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Article abstract

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MATTHEW S. WISEMAN*

Abstract

Between 1947 and 1954, medical scientists in Canada received support from federal and independent agencies to conduct a series of comparative biochemical studies on Inuit and white "test subjects." Originally conceived from a racialized intrigue in defining the vascular characteristics of cold tolerance, the Canadian defence establishment absorbed the research with the intent to apply the findings to military service work in the North. Potentially unlocking the "Eskimo" secret to cold-weather acclimatization meant scientists could devise a screening process for selecting male white bodies for Arctic service. The research took place within the edifice of colonial science, but unlike wider postwar perceptions of the Indigenous body, this article presents the concept of biological appropriation to explore the perceived value of Inuit physiology to northern defence. Interpreting experiential research on Inuit as distinct from cultural assimilation provides a broader interpretation of postwar Arctic policy, and helps discern an understudied yet important episode of the Cold War sciences in Canada.

Résumé

Entre 1947 et 1954, des chercheurs en médecine au Canada ont reçu le soutien d'organismes fédéraux et indépendants pour mener une série

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d'études comparatives en biochimie sur des sujets inuits et blancs. Conçue à partir d'une volonté de définir les caractéristiques vasculaires de la tolérance ethnique au froid, cette recherche a été reprise par l'establishment canadien de la défense en vue d'en appliquer les résultats au service militaire dans le Nord. En arrivant à percer le secret de l'acclimatation des « Esquimaux » au froid, les scientifiques auraient pu concevoir un processus de sélection de mâles blancs aptes au service dans l'Arctique. Cette recherche a été menée dans la perspective de la science coloniale, mais l'auteur a décidé d'utiliser la notion d'appropriation biologique pour étudier l'importance accordée à la physiologie inuite pour la défense du Nord, plutôt que les perceptions du corps des Autochtones généralement répandues après la guerre. La distinction faite entre la recherche expérientielle sur les Inuits et leur assimilation culturelle permet d'élargir l'interprétation de la politique d'après-guerre sur l'Arctique et contribue à mettre au jour un épisode négligé, mais néanmoins important, des sciences de l'époque de la Guerre froide au Canada.

> "To be an Eskimo is not necessarily to be acclimatized to cold, but it is our conclusion, for the reasons given, that our selected Eskimo subjects were so acclimatized."[1]
>
> G. Malcolm Brown et al., 1958

After having made five trips to the Canadian Arctic, medical scientist G. Malcolm Brown wrote a progress report for the Defence Research Board (DRB) in December 1950 that described a series of environmental studies conducted on Inuit[2] and white "test subjects."[3] Designed and carried out as a long-term study of the effect of cold on the human body, the research aimed to determine how much cold exposure was required to achieve acclimatization. To make this determination, Brown oversaw the administration of medical treatment services and biochemical work over an eight-year period with financial support from the Department of National Health and Welfare, the DRB of the Department of National Defence, the National Research Council, and the Arctic Institute of North America.[4] Four trips took researchers to

Southampton Island in the north of Hudson Bay and a fifth to both Southampton Island and Igloolik in the northeast corner of present-day Nunavut. Brown and his team returned to Southampton Island on a final trip in 1954. While on location over the eight years, researchers took samples of blood, urine, skin, and liver from "Eskimo test subjects" and transported the "specimens" to university labs in southern Ontario for independent and comparative biochemical analyses with samples taken from white university students.[5] Records indicate that Brown and his colleagues worked on no fewer than 288 Inuit, including at least 16 children who ranged in age between one and ten.[6] Although the exact number remains unclear, at least 67 of the 288 were men used to study acclimatization.[7]

In the absence of a full physiological description of cold acclimatization, scientists conducted the research in an attempt to deduce information that might better prepare both government and military personnel to work and defend in the Arctic. The theory of acclimatization offered a potential solution to the problem of cold tolerance. Inuit represented acclimatized "experimental subjects" while "85 male, healthy medical students" from Queen's University represented the "control group" of unacclimatized white "subjects."[8] Researchers subjected both groups to similar studies but Brown and his team of scientists seem to have obtained organ samples from Inuit alone. Administered during medical treatment, "needle biopsies" resulted in samples of liver from at least ten adult Inuit "test subjects."[9] In the end, Brown deemed the studies inconclusive because testing failed to detect definitive evidence of the existence of cold acclimatization. Nonetheless, the circumstances and attitudes that gave rise to the research point to some important considerations for understanding postwar physiological perceptions of Inuit as well as the impact of the Cold War sciences in Canada.

Operating under racialized perceptions of human biology, the defence establishment funded medical science in an attempt to devise a method for selecting male white bodies with "Eskimo-like" cold-weather-fighting physiological traits. In the process, scientists supported a colonial agenda by imposing

medical practices on Inuit communities, asserting claim over the Inuk body, and subjecting Inuit to physiological experimentation. This article argues that while wider government initiatives aimed at Inuit health in the period, in so far as cold acclimatization research is concerned, assimilation was secondary to the primary goal of biological appropriation. In the context of the acclimatization research examined here, I define biological appropriation as the attempted use of Inuit biology for a non-Inuit purpose. To be clear, the scientific use of Inuit biology was theoretical. Researchers did not attempt to extract and then transmit blood or tissue from Inuit bodies, but instead used comparative sampling of Inuit and white "test subjects" to pursue a scientific understanding of an abstract physiological response to cold tolerance. Under the auspices of the Canadian government, comparative biochemical research intended primarily to isolate the vascular characteristics of cold acclimatization, which in turn would be used to devise a process for the "physiological screening of persons considered for service in the far north."[10] If scientists could identify the vascular characteristics of cold acclimatization, they thought it possible to "provide some guides as to the best method of rapidly acclimatizing a group of men, and of selecting those likely to adapt quickly and completely."[11]

The attempted appropriation of Inuit biology for a non-Inuit purpose suggests a new area of interpretation for understanding colonial views of Indigenous peoples. In contrast to wider perceptions of the Indigenous body, scientists involved in acclimatization research considered the Inuk's ability to live and work in the cold an "enviable" physiological trait. If science could unlock the "Eskimo" secret to cold-weather survival, the "functional capacity of white men in the Arctic" might increase, thereby improving the ability of Canada's government and military personnel to work and defend in the North.[12] In this instance, white peoples viewed Inuit bodies as having superior, rather than sickly and inferior physiological traits.[13] That the research was conceived from an imagined racial dissimilarity suggests the scientists operated under deeply entrenched colonialist positions. The biologized Inuk body, according to a Euro-Canadian inter-

pretation, was better suited than the white body to survival in the harsh Arctic climate of northern Canada.

