Arctic as a whole, within the “frontiers of knowledge.” Backed by the National Academy of Sciences and the National Research Council, the first Alaskan Science Conference in November 1950 signaled the arrival of this new approach. Speakers in the opening session included Alaska’s territorial governor, Ernest Gruening; representatives from the U.S. Departments of Commerce, Defense, and the Interior; and officials from the Smithsonian Institution and the Arctic Institute of North America.³⁵ A number of more specialized military-sponsored symposia were subsequently held on “environmental physiology” in cold environments. The AAL hosted several of these, including the fifth Macy Foundation Conference on Cold Injury in 1957.³⁶ But it was the 1950 event, held in Washington, D.C., that inaugurated an unprecedented synchronization of Alaskan inquiry and the formal recognition of military science already under way in the north. The proceedings of successive Alaskan Science Conferences are rife with presentations by military researchers. And their contributions were drawn together by a set of Alaska-based institutions established to address dilemmas that posed steep challenges for “American technical imagination and ingenuity” in the years after World War II.³⁷

THE AIR FORCE’S “COLD LABORATORY”

An official history of U.S. Army research on winter warfare in Alaska begins with a dreaded scenario: “Men become walking wounded without engaging a living foe.” Given the global “obligations” that have confronted American troops since the 1940s, the document continues, “the modern soldier must be able to adapt to any environment in which he is called upon to operate.”³⁸ In Alaska after World War II, the first response to this predicament was a pair of winter task forces, Frigid and Williwaw, whose exercises were held in “extreme cold” and “wet-cold” conditions, respectively. They were followed in 1949 by the establishment of an Arctic Test Branch at Big Delta (subsequently the Army’s Fort Greely), another World War II air field southeast of Fairbanks. Its location chosen owing to the variety of “ruggedly realistic” terrain, the Test Branch included an Arctic Indoctrination School that taught “living and movement under extreme arctic and

³⁴ Jenness, *Eskimo Administration*, Vol. 1 (cit. n. 30), p. 39; and Whitehead, “Alaska and Hawai’i.”

³⁵ John C. Reed, “The United States Turns North,” *Geogr. Rev.*, 1958, 48:321–335, on p. 321 (quotation); *Proceedings of the Alaskan Science Conference* (Washington, D.C.: National Research Council, Apr. 1951); and Reed and Harold J. Coolidge, “The Alaskan Science Conference,” *Science*, 2 Mar. 1951, pp. 223–227.

³⁶ M. Irene Ferrer, ed., *Cold Injury: Transactions of the Fifth Conference, March 10–15, 1957, Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska* (New York: Josiah Macy, Jr., Foundation, 1958). For an example of attention to a more specialized subject see Eldon W. Askew, “Cold Weather and High-Altitude Nutrition: Overview of the Issues,” in *Nutritional Needs in Cold and High-Altitude Environments: Applications for Military Personnel in Field Operations*, ed. Bernadette M. Marriott and Sydne J. Carlson (Washington, D.C.: National Academy Press, 1996), pp. 83–94, esp. p. 85.

³⁷ Hunt, *Alaska* (cit. n. 33), p. 113.

³⁸ “History of the Army in Alaska,” www.usarak.army.mil/main/ArmyInAk/armyinalaska.htm (accessed 15 July 2009). For the designation “Cold Laboratory” see Channing Murray, *History of the Arctic Aeromedical Laboratory, 1 January 1957–30 June 1957* (Alaskan Air Command, 1 Oct. 1957), File K484.7401, AFHRA, p. 1.

subarctic conditions to personnel from all branches of the armed services.”³⁹ At Fort Greely and the adjacent Gerstle River Test Site, activities eventually included field tests with equipment ranging from “sleeping bags and tents to mortars and tanks,” but also experiments with chemical and biological weapons.⁴⁰

The establishment of the Test Branch in 1947 was matched by the opening of two Alaskan facilities for the scientific study of the north. In Barrow, the Naval Arctic Research Laboratory, operated by the Office of Naval Research, was concerned overwhelmingly with basic science.⁴¹ Its initiatives in “expeditionary physiology,” led by the distinguished scientist Laurence Irving, mostly targeted animals, but with an eye to the broader question of “physiological reactions to difficult conditions.”⁴² The other was the Air Force’s Arctic Aeromedical Laboratory. Launched in March 1947 at the School of Aviation Medicine at Texas’s Randolph Air Force Base, and then moved in August to Ladd Field, the AAL pursued a series of diverse and unusual experiments on cold-weather warfare until 1967.⁴³ After twenty years in Alaska, its functions and records were moved back to Texas, this time to Brooks Air Force Base; the AAL’s Fairbanks facilities were occupied by a new Arctic Medical Research Laboratory, a subsidiary of the Army Research Institute of Environmental Medicine, based in Natick, Massachusetts.⁴⁴

Between 1947 and 1961, when it was transferred to the Army and renamed Fort Wainwright, Ladd was home to an impressive array of missions related to the Air Force presence in northern Alaska. It was the staging point for Task Force Frigid, a test of clothing and equipment in the winter of 1947 that concluded with the “halting of a theoretical enemy bent on capturing high ground commanding Fairbanks and the surrounding territory.” According to a history of the base, “men from Ladd laid some of the groundwork of the early Cold War with strategic reconnaissance and Arctic research projects.” This position of science as “one of the battlefronts of the Cold War” was particularly clear in the case of the AAL, where specific Air Force interests in Alaska, including the survival and recovery of downed airmen and the maintenance of planes, could be extended to encompass “the health and combat efficiency of military personnel

³⁹ Major Hal D. Steward, “The Army in the Arctic,” *Coast Artillery Journal*, Mar.–Apr. 1947, pp. 37–40, on p. 37; “U.S. Army Cold Regions Test Center—History,” www.crtc.army.mil/history.asp (accessed 20 May 2012); Safford, “Look to the North” (cit. n. 1), p. 68; and “History of the Army in Alaska.”

⁴⁰ Richard A. Fineberg, *The Dragon Goes North: Chemical and Biological Warfare Testing in Alaska* (Santa Barbara, Calif.: McNally & Loftin, 1972), p. 86. “Some soldiers in Alaska and other states who engaged in chemical and biological weapons testing in the 1960s may not have been fully informed about the secret experiments”: Matt Kelley, “GIs, Public Used in ‘60s-Era Tests,” *Anchorage Daily News*, 10 Oct. 2002, p. A1.

⁴¹ John C. Reed and Andreas G. Ronhovde, *Arctic Laboratory: A History (1947–1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska* (Washington, D.C.: Arctic Institute of North America, 1971).

⁴² Laurence Irving, “Measurement of Some Physiological Reactions to Arctic Conditions,” *Annals of the New York Academy of Sciences*, 1950, 51:1045–1050, on p. 1045. A decade later, having moved to Anchorage to become chief of the Arctic Health Research Center’s Physiology Section, Irving did contribute to studies on responses to cold among Alaskan Natives. See, e.g., Robert W. Elsner *et al.*, “Circulation of Heat to the Hands of Arctic Indians,” *Journal of Applied Physiology*, 1960, 15:662–666.

⁴³ Robert C. Gibbs, *History of the Arctic Aeromedical Laboratory, 1 July 1957–31 December 1957* (Alaskan Air Command, 15 Apr. 1958), File K484.7401, AFHRA, p. 6. Ladd Field was also the home of the Army Air Corps Cold Weather Experimental Station, which opened in 1940, but it focused on “the operation of aircraft in cold climates”: David J. Chesnut and Paul R. Kaufman, *The Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967* (Maxwell AFB, Alaska, May 1981), p. 1; and *Report on Search for Human Radiation Experiment Records, 1944–1994*, Vol. 1 (cit. n. 5), p. 45.

⁴⁴ This new laboratory opted for a more narrow focus on “cold injury.” See *Northern Libraries Bulletin*, 1972, 2:5; and Ralph Francesconi *et al.*, “United States Army Research Institute of Environmental Medicine: First Quarter Century,” *Physiologist*, 1986, 29(Suppl.):58–62.

in arctic climates.”⁴⁵ But the AAL’s early years were marked by bureaucratic uncertainty and struggles to gain funding and supplies. Even as late as 1957, an internal history stated plainly that “civilian scientists are very reluctant to move to Fairbanks,” citing the cost of living, inadequate accommodation, and “the long severe winters.” And a retrospective Air Command and Staff College study described a “lack of qualified personnel and a severely restricted budget.”⁴⁶

However, in its second winter at Ladd, the laboratory was depicted by Ben Pearse in the *New York Times Magazine* as a vital purveyor of fresh geographic knowledge. Whereas the Army Medical Library in Washington contained “thousands of volumes” on tropical subjects, “all the books, bulletins, pamphlets and reports on what is coming to be known as Arctic medicine could be carried in one arm.” The AAL was accorded special status as a Department of Defense agency devoted to “the immediate problems of its own forces in the field.” And the results of its early studies were proving that “what little we knew about the effect of cold on the human body was folklore, and most of that was fallacy.” Citing AAL successes, Pearse refuted several of these fallacies, including the idea “that persons from northern climates have any inherent adaptability or resistance to cold,” but he also affirmed the overarching mystery of cold environments. One “line of attack” under consideration was a thyroid injection that could stimulate heat production. Although he admitted that “administering thyroid tablets to large bodies of troops is obviously out of the question,” Pearse—who had served in Alaska during World War II—still concluded by dreaming of a day when “no one will have to worry about the cold.” This included truck drivers, football fans, and hunters, because the lab’s research, while portrayed as unusual, was simultaneously marketed as useful for civilians.⁴⁷

At the closing session of the first Alaskan Science Conference, Captain Ernest McCollum described the AAL as “the medium through which . . . material is field tested and evaluated,” but clearly *Alaska* was the true medium. As early as 1950, the lab had conducted studies at some twenty-five Alaskan locations. And its mandate continued to expand, aided by the familiarity of AAL staff, as McCollum put it, “with local conditions and people and *with the Territory itself*.” By February 1955, the initial Quonset huts had been replaced by a complex of buildings and facilities devoted to “human factor problems” in the north (see Figure 2).⁴⁸ At the end of that year, the laboratory employed sixty personnel. And the barrier between lab and land was porous: “as the lab staff pointed out, all of Alaska and even the Arctic basin were extensions of the lab due to its emphasis on studying actual field conditions.”⁴⁹ While this is

⁴⁵ Frederick Graham, “Task Force Frigid Repulses ‘Enemy,’” *New York Times*, 25 Jan. 1947, p. 8; and Murray, *History of the Arctic Aeromedical Laboratory, 1 January 1957–30 June 1957* (cit. n. 38), p. 1. See also Chesnut and Kaufman, *Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967* (cit. n. 43), p. 28.

⁴⁶ Gibbs, *History of the Arctic Aeromedical Laboratory, 1 July 1957–31 December 1957* (cit. n. 43), p. 10 (unsurprisingly, this document does not mention the potential reluctance of civilians to work for the military); and Chesnut and Kaufman, *Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967*, p. ii. For more on the difficulties of the AAL’s early years see *ibid.*, p. 3; and Kathy Price, *Northern Defenders: Cold War Context of Ladd Air Force Base, Fairbanks, Alaska, 1947–1961* (Fort Collins, Col.: Center for Ecological Management of Military Lands, Jan. 2001), pp. 26–27.

⁴⁷ Ben Pearse, “How to Live at 35 Below,” *New York Times Magazine*, 13 Mar. 1949, pp. 19, 24–25.

⁴⁸ Captain Ernest L. McCollum, “The Arctic Aeromedical Laboratory at Fairbanks,” in “Proceedings of the Alaskan Science Conference of the National Academy of Sciences–National Research Council, Washington, November 9–11, 1950,” *Bulletin of the National Research Council*, 1951, 122:171–174, on pp. 172–173 (emphasis added); and Robert E. Hedblom, *History of the Arctic Aeromedical Laboratory, 1 January 1956–30 June 1956* (Alaskan Air Command, 1 Nov. 1956), File K484.7401, AFHRA, p. 1 (replacement of Quonset huts). See also *The Arctic Aeromedical Laboratory: Its History, Mission, Environment* (Fort Wainwright, Alaska, 1961), n.p.; and Price, *Northern Defenders* (cit. n. 46), p. 27.

⁴⁹ Hedblom, *History of the Arctic Aeromedical Laboratory, 1 January 1956–30 June 1956*, p. 3 (personnel



Figure 2. Former site of Arctic Aeromedical Laboratory, Fort Wainwright, Alaska, Summer 2000. From Kathy Price, *Northern Defenders: Cold War Context of Ladd Air Force Base, Fairbanks, Alaska, 1947–1961* (Fort Collins, Col.: Center for Ecological Management of Military Lands, Jan. 2001), p. 27. Reproduced with permission from the CEMML.

not a particularly surprising statement, it does confirm the degree to which the “Territory itself” was perceived as a space for conducting military science—science, that is, with explicitly “practical” implications.

As Robert Kohler has written, what gives modern laboratories power is “their separation from the world of nature . . . their generic placelessness.” But this separation is a fiction: “laboratory thresholds are designed less to keep nature out, and workers in, than to regulate the traffic between lab and nature on terms favorable to those inside.”⁵⁰ While the AAL was firmly *placed* in central Alaska, this status could be made generic by emphasizing the homogeneity of a vast Arctic region. Still, the decision to situate it in Alaska was clearly made to bring lab and field closer together. The exceptional combination of location and distinction—in Alaska but also built to simulate “Alaska”—may have contributed to the hubris that subsequently tarnished its record of research.

That AAL science was steeped in militarization is demonstrated by its Research Division’s durable departments. Environmental Medicine “focused mainly on diseases, preventive medicine, and sanitation”—areas of study that blended conveniently with research on chemical and biological agents. Biochemistry employees “investigated biochemical responses to cold, cold weather metabolism, and developed and tested cold weather rations.” In Psychology, the emphasis was on such challenges as “the vigilance of radar scope operators, the effects of cold on mental performance, the problems of isolation at remote duty stations,” and the general state of morale in northern military facilities. The Department of Protective Equipment designed and field-tested clothing and supplies. Finally, scientists in Physiology studied acclimatization and exposure, which led them to the controversial recruitment of Alaskan Natives, but also conducted animal studies and trials with soldiers.⁵¹ The overall goal, it seems, was to obtain a full picture of

expansion); and Price, *Northern Defenders*, p. 27 (quotation). The locations of AAL field sites “covered virtually the entire state of Alaska”: Chesnut and Kaufman, *Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967* (cit. n. 43), pp. 32, 48–49.

⁵⁰ Kohler, “Labsapes” (cit. n. 1), pp. 473, 476.

⁵¹ Price, *Northern Defenders* (cit. n. 46), pp. 27–28; W. C. Herbert, *History of the Arctic Aeromedical Laboratory, 1 July 1956–31 December 1956* (Alaskan Air Command, 1 Apr. 1957), File K484.7401, AFHRA, pp. 8–49; and *Arctic Aeromedical Laboratory* (cit. n. 48).

human–environment interaction in the north, where the two elements were set up as oppositional—or, in the case of indigenous Alaskans, one and the same.

“A MAN ENJOYING A WORLD-WIDE REPUTATION”

While the historical literature on military activity in the Arctic after World War II is not substantial, it is still surprising that so little has been written about Kaare Rodahl, one of the most important northern scientists of the period.⁵² During the 1950s, first as Chief of the Department of Physiology (1950–1952) and then as the Director of Research (1954–1957) at the AAL, Rodahl and his collaborators published numerous scholarly articles. But unlike most AAL employees, he also authored popular accounts of his northern exploits.