At the core of acclimatization research, the socio-medical perception of the Inuk body is important to our understanding of the impact of the Cold War in Canada. The studies conducted by Brown and his team did not originate from a military or strategic Cold War agenda, but Canada's defence establishment assumed responsibility for the research on the advice of Arctic policy makers who championed the widespread applicability of the intended results. Predicated on the basis that the environment determines biological traits, acclimatization research in Canada first aimed to determine physiological evidence of biological variation between Inuit and white bodies as part of a wider international scientific interest in defining the vascular characteristics of cold tolerance. Originally financed by the National Research Council, the Defence Research Board absorbed the acclimatization research of Malcolm Brown with the intent to apply the science of cold-weather physiology to service work in the North. Although the defence of Canada in the nuclear age did not depend on the successful appropriation of Inuit biology, acclimatization research found and maintained federal support as a potential means to protect the lives of white service personnel during an era of intensifying Arctic activity.

The context in which the acclimatization research took place is extremely murky. At the time of the research, Canadian law did not require scientists to obtain written consent to conduct research on the Inuit and white "test subjects" studied for cold acclimatization. The Nuremberg Code set a base international standard for medical ethics in 1947, but Canada did not implement formal ethical guidelines for medical research until 1980.[14] Contemporary international standards stated that voluntary consent was mandatory for clinical research, which meant that all persons subjected must agree to participate without coercion and must understand the risks involved in the research. Sources indicate that Brown and his colleagues used an "excellent native interpreter" to communicate with Inuit involved in the research, but the details of any verbal contract went unrecorded.[15] Accord-

ing to the progress report referred to at the outset of this article, "the only method of selection used in these surveys was to take family groups as a whole as they became available."[16] Brown expanded this explanation in 1954:

> [The] selection of experimental subjects from among Eskimos who continue to live in their traditional dwellings and who still gain their livelihood by hunting and trapping has … the merit that such Eskimos as these have an ability to live and work in the cold that permits, on the basis of performance, their acceptance as acclimatized individuals.[17]

Brown's explanation reflects the findings of the research, and the 1954 publication date is significant. When the research began in 1947, Brown and his team pursued innate biological factors to explain the vascular characteristics of acclimatization. By 1954, the findings of their research pointed instead to environment, culture, and diet as an explanation for Inuit cold tolerance. This shift reflects wider scientific changes towards the perceived value of northern Indigenous knowledge. As Stephen Bocking has argued, the development of postwar research laboratories meant that "scientists no longer needed to live among Indigenous people, learn their techniques for travel and survival, or indeed, have any contact with them" by the mid-1950s.[18] The interim years between 1947 and 1954 are thus the focus of this article, when Brown and his team perceived cold acclimatization in strict biological terms and Canadian science wanted to appropriate the superficial cold-fighting physiological traits of Inuit in the North.

The socio-medical perception of the Inuk body, based on biology rather than cold performance, came to bear on Inuit as developments in science and technology pronounced the geostrategic significance of the Arctic in the early postwar period. The demands of science that drove imperial policy during the Second World War had woven relationships that influenced Western science diplomacy well after the war had ended.[19] Not unlike the bureaucrats and doctors responsible for carrying out the assimilative agenda of the Canadian welfare state in the postwar

period, scientists engaged in acclimatization research exploited contemporary circumstances to achieve distinctly southern goals. As Ian Mosby explained in his important work on the mistreatment of malnourished Aboriginal peoples, shifting attitudes in Canada supported racialized medical testing and experiential human science.[20] Predicated on the exploitation of Inuit bodies and communities, acclimatization research also occurred within the edifice of colonial science, but the so-called "Indian Problem" of "dependency" is noticeably absent in records pertaining to the work.[21] Although researchers used the welfare state to gain access to Inuit communities, cold-weather research on human beings derived specifically from a scientific and medical agenda that sought to describe superficial connections between the physical body and the natural world. The research was not militarily strategic in origin, but studies on acclimatization perpetuated in response to Cold War anxieties and a desire to pursue science as a solution to military problems.[22]

Although cognizant of the value of oral history material, this article relies exclusively on written records to examine what insights the colonial archive holds about early postwar perceptions of the Inuk body in Canada.[23] The findings are the result of archival investigation in digital and print repositories. Extensive primary research at Library and Archives Canada and the National Archives and Records Administration in the United States yields insight from the personal papers of lead scientist Malcolm Brown as well as the federal departments and independent agencies that jointly conceived, supported, and financed the scientific work.[24] Published materials in the fields of medicine and the Arctic also proved useful. Collectively, these sources provide sufficient detail to contextualize acclimatization research within a framework that shows the interplay of Cold War politics, national defence, and racialized experimental science.[25]

Science and the Cold War Arctic

To defence policy makers in Ottawa, the North only figured increasingly as a prominent location of geostrategic impor-

tance towards the end of the Second World War. Outside the small presence of the Royal Canadian Mounted Police, federal activity had shown little concern for the North and the people living there.[26] Officials commissioned an Eastern Arctic Patrol in 1935 to investigate the clinical and metabolic health of northern Indigenous populations, and the responsibility for Inuit health care passed to the new Department of Mines and Resources the year after.[27] The provision of health services to Inuit changed again in 1945. Under the new direction of Health and Welfare, the federal government again commissioned vessels to patrol the eastern Arctic and provide medical and evacuation services to Inuit.[28] Northern patrols promoted Canadian sovereignty as well, but the onset of a possible Soviet-American conflict in the postwar world provided new considerations for the role of the North on the federal agenda.[29]

The perceived need to have a white acclimatized body for the North highlights the importance of white settlement and the grip of the "colonial project," especially when we consider Canadian defence policy in relation to postwar problems of sovereignty and security.[30] As a well-developed body of literature has shown, Canada's top officials saw little intrinsic value in funding or facilitating a widespread defence of the North in the early postwar period.[31] Nevertheless, Canadian geography dictated a response to key strategic issues. If Ottawa was not prepared to defend the northern reaches of the continent, Washington might take charge to ensure the protection of the United States. Responding to the dual concern for Soviet and American encroachment on Canadian territory, defence officials in Ottawa abandoned any thought of an isolationist postwar security posture. A series of bilateral agreements with the United States established a network of radar stations by the mid-1950s that aimed directly to counter the primary strategic threat of the nuclear-carrying long-range bomber.[32]

Simultaneously, the Canadian defence establishment pursued inexpensive options to further protect and promote northern sovereignty and security. The concept of the Canadian Rangers developed consequently in 1947, according to Whitney Lacken-

bauer, when defence officials created "a military space for citizens who live in isolated coastal and northern communities and who would not otherwise be suitable for or interested in military service."[33] Equipped with only a "rifle and an armband," the Rangers assisted an air-portable and airborne brigade group known as the Mobile Striking Force (MSF).[34] If a potential invasion required Canadian soldiers in the Arctic, aircraft could theoretically fly and drop the specially trained MSF to form a northern frontline resistance and counter the enemy presence.