In 1943, at the age of twenty-five, Rodahl addressed a meeting of Britain’s Royal Geographical Society. He recounted ten months of research, in 1939 and 1940, in northeastern Greenland, where he studied local nutrition and assisted the glaciologist Hans Ahlmann. This trip marked Rodahl’s introduction to the Inuit, whom he described as “specialized and adapted” to a northern environment. But they were also threatened by the addition of carbohydrates to their regular diet, “with the result that the Eskimo is becoming unsuited for the Arctic conditions under which he lives.” Thanking Rodahl for his lecture, the society’s president George Clerk added his hope that, “when this horrible war is over,” Rodahl would be able to “continue for very many years those researches which I am certain will prove of the greatest value.” Such anticipation was well founded, but Rodahl was certainly distracted by the war. Stranded in Britain after the German occupation of his country, he became a parachutist, one of the several thousand Norwegians fighting for national liberation from across the North Sea.⁵³

By 1950 Rodahl had obtained both an M.D. and a D.Sc. at Oslo’s Institute of Physiology. He had also begun to share the results of his research on nutrition with the U.S. Air Force. This consulting work took him to Alaska, where he was “impressed with the opportunities for medical research” amongst “several interesting ethnic groups . . . and above all, excellent resources for the support of field studies.” For such an adventurous scholar, Alaska had already assumed the status of a laboratory. When Rodahl received a telegram from Washington in the summer of 1950, inviting him to develop the AAL’s Department of Physiology, he was delighted.⁵⁴

Rodahl’s 1963 memoir *The Last of the Few* discusses some of his AAL work on acclimatization. If this process was possible, he hypothesized, then “one would expect the Eskimos, who have been exposed to the Arctic environment for generations, to be acclimatized. It would therefore be very logical to start our inquiry . . . with a broad survey of the physiology of the Eskimos.” The first site for this inquiry was the village of Kaktovik, on the Arctic Ocean near the Canadian border, where a small air base made the

⁵² The quotation in the subhead comes from Chesnut and Kaufman, *Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967* (cit. n. 43), p. 27.

⁵³ Kaare Rodahl, “The Swedish-Norwegian Expedition to North-East Greenland,” *Geographical Journal*, 1943, 102:97–116, on pp. 114, 116. On Ahlmann see Sverker Sörlin, “Narratives and Counter-narratives of Climate Change: North Atlantic Glaciology and Meteorology, c. 1930–1955,” *J. Hist. Geogr.*, 2009, 35:237–255.

⁵⁴ Kaare Rodahl, *The Last of the Few* (New York: Harper & Row, 1963) (hereafter cited as **Rodahl, Last of the Few**), pp. 6–8. Rodahl’s first name is spelled Kåre in his Norwegian publications. He died in 2008. Interestingly, Rodahl is not listed in the index of Einar-Arne Drivenes and Harald Dag Jølle, eds., *Into the Ice: The History of Norway and the Polar Regions* (Oslo: Gyldendal Norsk Forlag, 2006).

community accessible and where the chief, Akiviak, “was known as an outstanding individual whose co-operation we could count on.” Having deposited their equipment at the base, “the scientists approached the people of the Stone Age.” Thus began, in 1950, a long-term project that, while hardly the first endeavor in the human sciences to inspect northern indigenous bodies, was remarkably invasive and wide ranging. Using the Ladd facilities for comparative evaluation of “white controls” and scrutiny of data, AAL staff “would establish complete field laboratories for systematic studies of the people in their natural habitat.” Some of these individuals were then flown to Fairbanks for additional scrutiny, fed a “white man’s diet” and observed in a cold chamber.⁵⁵ The identification of white “controls” and “diet,” which were common features in AAL experiments, suggests not only a racial norm against which others were differentiated but also an affinity between whiteness and the scientific spaces of the laboratory.

Rodahl’s Air Force affiliations were critical to his transformation into an Arctic authority. As the title suggests, his book *North: The Nature and Drama of the Polar World*, published in 1953, was crafted for a general audience, at a time when demand for information on the region was surging. The narrative begins with the dramatic 1952 Air Force landing on ice island T-3 near the North Pole. Rodahl used his role in the operation to set the stage for his “attempt to draw a picture, as we know it today, of the Polar Basin.” This was a common approach to the presentation of northern expertise in the 1950s: specific missions led to general conclusions, and the military dimensions of those missions were downplayed or normalized as necessary for a full understanding of “the Arctic.”⁵⁶

North contains chapters on ice, biology, and resources, and the second half of the book is a detailed narrative of Project Icicle, the ice island expedition. But *North*’s centerpiece is a long chapter on “human factors.” This was a telling title, referencing a young interdisciplinary subject closely related to the equally nascent fields of cybernetics and systems analysis. All three were concerned with the increasingly tangled affiliations between humans and machines. For Rodahl, the study of human factors was also part of a larger project: “the conquest of the polar regions.” And in this campaign, which was at once scientific and geopolitical, “man” was the “limiting factor.” Rodahl was hardly the only Arctic observer who used the language of frustrated mastery during the 1950s; its prevalence is a sign that the region had become an object of sustained contemplation and that the long colonial history of the north had entered a new phase.⁵⁷

Whereas machines and equipment could be adjusted during northern travels, Rodahl wrote, “man himself cannot change physiologically beyond certain definite limits.” These boundaries were narrowed further by the “merciless” Arctic environment, and he invoked a tragic history of “northward expansion” to bolster this claim. However, a new approach to the body—or, as he put it, the “human machine”—was yielding a more complete understanding of acclimatization. Even if a successful existence in the north depended

⁵⁵ Rodahl, *Last of the Few*, pp. 8, 15, 21; and Kaare Rodahl, *North: The Nature and Drama of the Polar World* (New York: Harper, 1953), p. 88. For earlier examples of scientific efforts to study northern indigenous bodies see Shari M. Huhndorf, “Nanook and His Contemporaries: Traveling with the Eskimos, 1897–1941,” in *Going Native: Indians in the American Cultural Imagination* (Ithaca, N.Y.: Cornell Univ. Press, 2001), pp. 79–128.

⁵⁶ Rodahl, *North*, p. xii. On this approach to the presentation of northern expertise see Matthew Farish, “Frontier Engineering: From the Globe to the Body in the Cold War Arctic,” *Canadian Geographer*, 2006, 50:177–196. For media coverage of the landing on T-3 see “Arctic Outpost,” *Time*, 31 Mar. 1952, www.time.com.

⁵⁷ Rodahl, *North*, pp. 74–75; and Farish, “Frontier Engineering.” On the entanglement of humans and machines more generally see Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge: Cambridge Univ. Press, 2002).

heavily on “know-how, environmental protection and proper diet,” all of which were important to the work of the AAL, it was acclimatization and related physiological questions that fascinated Rodahl.⁵⁸

Fieldwork in Kaktovik suggested to Rodahl that village residents “had a significantly higher rate of body heat production than normal whites.” The reasons were initially unclear. By 1952 his team had concluded that “there are no racial differences between the Eskimo and the whites in heat production,” but this result did not convince him or his colleagues to abandon racial categorization or the research methods that it shaped. Physiological studies at the AAL were consistently premised on distinctions between indigenous northerners and “modern man” aided by “modern technical support.” And while learning “from the Eskimo’s wisdom” was certainly important, Rodahl quickly indicated that this knowledge, distilled through conventional anthropological interaction and observation, was inadequate. The extent of “white man’s ambitions” meant that more was required to “exploit the arctic regions.”⁵⁹ The answer to this demand was an equally modern form of science that would establish not only the characteristics necessary to battle northern nature but also who, among the American armed forces, was best suited to the fight. And this authoritative science could be produced only within the “truth-spots” of the laboratory and its outposts.⁶⁰

Unsurprisingly, Rodahl’s human factors chapter in *North* ends with a list of priorities that closely matched the program of the AAL. This was not work that would aid exploration as it was classically defined—that era was over. Instead, a blend of familiar field studies and novel “highly technical laboratory research” was essential to the conquest of the Arctic. The need for laboratory facilities in the north and the need for the north to be formally treated as a laboratory were inseparable. But there was an irony in this distillation of the “search for new knowledge in a virgin field of science”: even as indigenous Alaskans were understood to have adapted effectively to a hostile polar world, determining why this was so meant removing them from such environmentally alien and culturally “traditional” circumstances.⁶¹ Enrolling them in experiments was thus a form of modernization—and, for Rodahl, a more suitable form than the undisciplined changes that he observed in northern communities.

The collective interest at the AAL in the Arctic as a landscape for living, working, and warring produced a remarkable array of activity. Laboratory staff staged survival treks, examined hibernating animals, studied snow shelters, tested a cold-weather garment dubbed the “walk-around sleeping bag” (see Figure 3 and Frontispiece), and conducted detailed mental health surveys pertaining to indoctrination and isolation. The official Ladd base history describes innovations in clothing, equipment, and medicine and notes the regular participation by laboratory personnel in the annual Alaskan Science Conferences. But the document also mentions the “substantial ethical questions and cross-cultural issues” generated by the I-131 tests.⁶²

⁵⁸ Rodahl, *North*, pp. 74, 78–79, 83.

⁵⁹ Rodahl, *Last of the Few*, p. 39; and Rodahl, *North*, pp. 88, 109. For Rodahl’s early conclusions on the absence of racial differences in heat production see Kaare Rodahl, “Basal Metabolism of the Eskimo,” *Journal of Nutrition*, 1952, 48:359–368.

⁶⁰ Thomas F. Gieryn, “Three Truth-Spots,” *Journal of the History of the Behavioral Sciences*, 2002, 38:113–132; and Kohler, “Lab History” (cit. n. 18).

⁶¹ Rodahl, *North* (cit. n. 55), p. 110.

⁶² Price, *Northern Defenders* (cit. n. 46), p. 28. This activity at the AAL is summarized in *Arctic Aeromedical Laboratory* (cit. n. 48). See also Ned Rozell, “Northern Lab Cranked Out the Quirky and Controversial,” *Alaska Science Forum*, 7 Oct. 2004, <http://www2.gi.alaska.edu/ScienceForum/ASF17/1719.html> (accessed 20 May



Figure 3. An Arctic Aeromedical Laboratory experiment with a “walk-around sleeping bag.” From Harvey A. Buskirk, *Walk-Around Sleeping Bag*, Technical Report 59-4 (Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, Apr. 1959), p. 10.

After a stint in Oslo, where he completed *North*, Kaare Rodahl returned to Alaska as the AAL’s Director of Research. He was the lead author of Arctic Aeromedical Laboratory Technical Report 57-36, *Thyroid Activity in Men Exposed to Cold*, which details the iodine-131 experiments.⁶³ The thyroid was chosen because other research, including some conducted at the AAL, had demonstrated a correlation between severe cold and increased thyroid activity in animals, shown that the thyroid was somehow involved in human acclimatization, and suggested that Alaskan Natives had “elevated basal metabolism”—namely, “the amount of energy needed to maintain essential basic body functions.” After the administration of tracer doses to subjects, the levels of I-131 in their blood, saliva,

2012); and Harvey A. Buskirk, *Walk-Around Sleeping Bag*, Technical Report 59-4 (Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, Apr. 1959).

⁶³ Rodahl and Bang, *Thyroid Activity in Men Exposed to Cold* (cit. n. 5). Rodahl’s coauthor Gisle Bang, who did much of the fieldwork in northern communities, was also a Norwegian physician.

thyroid, and urine were analyzed. The result was disappointing: the thyroid, Rodahl summarized, “does not play any significant role in human acclimatization to the arctic.” This conclusion, which “did not support the findings of earlier studies,” was subsequently refuted by other researchers.⁶⁴

When questioned much later as part of the NRC investigation, Rodahl maintained that subjects were recruited through village elders and were offered the opportunity to exit the study.⁶⁵ (*The Last of the Few* mentions a contrasting group of recruiters for the 1950–1952 AAL studies: ministers and schoolteachers.⁶⁶) The NRC committee concluded that the use of I-131 “was scientifically reasonable for the standards of the time” but was deeply problematic from the perspective of medical ethics. But the July 1994 Fairbanks public hearing and interviews in two communities also revealed “widespread frustration, and even rage,” among Alaskan Natives at “what was done to them during this and other past research.”⁶⁷ This generalization—including “other past research”—is understandable, not least because it mirrored the way in which AAL scientists, and those who sponsored their work, derived sweeping conclusions from specific experiments.

Administering I-131 was one of many methods deployed to understand the physiology of the (singular) Eskimo as a gateway to military success in the north. Laboratory scientists, like those employed on AEC radiation projects, were preoccupied by racialized, *different* bodies. AAL journal publications such as “Racial Variations to a Standardized Cold Stress” described the recruitment of “Negro” and “Caucasian” soldiers, but also several “Eskimo subjects . . . obtained from Anaktuvuk Pass.” Quite aside from the strict racial divisions rendered as science, the use of words such as “obtained” and “standardized” hints at the projection and production of Alaska itself as a laboratory. Speaking to the NRC Committee, Rodahl claimed that his thyroid experiments had been approved by both the “base commander” in Fairbanks and at “headquarters in Washington.”⁶⁸ Scientific motives, no matter how flawed, were never far removed from the broader project of Cold War militarization.

Rodahl was sensitive to the various “conditions of entirely different nature” across the

⁶⁴ *Report on Search for Human Radiation Experiment Records, 1944–1994*, Vol. 1 (cit. n. 5), p. 46; and Rodahl and Bang, *Thyroid Activity in Men Exposed to Cold*, pp. 80–81. For the refutation of the conclusion that the thyroid did not play a role in acclimatization to the Arctic see *Report on Search for Human Radiation Experiment Records, 1944–1994*, Vol. 1, p. 47; and Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹, *Arctic Aeromedical Laboratory’s Thyroid Function Study* (cit. n. 7), p. 21.

⁶⁵ Rodahl admitted to the NRC that he did not use the word “radiation” in conversations with the English-speaking elders who recruited subjects. And subsequent medical care in home villages, he claimed, was delegated to the Alaska Native Service (part of the Bureau of Indian Affairs). But indigenous witnesses before the NRC Committee “could not recall any follow-up visits by physicians”: *ACHRE Report*, Ch. 12.

⁶⁶ Rodahl, *Last of the Few*, p. 43. In Anaktuvuk Pass, recruitment was haphazard: after confirming with the first man they met that their proposal “was in order,” Rodahl’s team “selected four of the healthiest-looking men to take back to Fairbanks. The postmaster was one of them, but he said he had to ask his wife first. The rest of them had no reservations. The pilot gave them an hour to get ready.” *Ibid.*, pp. 101–102.

⁶⁷ Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹, *Arctic Aeromedical Laboratory’s Thyroid Function Study* (cit. n. 7), pp. 3, viii. See also Hummel, “U.S. Military as Geographical Agent” (cit. n. 11), pp. 64–65; and “Eskimos Seek Redress for Cold War Medical Tests,” *Reuters*, 1 Feb. 1997, www.thepeoplespaths.net/news/alaska.htm (accessed 20 May 2012). A provisional agenda for the hearing is at www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet12/brief12/tab_g/br12g1a.txt (accessed 20 May 2012).

⁶⁸ Harriett A. Washington, *Medical Apartheid: The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present* (New York: Doubleday, 2006), p. 218 (preoccupation with racialized bodies); Thomas Adams and Benjamin G. Covino, “Racial Variations to a Standardized Cold Stress,” *J. Appl. Physiol.*, 1958, 12:9–12, on p. 9; and *ACHRE Report*, Ch. 12.

Arctic, but he did not fully extend such a distinction to the human inhabitants of the north. When describing the observation of subjects drawn from the military, he was careful to stress the importance of “environmental control,” noting that temperatures in living and sleeping quarters were kept consistent. However imperfect, this sort of management was not easily transferred to the villages visited by Rodahl and his team. The solution was to generalize “Eskimo” into a comprehensive, “biologically discrete” category.⁶⁹

As Susan Smith writes in reference to World War II studies of mustard gas, “scientists slipped into investigating racial differences without interrogating what they were actually measuring when they tested subjects by ‘race.’” Likewise, AAL researchers were not just invoking race as a variable; they were also constructing it as a powerful concept. While other scholars in the human sciences were backing away from simplistic racial categories, and even working to “oppose racial topologies,” the AAL, an organization that held both scientific and military authority, was perpetuating such formations of knowledge—and doing so from the sanctity of a standardized laboratory “microworld.”⁷⁰

The production of racial difference persisted at the AAL for multiple reasons. Although Rodahl and his colleagues dismissed a fixed link between race and acclimatization—a hallmark of colonial era scientific racism—this was, on the whole, a narrow gesture.⁷¹ They were still focused on the combination of human and environmental distinction as a unified military/scientific concern. This approach is evident in the language and location of their academic publications, most notably the anodyne technical descriptions of experimental results sent to friendly periodicals such as the *Journal of Applied Physiology*.⁷² These were studies and sources that were epistemically detached from the concurrent tumult in genetics and cultural anthropology. Equally, while the Arctic was certainly a regional vessel for the blending of scholarly disciplines during the early Cold War, its apparent scientific and strategic exceptionality also served to detach northern research, particularly that work directly concerned with military operations, from disciplinary communities. Operational demands encouraged a search for what one history of physiology calls “knowledge of the physiological requirements of man in extreme climates.” This “pressing concern,” which influenced the education of many AAL scientists and was reinforced by Cold War imperatives, justified uncritical racial categorization and diminished individuals and communities by attaching them to a larger geopolitical project.⁷³ But while the AAL practiced a direct form of Cold War science, its work should not be treated as intellectually autonomous. “Expert knowledge,” writes Timothy Mitchell, “works to format social relations, never simply to report or picture them.”⁷⁴ Laboratory experiments

⁶⁹ Kåre Rodahl, *Nutritional Requirements under Arctic Conditions* (Oslo: Oslo Univ. Press, 1960), pp. 8–9, 29; and Johnston, “More Like Us Than Mice” (cit. n. 3), p. 44.