Although the likelihood of a land invasion or establishment of enemy lodgment in the Arctic was remote, Canada participated in pre-emptive measures with both the United States and Britain that aimed to counter the postwar threat in the North. Canadian, American, and British forces trained and developed methods and equipment specifically designed to function under the extremes of climate and terrain encountered in northern latitudes. In support of military activity, scientific research became important to Canada's national and international security posture. According to Archie Pennie, former Superintendent of the DRB's Defence Research Northern Laboratory (DRNL) in Churchill, Manitoba, "joint military and scientific work was required to define the problems which faced man in the Arctic environment — his clothing, feeding, tactical deployment, navigation, re-supply and a host of associated problems."[35]

Between 1947 and 1965, DRNL functioned as a multi-purpose facility for research, training, and education on winter and summer issues specific to the Canadian Arctic and sub-Arctic climate. Winter scientific work at Churchill concentrated on permafrost, problems of clothing and equipment, fuels and lubricants, and nutrition. During the summer months, scientists turned their attention to entomology and devised solutions to improve military operations in areas of intense blackfly population. Research at DRNL constituted a variety of scientific disciplines, because problems "dealing with any phase of military operations in the Arctic had to have an input from the operational, the human resources, the biochemical [and] as well as from the engineering side."[36] Of particular concern for research-

ers at DRNL was the efficiency of northern military operations conducted by the MSF while under the peculiar stresses of the Arctic environment.[37] Situated on the west bank of Hudson Bay, Churchill served many of the joint scientific and military research needs of Canada's defence establishment, but the federal government also extended its reach in the Arctic by provisioning financial and technical support for northern research elsewhere. The "Queen's University Arctic Expedition" led by Malcolm Brown was one such northern initiative that served a specific scientific research need beyond the area around Churchill. Brown's biochemical work on cold acclimatization contributed to a large body of multi-purpose scientific research, designed simultaneously to support Canada's independent and collaborative military needs associated with defence and sovereignty in the North.

The connection between Brown's medical acclimatization research and the military needs of Canada is further evident in the early postwar environmental protection programme of the federal government. A progress report published by the Department of National Defence in 1954 defined the field of environmental protection as research on "the protection of the serviceman and his equipment against the adverse physical effects of his environment."[38] The programme employed a diverse set of scientific disciplines across multiple government divisions, resulting in co-operation between the DRB, the National Research Council, the Science Service of the Department of Agriculture, the Ontario Research Foundation, and from direct support by branches of the Armed Services. While each division made both individual and collective research contributions, coordination of all program activities was the responsibility of the Environmental Protection Section of DRB headquarters. As a coordinating body of environmental protection research, the DRB facilitated "field testing" in the Canadian Arctic and liaised international information exchange between Canada, the United States, and Britain to improve co-operation on geographical considerations pertinent to security in northern latitudes.

Scientific investigations on the effect of cold on human physiology and climatic adaptation were vital components of

the environmental protection research financed by the federal government between 1947 and 1954. At the height of Brown's work in 1951, scientific study on "physiological stress produced in men by cold" topped the list of 14 research activities conducted at DRNL.[39] Scientists conducted blood and urine sampling on service personnel in an attempt to determine quantitatively the physiological and biochemical responses to cold in men, with the aim to "determine the degree to which adaptation to cold occurs … [and] the best methods of bringing about adaptation."[40] Thus, the comparative sampling conducted on Inuit and white "test subjects" by Brown and his team did not occur in isolation. The Canadian defence establishment showed significant interest in acclimatization research, facilitating and funding multiple studies at different locations in the North during the first decade of the postwar period.

Malcolm Brown and the Federal Organization of Arctic Research

When the threat of Soviet activity captured the attention of Canada's defence and military establishment, the roots of a southern Arctic romanticism came to bear on Inuit. Long-entrenched cultural beliefs shaped the work of the acclimatization researchers. From a privileged position, Brown and his team exploited contemporary understandings of Indigenous health to gain access to Inuit communities and bodies. Their intentions of providing medical services were sincere. Brown and his team treated Inuit for nutritional, metabolic, and respiratory disease, but simultaneously the administration of medical treatment services gave researchers access to Inuit bodies for a purpose unrelated to Inuit health and welfare. The circumstances constructed the "Eskimo" as a racially pure, cold-weather adapted body. Scientifically, researchers considered the Inuk body as the ideal "test subject" to study the vascular characteristics of cold tolerance. A discourse of "assistance" gave Brown's team initial access to Inuit communities and bodies, while the longevity of acclimatization research resulted from Cold War anxieties that produced a distinct scientific agenda.

The first "Queen's University Arctic Expedition" to Southampton Island took place during the summer of 1947. Malcolm Brown led a team of four researchers that also included medical professor R.G. Sinclair, biochemist L.B. Cronk, and George Clark.[41] Brown graduated in medicine from Queen's in 1938 and obtained a Ph.D. from Oxford University in 1940. Following a three-year research term, he served with the Canadian Army Medical Corps between 1943 and 1946. During two of those years, he was on loan to the Royal Army Medical Corps as a physiologist with the Malaria Research Unit. Discharged with the rank of major after having served in the United Kingdom, Italy, and northwest Europe, Brown held various academic and professional positions following the war. His appointments included an associate professorship with the Faculty of Medicine at Queen's University in 1946 and a membership with the Defence Research Board's Panel on Arctic Medical Research in 1947. While with the DRB, Brown simultaneously held a position with the Department of National Health and Welfare, and maintained scientific advisory roles in government to the 1970s.[42]