⁷⁰ Susan L. Smith, “Mustard Gas and American Race-Based Human Experimentation in World War II,” *Journal of Law, Medicine, and Ethics*, 2008, 36:517–521, on p. 517; Elazar Barkan, “Race and the Social Sciences,” in *The Cambridge History of Science*, Vol. 7: *The Modern Social Sciences*, ed. Theodore M. Porter and Dorothy Ross (Cambridge: Cambridge Univ. Press, 2003), pp. 693–707, on p. 701; and Joseph Rouse, *Knowledge and Power: Toward a Political Philosophy of Science* (Ithaca, N.Y.: Cornell Univ. Press, 1987).

⁷¹ For the colonial context see David N. Livingstone, “Human Acclimatization: Perspectives on a Contested Field of Inquiry in Science, Medicine, and Geography,” *Hist. Sci.*, 1987, 25:359–394.

⁷² The journal was founded in 1948.

⁷³ *A Century of American Physiology* (Bethesda, Md.: National Library of Medicine, 1987), n.p., www.nlm.nih.gov/hmd/pdf/century.pdf (accessed 20 May 2012). See also Kuletz, *Tainted Desert* (cit. n. 3); and Washington, *Medical Apartheid* (cit. n. 68).

⁷⁴ Timothy Mitchell, *Rule of Experts: Egypt, Techno-politics, Modernity* (Berkeley: Univ. California Press, 2002), p. 118. See also Joel Isaac, “Tangled Loops: Theory, History, and the Human Sciences in Modern America,” *Modern Intellectual History*, 2009, 6:397–424, esp. p. 407.

were credibly translated to larger audiences through academic journals and Rodahl's books, but also to military readers of AAL reports who were seeking a better understanding of the north as a site for war.

The Last of the Few, as the title indicates, is preoccupied with the dilution of "Eskimo blood." The book restages a familiar drama of indigenous degeneration in a new location and a new historical moment.⁷⁵ It was published during a period when "Americans for the most part [had] lost interest in Native peoples," despite the continuing, wrenching experiences of assimilation, relocation, and modernization for many indigenous communities. Rodahl wrote that his field research in Inuit settlements "would help us predict what the future has in store for their race."⁷⁶ If modern influences were dooming an older way of life, his task, as he saw it, was to learn more about Inuit bodies—bodies that contained the traces of a disappearing culture. But his work was not just predicting the prospects for indigenous Alaskans; it was shaping their future. For Rodahl, the solution to the plight of the Eskimo was the correct form of modernization, just as the military solution to the hostile Alaskan environment was the development of sophisticated technologies.

The Last of the Few depicts Rodahl as a thoughtful observer of Iñupiat life. Many chapters begin with scene-setting exercises in various communities. But they just as often conclude with a seamless transition from village to laboratory spaces, where, for instance, "we exposed nude Eskimos for several hours in a room where the temperature was only slightly above freezing while we recorded their metabolism, their body temperature, and the onset of shiver." This was a lighthearted, masculine affair: it "soon developed into a contest among the proud Eskimos to see who could stand the most cold without shivering."⁷⁷ Even if the ethical bases for such experiments were sound, Rodahl's interest in village culture still rubbed awkwardly against the AAL's mandate, and his attempt to position himself as *only* a provider of medical care, a witness to the tragedy of modernization, or a collector of scientific data on a vanishing race was misleading. It would eventually be vigorously challenged.

A GEOGRAPHICAL RESPONSE

The AAL's "experimental landscape" clearly included more than its Ladd facilities or its field camps. It was the understanding of Alaska as a laboratory that enabled such compromised inquiry to be presented as science far beyond the north. For instance, readers of the November 1957 issue of *Science Digest* found an excerpt from a July *New York Times* article documenting the laboratory's work on pills "that may increase resistance to cold." But the description of this specific project was accompanied by an acknowledgment that the lab was more broadly interested in "why some ethnic groups seem more resistant to cold than others"—even after studies of Inuit showed only that their "ability to endure

⁷⁵ Rodahl, *Last of the Few*, p. 189. On the "vanishing Indian" idea see Brian W. Dippie, *The Vanishing American: White Attitudes and U.S. Indian Policy* (Middletown, Conn.: Wesleyan Univ. Press, 1982).

⁷⁶ Huhndorf, "Nanook and His Contemporaries" (cit. n. 55), p. 127; and Rodahl, *Last of the Few*, p. 9. In Britain, Rodahl's title was changed to *Between Two Worlds: A Doctor's Log-book of Life amongst the Alaskan Eskimos* (London: Heinemann, 1964).

⁷⁷ Rodahl, *Last of the Few*, p. 52. For an example of later AAL research that used the same combination of nudity, cold, and racial categories see Adams and Covino, "Racial Variations to a Standardized Cold Stress" (cit. n. 68).

extremely low temperatures seems based on acquired skills and excellently adapted clothing and diet.”⁷⁸

This approach to the AAL was consistent with contemporaneous media representations of radiation experiments as noble, volunteer-driven, exciting, and wholly acceptable ordeals, yielding important knowledge for both military sponsors and the general public. If Alaska was understood as a space demanding additional investigation—in the name of science and security—then the rights of “a subject population of convenience,” as the NRC report described Alaskan Natives, were more easily constrained.⁷⁹

It is tempting to contrast the belated critique of the AAL with the successful campaign to stall Project Chariot’s Alaskan activities. The comparison is striking because, as Scott Kirsch has shown, in seeking to fashion “a new experimental space outside of their own laboratories,” Chariot scientists found the parameters of power shifting. They were successfully challenged by “those whose authority rested more firmly on the place itself or on knowledge of the place,” including the Point Hope community and dissident scholars from the University of Alaska. And yet Kirsch’s suggestive argument should not be limited to Chariot; it helps to explain the stirrings of formal resistance to militarization in 1960s Alaska but also the ways in which, as “subjects of theoretical knowledge,” indigenous Alaskans were *inevitably* challenging their definition from the very beginning.⁸⁰

Ten years after the publication of Kaare Rodahl’s infamous report, a similar initiative was proposed to the residents of Wainwright, Alaska, under the auspices of the International Biological Program (IBP) (1964–1974).⁸¹ A group of scientists attending an IBP conference at the Naval Arctic Research Laboratory traveled west to Wainwright in November 1967, where they met with the Village Council. The Barrow delegation was led by Frederick Milan, a longtime AAL employee who (with the closure of the facility) had recently moved to the University of Wisconsin. His AAL reports consistently adopted a race-based perspective on physiology and climate. According to his AAL colleague Robert Elsner, Milan had already established a “close association” with Wainwright, where his linguistic abilities “enabled him to gain the villagers’ confidence.”⁸² Milan had

⁷⁸ Kirsch, “Ecologists and the Experimental Landscape” (cit. n. 17); “Pills to Keep You Warm,” *Science Digest*, Nov. 1957, <http://blog.modernmechanix.com/pills-to-keep-you-warm/> (accessed 20 May 2012); and Walter Sullivan, “Air Force Tests Pill to Help Man Keep Warm under Icy Conditions,” *New York Times*, 23 July 1957, p. 29.

⁷⁹ Ruth R. Faden *et al.*, “U.S. Medical Researchers, the Nuremberg Doctors Trial, and the Nuremberg Code: A Review of Findings of the Advisory Committee of Human Radiation Experiments,” *Journal of the American Medical Association*, 1996, 276:1667–1671 (regarding contemporaneous media representations of radiation experiments); and Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹, *Arctic Aeromedical Laboratory’s Thyroid Function Study* (cit. n. 7), p. 130 (quotation).

⁸⁰ Scott Kirsch, *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (New Brunswick, N.J.: Rutgers Univ. Press, 2005), p. 116; and Isaac, “Tangled Loops” (cit. n. 74), p. 412. See also James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, Conn.: Yale Univ. Press, 1998).

⁸¹ Frederick A. Milan, “The International Study of Eskimos,” *Arctic*, 1968, 21:123–126; and Milan, “The Demography of Selected Circumpolar Populations,” in *The Human Biology of Circumpolar Populations*, ed. Milan (Cambridge: Cambridge Univ. Press, 1980), pp. 13–36. On the IBP see Joel Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology* (New Brunswick, N.J.: Rutgers Univ. Press, 1992), pp. 164–188; and Elena Aronova, Karen S. Baker, and Naomi Oreskes, “Big Science and Big Data in Biology: From the International Geophysical Year through the International Biological Program to the Long Term Ecological Research (LTER) Network, 1957–Present,” *Historical Studies in the Natural Sciences*, 2010, 40:183–224.

⁸² Robert Elsner and Frank P. Pauls, “Frederick A. Milan (1924–1995),” *Arctic*, 1995, 48:310–311; and Frederick A. Milan, *Observations on the Contemporary Eskimo of Wainwright, Alaska* (Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, 1958). For other work by Milan see Milan, *A Study of the Maintenance*

just published an article in the *Journal of Applied Physiology* that described the measurement of oxygen consumption and body temperature of six Wainwright men flown to the AAL. In his remarks to the council he sketched the outlines of the IBP study, which targeted the effects of cold and exercise on thyroid function. Each of the male participants would be given a single dose of the radioisotope iodine-125. But Milan's emphasis was on the benefits for Wainwright: all residents would receive "first-rate" medical and dental care. The reaction of the council was positive, but guarded. They would cooperate, but "the people would not allow nude photographs" and they "did not want to be treated as 'guinea pigs.'"⁸³

This quotation is all too brief, drawn from a historical record so patchy that even the NRC inquiry could not determine whether the iodine-125 study was ever actually conducted.⁸⁴ Wainwright certainly became the "main village" for IBP human science research, which ran until 1974.⁸⁵ But in drawing a link between the two iodine studies, developed a decade apart, the NRC report helps to contextualize the long arc of military research on and with indigenous northerners. The formality of the 1967 meeting with Wainwright's Village Council suggests that the IBP scholars felt compelled to work more openly with such communities, at least relative to the casual affiliations previously exploited by AAL staff. Still, the continuities between earlier, military experiments at the AAL and the IBP proposal—framed within the rhetoric of international scientific cooperation—are suggestive. By 1967, both Kaare Rodahl and Frederick Milan had been accorded the status of Arctic experts on the basis of projects that they initiated at the AAL and continued to pursue in the years after their respective departures.⁸⁶ In the transition from military to academic life, they upheld the methodologies, results, and significance of the laboratory's work. It would take decades for this work to be fully challenged, but the concerns of the Wainwright Village Council contain important elements of this refutation.

Summarizing her recent interviews with residents of Anaktuvuk Pass, Margaret Blackman notes that the trip to the laboratory was also a trip to Fairbanks, part of a longer history of "going to town." Those recruited to visit the AAL, she claims, did so eagerly,

of Thermal Balance in the Eskimo, Technical Report 60-40 (Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, Nov. 1960); and Milan, "Racial Variations in Human Response to Low Temperature," in *Proceedings of the Symposia on Arctic Biology and Medicine*, Vol. 2: *Comparative Physiology of Temperature Regulation*, ed. John P. Hannon and Eleanor Viereck (Fort Wainwright, Alaska: Arctic Aeromedical Laboratory, 1962), pp. 335–380.

⁸³ Frederick A. Milan and Eugene Evonuk, "Oxygen Consumption and Body Temperatures of Eskimos during Sleep," *J. Appl. Physiol.*, 1967, 22:565–567; "Report of the Working Party Conference for the IBF/HA Study of Circumpolar Populations held at the Naval Arctic Research Laboratory, Ft. Barrow [sic], Alaska, 17–22 Nov. 1967, Summary Statement," http://www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet12/brief12/tab_g/br12g1a.txt (accessed 27 Nov. 2012); and "Notice on a Meeting with the Wainwright Village Council, 21 November, 1967," http://www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet12/brief12/tab_g/br12g1a.txt (accessed 27 Nov. 2012). "Guinea pigs" has often been used to characterize soldiers who participated in atomic tests. It can also be found in the section of Chapter 12 of the ACHRE report on atomic testing in the Marshall Islands, where it is noted that the dual American aims of medical care and study of radiation exposure "led to a view by the Marshallese that they were being used as 'guinea pigs' in a 'radiation experiment.'"

⁸⁴ Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine¹³¹, *Arctic Aeromedical Laboratory's Thyroid Function Study* (cit. n. 7), p. 21; and Johnston, "'More Like Us Than Mice'" (cit. n. 3), p. 46 n 4. Milan, "International Study of Eskimos" (cit. n. 81), mentions the 1967 "working party conference" at Point Barrow (p. 124) and the opportunities for "dental and health benefits to Eskimos" (p. 126), but not the visit to and proposed experiment in Wainwright.

⁸⁵ Milan, "Demography of Selected Circumpolar Populations" (cit. n. 81), p. 20. Nearby Point Barrow was the home of the IBP's Tundra Biome study; see Aronova *et al.*, "Big Science and Big Data in Biology" (cit. n. 81), p. 208.

⁸⁶ In 1957 Rodahl left military employment to direct the Division of Research at Philadelphia's Lankenau Hospital. See www.limr.org/oth/Page.asp?PageID=OTH003642 (accessed 20 May 2012).

“as participation in the research project meant wages at a time when the bounty on wolves and fur trapping provided the only sources of cash income.” This is a reasonable explanation, but Blackman’s depiction of the laboratory experience is brief and uncritical; her only references are to Rodahl’s publications. More important, she notes that excitement accompanied “the inaugural trip in 1951” and says nothing about subsequent contact with AAL staff. This is a vital omission. In *The Last of the Few*, a book that circumscribes the military motivations for his journeys, Rodahl portrays the residents of Kotzebue, in northwest Alaska, as unable “to keep their appointments for our studies” during the summer months of midnight sun. “We traveled up and down the coast trying to persuade them to come to the laboratory,” he writes, “but they all had an excuse. It is not natural for Eskimos to say no, so when possible they hid behind the house until we had left.”⁸⁷ Rodahl downplays these incidents, but he still blames the villagers rather than the researchers, despite the fact that this was the *second* visit of AAL staff and their equipment to the Kotzebue area.

In 1966, Kotzebue’s William Iggiagruk Hensley decided to run for a seat in Alaska’s House of Representatives. His reasons were many, but one stands out: “When a doctor operated on one of us, there was no one on the staff to tell us in our own language just what was being done to our bodies.” Just twenty-five, Hensley led a new generation of indigenous Alaskan activists who sought “to see our own people participate in making decisions that affected their lives and their children’s lives.” The following year, as the AAL disbanded, a huge oil field was discovered at Prudhoe Bay, a development—along with the inspiration of the civil rights movement—that propelled Hensley and his cohort to advocate more forcefully for indigenous title to Alaskan territory. When President Richard Nixon signed the Alaska Native Claims Settlement Act in December 1971, some 44 million acres of land was transferred to the state’s Natives. For all of the act’s limitations, this transfer undoubtedly marked an era of indigenous empowerment and encouraged alternate ways of comprehending Alaska’s landscapes that did not accord with the vision of the state as a hostile environment and a military laboratory.⁸⁸ Hensley’s comments suggest that the challenge to this vision was premised not only on different political and environmental understandings of land, but also on a reassertion of indigenous *life*, of bodies and cultures that were not bound by the categories of laboratory inspections or military doctrines.

This struggle has continued since the declared conclusion of the Cold War. After the NRC released its report in 1995, George Ahmagoak, Sr., the mayor of the North Slope Borough, was disappointed. He observed, “They say the radiation didn’t do any harm. But then they admit Iodine-131 isn’t used any more because it sends a lot of radiation to the thyroid gland.” Dismay with the conclusions of the various government-sponsored inquiries led the borough to commission a report of its own, which not only issued stronger recommendations but drew the narrative forward. This approach was signaled by the report’s title: *Threats to the Health and Environment of Alaska Natives in the Nuclear Age* (1997).⁸⁹

⁸⁷ Margaret B. Blackman, “Anaktuvuk Pass Goes to Town,” *Études/Inuit/Studies*, 2008, 32:107–115, on p. 110; and Rodahl, *Last of the Few*, p. 132.