Brown's personal experiences at war shaped his postwar research and views towards acclimatization. Having witnessed unparalleled death first-hand, his physiological work on wartime malaria gave him cause to pursue and promote blood sciences as a means to prevent unnecessary death in the postwar period. Armed with the desire to prevent further loss of life, human survival became fundamental to Brown's acclimatization research and, by extension, his work influenced perceptions of acclimatization among defence officials in charge of the implementation of Arctic policy. Brown's research was particularly fundamental to the Arctic division of the Defence Research Board. Established in 1947 as a division of Canada's National Defence, the DRB had a mandate to provide scientific and technical assistance to the Canadian Armed Forces.[43] As an intricate division comprised of numerous advisory committees and research panels, the Board supported a diverse range of scientific research activity.[44] Prior to the mid-1950s missile threat, the DRB facilitated Arctic research in areas primarily concerned with defence of land and

sea. In aiding the military, the Board conducted Arctic warfare research concerned with human living and fighting in northern environments. The DRB also conducted naval research on Arctic oceanography, shipping and re-supply of northern stations, and anti-submarine activity in northern waters. Apart from these strategic considerations, the DRB pursued northern research because of Canada's geography and climate. Both the United States and Britain showed interest in Arctic defence research in the early postwar period and Canada was well suited to provide the location, facilities, and personnel to meet the required need. In return, Canada gained greater access to resources provided through reaffirmed defence partnerships and maintained an active role in defence matters concerning its own territory.

The direction of Arctic research in Canada was multilayered and intergovernmental. The federal government approved the formation of both an inter-service committee on winter warfare and a subcommittee on winter warfare research on 7 May 1946.[45] Officials decided to provide the chair and secretary for the subcommittee from the branch of the Director General of Defence Research, but plans changed following the establishment of the DRB in 1947. The subcommittee underwent reorganization and emerged as the Arctic Research Advisory Committee under the Chairmanship of Hugh Keenleyside, the Deputy Minister of Mines and Resources and Commissioner of the Northwest Territories.[46] From a federal perspective, Keenleyside was an ideal choice. Arctic geographers such as Vilhjalmur Stefansson, Erling Porslid, and Trevor Lloyd had versed him on the Canadian North and its Indigenous populations, and he had participated in the creation and subsequent activities of the Arctic Institute of North America.[47]

Keenleyside's informal education on northern affairs worked to the advantage of the DRB. He shared with Liberal foreign minister Lester Pearson the view that Canada should emphasize resources and research over strategy and politics. Defence considerations in the North were lower on his agenda than matters he considered to be of "far greater immediate significance in the history of humanity, [such as] the work being done by

the scientists, explorers, administrators, educators, doctors, and social workers," who brought the industrialized south into the North.[48] Keenleyside's value of modern science and desire to spread "industrial civilization" northward benefited the DRB when he chose to support the Board as an important resource for the Canadian government in the North.

At the first meeting of the Arctic Research Advisory Committee on 15 May 1947, DRB Chairman Omond Solandt voiced the basic principle for the Board's Arctic initiative.[49] Solandt claimed that science could help the Services operate in the Arctic, but also noted the value of the Services to scientific research by the provision of transportation, facilities, and other resources in the North. According to Solandt's vision, a primary role of the Arctic Research Advisory Committee was coordination, and the membership took shape accordingly with the aim of bringing together persons highly connected with Arctic development. In the absence of a coordinated long-term government plan for Arctic research, the newly formed advisory committee decided to pursue a diverse and expansive research program. The committee also made recommendations that partly led to the establishment of the Advisory Committee of Northern Development, which advised Cabinet on important matters of policy affecting the Arctic.

Throughout the duration of Brown's acclimatization research, the administration of the Northwest Territories and the Yukon fell under the jurisdiction of the federal government at the time of the research. The Northwest Territories Council held the place of provincial governments, while the Bureau of the Northwest Territories and Yukon Affairs of the Department of Mines and Resources managed executive functions. It was the position of the Advisory Committee on Northern Development to advise Cabinet on northern matters and ensure consistency in policy where the interests of different government departments were concerned. The Arctic Research Advisory Committee, although under the auspices of the DRB, had representatives of various government agencies and coordinated scientific research activities in the North. When scientists aimed to conduct research activities in the Northwest Territories, work depended on

licences issued by the Bureau of the Northwest Territories and Yukon Affairs. Brown's research conformed to federal standards, according to the minutes of the first meeting of the Panel of Arctic Medical Research.[50]

The basis of support for acclimatization research formed when the Arctic Research Advisory Committee decided to establish a section to meet the needs of Arctic medical research. The first meeting of the Arctic Medical Research Panel, a division of the larger advisory committee, took place on 16 December 1948.[51] As an authoritative body, the panel brought attention to advances in Arctic medical research pertinent to defence and suggested areas of potential research interest. The terms of reference for the panel stipulated the responsibility of its members to review and report on the progress of Arctic medical research projects of both the DRB and the Services.[52] The work was confidential and all members were bound to an "oath of secrecy … sworn before a Justice of Peace or Commissioner for Affidavits."[53]

Malcolm Brown was one of the six original members of the Panel, and was chair between 1952 and 1954. He reported directly to both the Defence Medical Research Advisory Committee and the Arctic Research Advisory Committee. Under the oath of secrecy, Brown, as an official member of a DRB panel, had full security clearance to discuss and write about cold acclimatization research.[54] His authority to communicate research was autonomous, confined only by the limits of the Official Secrets Act, Chapter 49 of the Revised Statutes of Canada. Under the Act, it was "an offence to communicate to any person, except under lawful authority, information which might be useful to a foreign power — or to fail to take reasonable care of, or to endanger the safety of such information in one's possession or control."[55] These restrictions did not prevent Brown from publishing extensively about cold acclimatization, which speaks to the popularity of the science but also to the results of the work. When the research failed to isolate the vascular characteristics of cold acclimatization, Brown had no secrets to protect.

The studies administered by Brown and his colleagues were a direct, non-military extension of the DRB's wider cold acclima-

tization programme that studied the physiological adaptation to cold of personnel while operating under the cold environmental conditions of the Canadian North.[56] About 40 percent of the total amount granted by the DRB for research in Arctic regions in the late 1940s went to medical projects that supported "basic studies of the Eskimo and experiments on nutritional problems, on physiological and other responses to cold, and on conditions resulting from exposure to cold."[57] The studies provided scientists an opportunity to conduct "field work" in an actual cold environmental locale and the defence establishment an opportunity to assess a theatre considered imperative to Canadian security in the early postwar years.