⁸⁸ William Iggiagruk Hensley, *Fifty Miles from Tomorrow: A Memoir of Alaska and the Real People* (New York: Farrar, Straus & Giroux, 2009), pp. 129, 160; and Haycox, “View from Above” (cit. n. 14), p. 150.

⁸⁹ “Test Wronged Natives: Report Urges Feds to Admit Errors,” *Anchorage Daily News*, 31 Jan. 1996, p. A1 (quoting Ahmagoak); and *Threats to the Health and Environment of Alaska Natives in the Nuclear Age: The U.S. Government’s Treatment of Alaska Native Research Subjects in a Thyroid Function Study Involving the Administration of Radioactive Iodine-131* (Anchorage: Birch, Horton, Bittner & Cherot, Jan. 1997), p. 1.

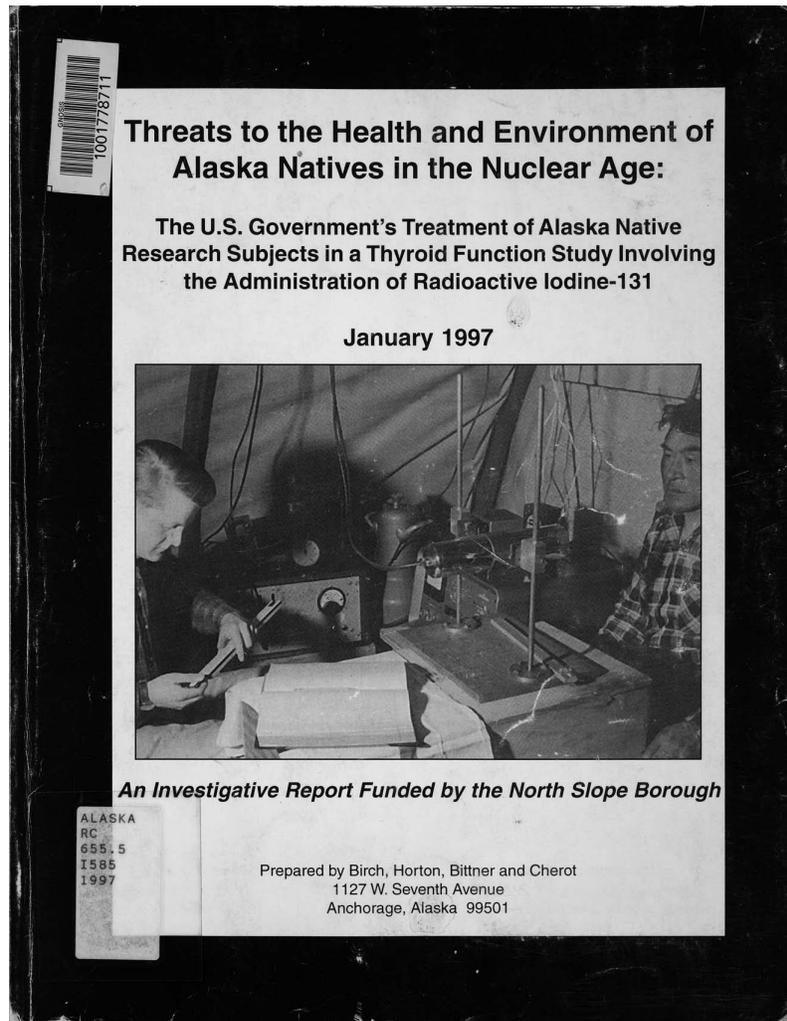


Figure 4. The cover of *Threats to the Health and Environment of Alaska Natives in the Nuclear Age* (Anchorage: Birch, Horton, Bittner & Cherot, Jan. 1997). High-resolution image provided by the Alaska and Polar Regions Collections, Elmer E. Rasmuson Library, University of Alaska, Fairbanks. Reproduced with permission of the North Slope Borough, Alaska.

Prepared by an Anchorage law firm, with the close assistance of the borough, the volume included a number of striking photos, including a cover image of Homer Mekiana, the Anaktuvuk Pass postmaster, seated next to a scintillation detector that is measuring the uptake of I-131 in his thyroid (see Figure 4).⁹⁰

⁹⁰ Whereas Rodahl reported in *The Last of the Few* (p. 101) that Mr. Mekiana understood the purpose of his trip to the laboratory, *Threats to the Health and Environment of Alaska Natives in the Nuclear Age* (p. 25) notes

Connecting the AAL's work to fallout and food chain research, and to the local consequences of waste disposal and the dangers of decrepit Russian reactors, the borough report offered a more comprehensive portrait of Alaskan militarization. While the NRC had used dosage estimates to justify a limited inquiry—thus restricting both blame and the personalization of historical subjects—this approach was rejected in the borough effort, which included interviews with and medical examinations of all surviving Iñupiat participants, along with some of their children. The result was a reaffirmation of ACHRE and NRC conclusions regarding medical ethics, but there was an additional emphasis on the “significant fear of illness among the surviving experiment population, their relatives and most other Alaska Natives from the North Slope.”⁹¹ In this sense, Alaskan Natives had much in common with other individuals enrolled in Cold War radiation studies. But there was also a distinction: “The federal government was and is a fiduciary for Alaska Natives” and was entrusted with the delivery of health care—which many individuals believed they were receiving when they were administered I-131. The state of health care in rural Alaska was clearly inadequate in the 1950s, to the extent that it had attracted Congressional concern. The borough report asserts that “this dependence was well known to the Iodine-131 researchers” and that it was exploited to ensure participation in AAL tests. “Without exception,” indigenous interviewees “stated that they did not know that they were participating in an experiment.”⁹² This meant that the ability of subjects to contest their racialization—portrayed as objective or natural—was severely circumscribed.

The borough report plainly advocated for an “administrative or legislative settlement”—which followed three years after its publication.⁹³ The document appropriates both legal and scientific language to identify the scope of an injustice and the need for appropriate rectification. As such, it reminds readers that law and science have long shared a close relationship with militarization. But the text also hints at the ways in which this relationship can create and stabilize powerful ways of seeing and thinking about a place, while alluding to the various tactics that might be used to contest this fixity. The *necessity* of indigenous participation in much of the laboratory's work—a fact, as the borough report makes clear, that lifts individuals out of their rigid positions within AAL categories—makes it imperative that this case is contrasted with alternate forms of collaborative human subject research. It is thus not surprising that recent discussions of northern scholarly methodologies are driven by an explicit opposition to past practices.⁹⁴

CONCLUSION: CLIMATIC ANXIETIES

The prospect of acclimatization to new and unusual climates has preoccupied travelers and scientists for centuries and is inseparable from both military campaigns and meditations on race. In the nineteenth century, medical scholars used the colonial setting of British

that his relatives “dispute this assertion. . . . No one in Mr. Mekiana's family remembers being told they were part of any Air Force experiment.” See also note 66, above.

⁹¹ *Threats to the Health and Environment of Alaska Natives in the Nuclear Age*, pp. 1, 4. The report also contains (pp. 22–24) an indictment of the AAL's inability to meet Nuremberg Code standards of informed consent and its preference for the cooperation of village leaders such as Kaktovik's Akiviak.

⁹² *Ibid.*, pp. 6, 55–57. *Threats to the Health and Environment of Alaska Natives in the Nuclear Age* (pp. 20–21) cites Thomas Parran's 1954 report to the Department of the Interior, *Alaska's Health*, as evidence of the dire state of health care among indigenous Alaskans. And the AAL report itself described near-starvation in Point Lay, one of the recruitment sites. See Rodahl and Bang, *Thyroid Activity in Men Exposed to Cold* (cit. n. 5), p. 16.

⁹³ *Threats to the Health and Environment of Alaska Natives in the Nuclear Age*, p. 7.

⁹⁴ See, e.g., Scot Nickels *et al.*, eds., *Negotiating Research Relationships with Inuit Communities: A Guide for Researchers* (Ottawa/Iqaluit: Inuit Tapiriit Kanatami and Nunavut Research Institute, 2007).