Acclimatization Research on Inuit

Arctic research in the early Cold War period was a highly cooperative venture. When the DRB began to fund northern research in 1947, the federal government had already supported Arctic science through the National Research Council (NRC). In addition to participating in a number of scientific investigations, the DRB served as a coordinating agency in making arrangements for the transportation of scientific personnel and the organization of Arctic research.[58] At the request of the NRC, the DRB accepted five medical research projects in 1948.[59] All five projects were concerned with human performance and physical response under varying conditions of stress and environment. Among the five projects were an investigation into cold acclimatization by Louis-Paul Dugal and Malcolm Brown's study entitled "Clinical and Biochemical Studies on the Eskimo." Both projects were financed by a grant-in-aid from the NRC, but following examination "as to their suitability for support by the Defence Research Board, and with the permission of the applicants, the Defence Research Board assumed responsibility" for the projects.[60] Upon acquisition, the DRB absorbed each project into its wider extramural research programme.

The first acclimatization project financed by the DRB commenced at Churchill, Manitoba in December 1947.[61] Louis-Paul

Dugal of Laval University and a team of scientists collaborated with R.E. Johnson of the United States War Department Medical Nutrition Laboratory to "prove that ascorbic acid is necessary for acclimatization to cold."[62] Dugal's previous work indicated the importance of ascorbic acid in the acclimatization of animals to cold, and based on his experience the DRB decided to fund his Arctic research. Dugal's project aimed to determine scientifically if ascorbic acid was capable of increasing the ability of the human body to acclimatize to cold, and the DRB determined that his research fit well with wider defence initiatives in the North. Under the supervision of DRB Arctic scientist Guy Marier, Dugal's team at Churchill experimented on a group of 36 "volunteer" Service personnel from the Canadian Army who were engaged in winter exercise training. The troops underwent a two-day physical examination prior to and following the test programme. Examinations included the taking of blood samples, urinalysis, chest x-rays, and dental inspections. Split into three groups, troops took Vitamin C pills daily without knowing the dosage. Troops in "Group A" unknowingly received placebo pills containing zero Vitamin C, while "Group B" received pills containing a 300 mg dosage, and "Group C" a 1000 mg dosage. In the end, the trials proved inconclusive because of a "shortage of accommodation and other administrative difficulties" on location during the winter of 1947–1948.[63] Nevertheless, scientists believed the research produced valuable information for further study.

Aside from collaboration with the United States War Department, Malcolm Brown's DRB research mirrored the trajectory of Dugal's work. Brown's experience with peripheral blood vessels and diseases made him ideally suited to research cold acclimatization for the Canadian defence establishment. He first flew to Southampton Island in the summer of 1947, along with the three other members of his team, in RCAF planes by way of Winnipeg and Churchill. During the Second World War, the United States Air Force had established a camp at Coral Harbour on the Island. The air force abandoned the location following the war and left behind a collection of huts. Brown's team

used the abandoned huts as a base of operations. The establishment provided space for temporary housing as well as a medical clinic to examine Inuit and administer tests.

Brown's team reportedly brought 80 percent of the Indigenous population of Southampton Island by boat to the clinic for medical examination and testing during the first trip in 1947.[64] The results of the examinations suggested that respiratory tract infections and tuberculosis were the primary causes of illness and death among the local population. Researchers also observed that a third of those examined had enlarged livers: "Specimens of liver obtained from two subjects showed that the enlargement was due to the presence of large amounts of fat, and further work is being done on this problem which is of considerable interest."[65] In response, Brown and his team carried out further nutritional intervention experiments that draw obvious and grim connections to other federal studies of malnourished Aboriginal peoples.[66]

Clinical research at Southampton Island extended beyond Inuit health. In a comparative physiological study, researchers used water immersion to analyze cold tolerance in Inuit and white "test subjects." Brown and his colleagues studied Inuit "subjects" on location during June and July, and white "controls" during October and November in comparable outdoor temperatures in Kingston, Ontario. Although described as acute or short-term exposure tests, researchers immersed the hand and forearm of each "test subject" in water for a duration of one to two hours at temperatures between 5 and 45 degrees Celsius.[67] (Figures 1 and 2 show the results of the immersion test at 5 degrees Celsius).[68] Researchers measured rectal temperature at the conclusion of each immersion and compared the data with measurements taken prior to the test. Inuit tolerated the coldest water temperature for nearly an hour longer than the white subjects did, but the coldest conditions were so severe that all persons tested experienced a drop in core body temperature. A different test measured hand and forearm blood flow, skin, subcutaneous tissue, muscle, and rectal temperatures while subjects rested in a room at 20 degrees Celsius.[69] Researchers determined skin, tissue, and rectal temperature after the subjects' hand and forearm was clothed with cotton

wool for 30 minutes. The results of both experiments indicated that Inuit maintained a greater blood flow through the extremities than the white students. Researchers attributed the difference to hormonal thyroid activity. They postulated that increased metabolic heat production in the "Eskimo" body resulted in increased thyroid secretion, which enabled the vascular system to maintain a higher level of heat distribution to the extremities than was measured in the white students.

To Brown and his group of researchers from Queen's University, the hyperthyroidism showed in Inuit represented a potential physiological explanation for the existence of cold acclimatization. The wider medical community reacted with intrigue and caution. In reference to the findings, the founder of the Department of Medical Biophysics at the University of Western Ontario, Alan Burton, stated: "[Brown] finds that the liver in the Eskimo is markedly enlarged by clinical standards, and plainly palpable. Yet liver biopsies obtained from a number of very cooperative natives, have shown no microscopic abnormality whatever."[70] To Burton, the findings were inconclusive and only a seasonal change could show the existence of acclimatization. For Brown and his colleagues the research continued with the intent to investigate further the link between hormonal thyroid secretion, blood circulation, and cold tolerance in the human body.

Figure 1: Effect on Skin Temperature and Insulation Index of Immersion of Right Hand and Forearm in 5° C Waterbath

	Control Period	Immersion Period	Recovery Period
Average Skin Temperature °C			
Controls	31.52	31.10	30.87
Eskimos	31.53	31.21	31.00
Insulation Index			
Controls	0.5445	0.5778	0.5990
Eskimos	0.5392	0.5711	0.6097
Insulation Index of Trunk			
Controls	0.2426	0.2093	0.2022
Eskimos	0.1986	0.1667	0.1752

Figure 2: Average Temperature During Second Half-Hour of Immersion of Hand and Forearm in 5° C Waterbath

	Controls		Eskimos		P
	°C	S.E.	°C	S.E.	
Skin					
Toe	23.91	0.12	23.71	0.07	0.20
Calf	29.51	0.12	30.43	0.14	<0.01
Thigh	31.25	0.08	31.67	0.01	<0.02
Abdomen	32.88	0.08	35.07	0.04	0.01
Chest	32.69	0.17	33.25	0.06	>0.05
Lumbar	35.40	0.04	35.48	0.03	0.10
Scapula	36.03	0.07	35.49	0.06	0.01
Shoulder	28.63	0.32	30.45	0.06	<0.01
Forearm	32.09	0.14	28.01	0.11	<0.01
Hand	26.15	0.19	23.15	0.31	<0.01
Muscle					
Calf	31.55	0.17	28.43	0.07	<0.01
Thigh	34.83	0.04	34.41	0.05	<0.01
Forearm	34.07	0.07	33.09	0.04	<0.01
Rectal	36.99	0.05	37.09	0.04	0.20

Acclimatization Research Outside of Canada

Acclimatization science was not restricted to Canada. Strategic considerations also led the United States to invest in cold-weather science to support military operations in northern latitudes. As documented by historical geographer Matthew Farish, extensive militarization during and after the Second World War turned the North American Arctic into a Cold War "laboratory" for scientific investigation.[71] Researchers at the Arctic Aeromedical Laboratory in Fairbanks, Alaska conducted an extensive programme on acclimatization and cold survival that included experimentation on Indigenous Alaskans. Testing a hypothetical connection between hyperthyroidism and cold tolerance, scientists used a radioactive medical tracer to measure thyroid activity in 120 subjects, including "19 Caucasians, 84 Eskimos, and 17 Indians."[72] The administration of radioactive iodine was "one of

many methods deployed to understand the physiology of the (singular) Eskimo as a gateway to military success in the North," according to Farish.[73] Ethical questions regarding the selection process of the participants and the associated medical risks of the research led to a public inquiry in the 1990s. After hearing testimony from medical scientists and persons directly involved in the study, the committee heading the inquiry published a report that described the details behind what it considered a gross disregard for human life.[74]

Despite certain and obvious similarities, no direct evidence links the experiments in Alaska to the acclimatization research conducted in Canada. The experiments in the United States took place after the Canadian researchers returned from their final trip to Southampton Island in 1954, and Brown's personal correspondence does not indicate that he or any member of his research team was involved with the Alaska scientists. Brown read extensively on the experimental use of radioactive iodine in thyroid treatment, however.[75] In a letter dated 2 November 1954, Brown wrote to Keith Wightman of the University of Toronto's Banting Institute to inquire about the practice of administering "therapeutic doses" of radio-phosphorus.[76] In reply, Wightman confirmed that he had treated cancer patients with doses of a radioactive isotope of phosphorus and radioactive iodine. The correspondence seems to have ended with the reply and evidence does not suggest that Brown inquired with the intent to administer radio-phosphorus in his own practice.

Brown was also careful to keep the findings of his research separate from similar studies developed in the United States. When George Mann of Harvard University sought permission to co-publish results on acclimatization research in 1955, Brown declined: "Despite any estimates, I [Brown] don't believe anyone really knows what is the average fat intake in the Eskimos and it is a mistake to say that the results of our carefully done but necessarily restricted dietary experiment provide such a figure."[77] Mann specifically wanted to co-publish the results of a study that examined the relationship between diet and serum lipid in a group of 161 "Eskimos" of various ages, but Brown declined

because his results derived from separate and inclusive research on the biological characteristics of cold acclimatization. Nonetheless, the correspondence in Brown's personal papers reflects a fascination with race and science. His team conducted research in relative isolation, but the acclimatization research that took place in Canada fits a wider narrative of Cold War militarism and experiential human science.

Perhaps best epitomized in suggestions for future projects submitted to the Arctic Medical Research Panel of the Defence Research Board, postwar military science in Canada embraced colonial perceptions of the Inuk body. Light reflection from snow made military operations difficult on Arctic terrain, and some defence officials thought science might provide a useful solution to the problem of "snow blindness." One concept suggested "a study on the special senses of the Eskimo, especially eye function. As the Eskimo is 'racially pure' and has his high ultra-violet exposer for generations …. "[78] Another idea submitted for further consideration was "a study of the adaptability of the Eskimo to unfamiliar tasks." Although both suggestions seem to have gone unexplored scientifically, Arctic policy makers pondered and discussed a range of possibilities for the "Eskimo test subject." Brown made a final request for grant monies from the DRB on 15 January 1954 at the tenth meeting of the Panel: "Considerable discussions arose regarding acclimatization [and] Brown indicated his reasons for believing that his work did constitute a study of acclimatization itself and not racial differences, etc."[79] The specifics of Brown's reasoning went unrecorded, but the Panel did move to approve his funding request. He used the funds to make another trip north, which proved to be the last. Brown's research ended in 1955 without clinical evidence showing the existence of cold acclimatization.

Federal funding for cold-weather research remained at the conclusion of Brown's work, although DRB grant monies went increasingly to non-human cold studies such as weather and terrain. Science continued to support the defence establishment through collaborative projects in the North, and the military continued to indoctrinate and adapt its personnel to the poten-

tial Arctic battlefield. In the process, white service members turned to cultural appropriation of Inuit. Military records refer to the value of "Eskimo" shelter and living techniques, and the DRB provided funding for scientists to study and make military kit based on Inuit clothing.[80] Science had failed to appropriate the perceived cold-fighting biological traits of the Inuk body, but peoples indigenous to the Canadian North remained valuable to both the military and national defence.

Conclusion

When read more than 50 years following its conclusion, the acclimatization research on Inuit and white "test subjects" represents a disturbing and complex symbol of Canadian science in the Cold War. The research assumed that human testing might produce civilian as well as military applications, and ethical issues concerning the use of human subjects did not deeply penetrate the scientific or medical discourse. The studies contributed to a popular and growing area of environmental scientific inquiry and unlike the chemical and biological weapons testing that occurred in Canada during the same period, acclimatization research was not highly restricted or classified. Acclaimed scientists and doctors received support from state and academic institutions to conduct the research and publish the findings in reputable scholarly journals, illustrating the militarization of science in Canada and an increased integration between the defence establishment and civilian scientists in the early postwar period.[81] When the studies failed to yield practical results, Canadian science moved on and the experimental work gradually faded from relevance. Yet the survival of medical papers, unpublished reports, and defence records makes it possible to investigate the purpose of the research and contextualize the studies in the perceived scientific intent.