India to formulate and test both “ideas of nature and ideas of ‘man.’” Concurrent encounters with Aboriginal Australians led to a “crisis of humanism” and a revised, Eurocentric division of humanity into biological races, distinguished by their proximity to or distance from nature.⁹⁵ And by the early twentieth century, when American officials crafted new forms of medicine in the Philippines, the production of scientific knowledge about “other” natures, and by extension other cultures, was increasingly rooted in laboratory spaces. This knowledge was inextricable from historical and geographical claims. The prominent Yale geographer Ellsworth Huntington (1876–1947), for example, gave his climatic determinism cartographic form—effectively a “physiological projection of the white male body onto the globe.”⁹⁶

Two related emphases are apparent in the historical literature on these subjects. The first is an attention to *tropicality*—the construction of a distinct, uniform, and often degenerative region called “the tropics.” And the second is a stress on the nineteenth and early twentieth centuries. Both are unsurprising and understandable. But these emphases also encourage omissions, particularly with respect to the expansive forms of globalism championed by the United States in the middle of the twentieth century. Colonialism seemed to be in decline—and so did environmental determinism and simplistic scholarly treatments of race. And yet the 1940s was also the crucial decade for the consolidation of a global American military presence that endures today, backed by a consistent doctrinal stress on victory “anywhere in the world, from blistering desert to frigid wastelands.”⁹⁷ As troops were deployed to such locations, they were studied and aided by agencies devoted to the science of operations in nontemperate environments. The example of the AAL indicates that these institutions were not just representative of military globalism; they were also configuring its contours.⁹⁸

The American Cold War on nature, then, should be linked to colonial precedents, but it was novel in several respects. One was the sustained attention to an Arctic “region,” reinforcing a northern counterpart to tropicality. Although “human adaptation to polar areas has engaged scholars in many fields since the late nineteenth century,” in the United States it was only after World War II that such inquiries were conducted systematically, in laboratories, using what one advocate called an “experimental approach.” While this search for rigor was certainly not limited to the military-sponsored human sciences, the combination of field and laboratory studies at the AAL suggests a growing demand for reliability and a fondness for simulation on the part of the armed forces.⁹⁹ And

⁹⁵ Livingstone, “Human Acclimatization” (cit. n. 71); Warwick Anderson, “Disease, Race, and Empire,” *Bulletin of the History of Medicine*, 1996, 70:62–67, on p. 64 (quotation); and Kay Anderson, *Race and the Crisis of Humanism* (London: Routledge, 2007).

⁹⁶ Anderson, “Disease, Race, and Empire”; and Warwick Anderson, “Geography, Race, and Nation: Remapping ‘Tropical’ Australia, 1890–1930,” *Medical History Supplement*, 2000, 20:146–159, on p. 153. See also David N. Livingstone, *The Geographical Tradition: Episodes in the History of a Contested Enterprise* (Oxford: Blackwell, 1993), pp. 216–259.

⁹⁷ Robert Carter III *et al.*, “Environmental Stressors during Military Operations,” in *Mineral Requirements for Military Personnel: Levels Needed for Cognitive and Physical Performance during Garrison Training* (Washington, D.C.: National Academies Press, 2006), pp. 315–323, on p. 315 (quoting from a 2003 U.S. Army operations manual). Regarding tropicality see, e.g., Felix Driver and Luciana Martins, eds., *Tropical Visions in an Age of Empire* (Chicago: Univ. Chicago Press, 2005).

⁹⁸ David C. Engerman, “American Knowledge and Global Power,” *Diplomatic History*, 2007, 31:599–622; and Matthew Farish, *The Contours of America’s Cold War* (Minneapolis: Univ. Minnesota Press, 2010).

⁹⁹ Emilio F. Moran, “Human Adaptation to Arctic Zones,” *Annual Review of Anthropology*, 1981, 10:1–25, on p. 1; and Douglas H. K. Lee, “Physiological Climatology as a Field of Study,” *Ann. Assoc. Amer. Geogr.*, 1953, 43:127–137, on p. 131. Regarding attention to an Arctic “region” see Gísli Pálsson, “Arcticity: Gender, Race, and Geography in the Writings of Vilhjalmur Stefansson,” in *Narrating the Arctic: A Cultural History of Nordic*

during two momentous decades, the AAL was the most important site for research on Arctic acclimatization. By the time its Alaskan facilities were shuttered, the AAL, through a combination of reports, conference presentations, scholarly articles, sporadic news coverage, and a few popular books, had given additional “scientific” shape to a particular version of a place that North Americans were told was critical to the success of the Cold War.

Kaare Rodahl later blamed the “introduction of intercontinental missiles” and the concomitant reduced “emphasis on man-based military operations” for the declining geopolitical significance of Alaska and for the closure of the AAL. Other accounts stress “a lack of funds” and the conclusion that the laboratory’s work “could be performed in a less costly way on a task force basis.”¹⁰⁰ Collectively, these explanations suggest that the technological dimensions of the Cold War were changing, but also that, by the middle of the 1960s, the American interest in hostile environments had shifted elsewhere. Of course, the militarization of Alaska and the circumpolar Arctic did not cease, and the “man-based” emphasis of the AAL cannot be confined to a specific era. It has continued to inform military and popular perceptions of the north even after the apologies and compensation for Cold War human subject research.

As Shari Huhndorf has noted, the stark nineteenth-century colonial understandings of the Arctic—infamously epitomized by the exhibition of six Greenland Inuit “specimens” at the American Museum of Natural History in 1897—were complicated in the twentieth century. Ambivalence toward colonialism and its consequences was growing, but so were attempts to conceal and *naturalize* colonial relationships. This was done by simultaneously providing “an exoticized vision of Native life for Western consumption” and limiting the persistence of colonial relationships “by masking their motivations and hiding their violence.” Kaare Rodahl’s popular prose typifies this tradition, in which an authentic indigenous presence is separated in both space and time—namely, relegated to an Arctic past—from the modern world.¹⁰¹ But what made this move possible for Rodahl, and what ties his broad northern writings to the specific Cold War experiments of the AAL, was his position as a scientific documentarian—his ability to retreat, figuratively and literally, to the seemingly value- and violence-free realm of the laboratory, but also to extend these same qualities over Alaska.

In his address at a 1960 symposium on “Man Living in the Arctic,” held at the Army’s Quartermaster Research and Engineering Center in Natick, the explorer and geographer Paul Siple argued that it was “only when man attempts to conquer his environment that progress is made.” Once overcome, he added, environmental hazards become “a source of strength.” One way of overcoming the Arctic during the early Cold War, as another symposium participant put it, was for “man” to carry “his own environment with him.”¹⁰²

Scientific Practices, ed. Michael Bravo and Sverker Sörlin (Canton, Mass.: Science History Publications, 2002), pp. 275–310. For the emphasis on rigor see Carl E. Schorske, “The New Rigorism in the Human Sciences, 1940–1960,” in *American Academic Culture in Transformation: Fifty Years, Four Disciplines*, ed. Thomas Bender and Schorske (Princeton, N.J.: Princeton Univ. Press, 1997), pp. 309–329.

¹⁰⁰ Kaare Rodahl, *Stress Monitoring in the Workplace* (Boca Raton, Fla.: CRC Press, 1994), p. 3; and Chesnut and Kaufman, *Arctic Aeromedical Laboratory, 1 March 1947–30 June 1967* (cit. n. 43), p. 43.

¹⁰¹ Huhndorf, “Nanook and His Contemporaries” (cit. n. 55), pp. 79–84.

¹⁰² Paul A. Siple, “Limitations to Living in the Arctic Regions,” in *Man Living in the Arctic: Proceedings of a Conference*, ed. Frank R. Fisher (Washington, D.C.: National Academy of Sciences/National Research Council, 1961), pp. 14–17, on pp. 14–15; and Steven M. Horvath, “Summation: Man’s Future Conquest of the Arctic,” *ibid.*, pp. 115–118, on p. 115.

Such statements could not have been uttered so confidently without the Arctic Aeromedical Laboratory's transformation of Alaska into a military landscape. And if we understand landscape as not just a physical tableau but also a way of seeing and making geography, then the vision of the Arctic produced at the laboratory, a vision that was carried around Alaska, was premised on removing the bodies of both military researchers and indigenous subjects from the frame: one group situated behind a veneer of dispassionate science, the other subsumed into a nature under attack.