Records indicate that Brown and his team did not operate with the primary aim of "assisting" Inuit to "reduce" any perceived strain on the Canadian state. Although acclimatization scientists helped introduce the welfare state to the North

by providing medical treatment services to Inuit, they did so while pursuing an unrelated goal. Unlike the persons responsible for carrying out the government's extensive Inuit relocation programme during the same period, intrigue in the Inuk body rather than a desire to reform Inuit health care was the primary influence for the scientists engaged in acclimatization research.[82] The superficial problem of Inuit "dependency" merely opened the door to a different form of colonialism, where the biologized Inuk body could serve scientific and Cold War agendas.

The cold-acclimatized scientific perception of the Inuk body was a constructed idea. The scientists engaged in the research pursued an unattainable goal, conceived and perpetuated by racialized conceptions of peoples indigenous to the Canadian Arctic. Sources refer to the "dependency" of the "Eskimo," but the majority of those references are outside records pertaining to cold acclimatization. Where cold-weather research is concerned, defence reports and medical publications largely avoid discussion of the "Eskimo problem." Those engaged in acclimatization research biologized Inuit in a process that advanced southern interests first and the colonized second, but the southern interests pursued a dual-purpose agenda distinct from cultural assimilation.

Unfortunately, available sources speak little of the personal convictions of each scientist engaged in the cold acclimatization research. Published medical papers describe Inuit and white human "test subjects" as material objects. Brown's personal papers are much the same. Correspondence remains between Brown and his colleagues, but written records make seemingly no reference to interactions between researcher and subject. Brown was heavily invested in Arctic research and medical activities. He enjoyed his work and valued contributing to the Canadian medical profession through government initiatives. Brown died in 1977 and entered the Canadian Medical Hall of Fame in 2000. Remembered as a pioneer of medicine, his participation in acclimatization research should be considered as part of a wider intersection of complex circumstances and events. Brown's personal records provide a window of clarity without match, but he was amongst others engaged in the medical treat-

ment services and acclimatization research activities described herein. Although they are beyond the focus of this article, the many persons who jointly conceived, supported, and contributed to the work also deserve attention.[83]

Imbued with visions of dominance and superiority, cold acclimatization research in Canada ultimately provided an opportunity for science to serve multiple agendas. The research intrinsically posited the possibility of biological appropriation, contributing another disturbing layer to the colonial treatment of Indigenous peoples in Canada. The nordicity of the "Eskimo" was absolute in the eyes of the Arctic scientists, and the Inuk body became eminently well suited to meet the needs of the Canadian defence establishment when reduced strictly to a biological function. As Brown wrote in 1954, "[because] of their performance in the cold it seemed safe to assume that [Eskimos] were acclimatized, though in the beginning uncertainty had to be admitted." [84] The defence establishment endeavoured to exploit Brown's assumption, but cold acclimatization extended beyond the control of the state. Adaptation to the cold Canadian Arctic remained elusive and, by the end of the research, a dejected Brown could only conclude, "the degree of acclimatization seen in the Eskimo is not really important for any purposes but theirs."[85]

Available records describe a complex set of circumstances. The perceived acclimatization of Inuit served a specific scientific pursuit. Originally conceived from a medical intrigue to define the biological functions of cold tolerance, acclimatization research offered the potential to serve yet unrealized military problems. The inability of the scientists to define the vascular characteristics of cold acclimatization is thus irrelevant when assessing the impact of their research. The intended pursuit of an abstract biological variation between the Inuk and white body is the imperative point. An idea conceived by medical science took on an agenda distinct and unrelated to its original purpose. Perpetuated by a calculated response to postwar anxieties, acclimatization research represents a brief but important intersection between the colonial state and defence establishment in Cold War Canada.

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Endnotes

1 C.W. Baugh, G.S. Bird, G.M. Brown, et al., "Blood Volumes of Eskimos and White Men Before and During Acute Cold Stress," *The Journal of Physiology* 140, no. 3 (1958): 354.

2 The word *Inuit* means "people" and is plural; the word *Inuk* is a singular reference to one person. For a more detailed explanation, see Alan Rudolph Marcus, *Relocating Eden: The Image and Politics of Inuit Exile in the Canadian Arctic* (Hanover and London: University Press of New England, 1995), xv-xvi. See note 5 for more on terminology in this article.

3 See Library and Archives Canada (hereafter LAC), Record Group (hereafter RG) 128, Vol. 258, Malcolm Brown, Queen's University Arctic Expeditions 1947, 1948, 1949, 1950: Progress Report, December 1950. The Defence Research Board (hereafter DRB) published the report in October 1951 as Dr. G. Malcolm Brown, *Progress Report on Clinical and Biochemical Studies of the Eskimo* (Ottawa: DRB, Department of National Defence, 1951).

4 For a brief description of DRB Grant No. 80, "Clinical and Biochemical Studies of the Eskimo," see United States National Archives and Records Administration (hereafter NARA), RG 319, Box 865, DRB: Annual Report on the Progress of Defence Medical Research, Report No. D.R. 15 December 1949.

5 This article uses the word *Inuit* to refer to persons indigenous to the Canadian North who were the "test subjects" of the discussed acclimatization research. I use the term *Inuit* because the evidentiary record does not distinguish the "Eskimo" persons subjected to the research, other than one reference to "Iviliks." It is possible that the scientists conducted research on Indigenous persons who might not have been Inuit.

6 While the December 1950 report detailed experiments on 282 "Eskimo test subjects," Brown co-published a medical article in 1954 that detailed further experiments on an additional six adult "Eskimo" test subjects. See C.W. Baugh, G.S. Bird, G.M. Brown et al., "Blood Volumes of Eskimos and White Men Before and During Acute Cold Stress," *The Journal of Physiology* 140, no. 3 (1958): 347–58.

7 G. Malcolm Brown, G.S. Bird et al., "The Circulation in Cold Acclimatization," *Circulation: Journal of the American Heart Association* (1954): 813–22.

8 Ibid. Also see G. Malcolm Brown, G.S. Bird et al., "Cold Acclimatization," *Canadian Medical Association Journal* 70, no. 3 (1954): 259.

9 Researchers performed needle biopsies of the liver in two "subjects" in 1947, see "Northern Research Reports: Medicine," Arctic 1, no. 1 (1948): 65; and three in 1948, see Malcolm Brown, "Northern Research Reports: Medical Investigation at Southampton Island," Arctic 2, no. 1 (1949): 70–1. The December 1950 report (see note 3) states that "punch biopsies have been carried out on ten subjects ...."

10 LAC, RG 128, Vol. 258, File Miscellaneous Part 2, Recent Research on Cold Acclimatization and Other Arctic Medical Problems, G. Malcolm Brown, 14.

11 Ibid.

12 G. Malcolm Brown, "Cold Acclimatization in Eskimo," *Arctic* 7, no. 3 and 4 (1954): 351.

13 For a comprehensive account of southern views towards Indigenous health in the Canadian North, see Liza Piper and John Sandlos, "A Broken Frontier: Ecological Imperialism in the Canadian North," *Environmental History* 12, no. 4 (October 2007): 759–95.

14 For a brief history of the Nuremberg Code, see Paul Weindling, "The Origins of Informed Consent: The International Scientific Commission on Medical War Crimes, and the Nuremburg Code," *Bulletin of the History of Medicine* 75, no. 1 (2001): 37–71. For specific reference to the formalization of ethical guidelines for medical research in Canada, see Barb Cotton, Andrea Manning-Kroon, and William E. McNally, "An Overview of the Law Regarding Informed Consent," *The Barrister* 72, no. 10 (2004).

15 See G. Malcolm Brown, "Northern Research Reports: Medical Investigation at Southampton Island," *Arctic* 2, no. 1 (1949): 70.

16 LAC, RG 128, Vol. 258, Malcolm Brown, Queen's University Arctic Expeditions 1947, 1948, 1949, 1950: Progress Report, December 1950.

17 Brown, Bird et al., "Cold Acclimatization," 259.

18 Stephen Bocking, "Indigenous Knowledge and the History of Science, Race, and Colonial Authority in Northern Canada" in *Rethinking the*

Great White North: Race, Nature, and the Historical Geographies of Whiteness in Canada, eds. Andrew Baldwin, Laura Cameron, and Audrey Kobayashi (Vancouver: University of British Columbia Press, 2011): 39–61; quote on 46.

19 Roy MacLeod, "All for Each and Each for All: Reflections on Anglo-American and Commonwealth Scientific Cooperation, 1940–1945," *Albion: A Quarterly Journal Concerned with British Studies* 26, no. 1 (1994): 79–112; quote on 80.

20 Ian Mosby, "Administering Colonial Science: Nutrition Research and Human Biomedical Experimentation in Aboriginal Communities and Residential Schools, 1942–1952," *Histoire sociale/Social History* 46, no. 91 (2013): 145–72.

21 P. Whitney Lackenbauer has challenged protagonist narrative structures that pit "Aboriginal peoples on one hand, and the "Euro-Canadian" (non-Aboriginal) camp on the other." His extensive work on military-Aboriginal relations has shown that avoiding dichotomous language can serve well in assessing complex historical interactions. See "The Irony and the Tragedy of Negotiated Space: A Case Study on Narrative Form and Aboriginal-Government Relations during the Second World War," *Journal of the Canadian Historical Association* 15, no. 1 (2004): 177–206.

22 Acclimatization research was not unique in this regard, as evidenced by the diverse range of other federal scientific research initiatives that became essential to Canada's Cold War agenda. See, for instance, Stephen Bocking, "Seeking the Arctic: Science and Perceptions of Northern Canada," *The Dalhousie Review* 90, no. 1 (Spring 2010): 61–74.

23 The experiences of Inuit who had contact with Brown and his group of medical researchers may be lost to history. Unfortunately, it seems those experiences went unrecorded and untold. I contacted and received no response from Aboriginal Affairs and Northern Development Canada, and the Nunavut Food Security Coalition. The Government of Nunavut's Department of Health sent a kind response, recommending further contacts, but had no information pertaining to environmental or medical research in the 1940s and 1950s. Likewise, the friendly people at the Unikkaarvik Visitors Centre of Nunavut Tourism graciously provided a list of contacts, but also had no information. The Hamlet of Coral Harbour and the Hamlet of Igloolik also politely responded to my inquiries, but equally had no information.

24 The personal papers of G. Malcolm Brown are located at LAC in Ottawa, Ontario, as part of RG 128 (Medical Research Council/Canadian Institutes of Health Research). The papers comprise seven volumes of documentation, nearly the entire contents of which were released to me, following review, under the Access to Information and Privacy Act.

Volumes and files of interest are listed extensively in the notes of this article. Other important files from LAC derived from RG 24 (National Defence) and RG 85 (Northern Affairs), while documents from NARA were taken primarily from RG 319 (Army Staff).

25 If Inuit experiences or stories have survived, the details may further elucidate what information we do have and/or bring to light important insights for further consideration. Such insights may point to what Mary-Ellen Kelm refers to as "medical pluralism," which recognizes the resistance of Indigenous peoples to colonial medicine. See Kelm, *Colonizing Bodies: Aboriginal Health and Healing in British Columbia, 1900–50* (Vancouver: University of British Columbia Press, 1999). Currently, it remains unclear if Inuit subjected to cold acclimatization research resisted or embraced medical treatment services. Available records state the "Eskimos" were "very cooperative."

26 Pat Sandiford Grygier, *A Long Way from Home: The Tuberculosis Epidemic among the Inuit* (Montréal and Kingston: McGill-Queen's University Press, 1997), 58.

27 For details on the Canadian Government Eastern Arctic Patrol of 1935, see I.M. Rabinowitch, "Clinical and Other Observations on Canadian Eskimos in the Eastern Arctic," *The Canadian Medical Association Journal* 34, no. 5 (1936): 487–501.

28 The Hudson's Bay Company ship *Nascopie* patrolled eastern Arctic waters in 1947 but the main patrol belonged to the *C.D. Howe*, which made its maiden voyage in 1950 and sustained operation until the patrol was discontinued in 1969. See Grygier, *A Long Was from Home*, 86–103.

29 Ken S. Coates, P. Whitney Lackenbauer, William R. Morrison, and Greg Poelzer, *Arctic Front: Defending Canada in the Far North* (Markham, ON: Thomas Allen Publishers, 2008).

30 On the "colonial project," see Kristin Burnett, *Taking Medicine: Women's Healing Work and Colonial Contact in Southern Alberta, 1880–1930* (Vancouver: University of British Columbia Press, 2010), 7.

31 See, by date of publication, P. Whitney Lackenbauer and Matthew Farish, "The Cold War on Canadian Soil: Militarizing a Northern Environment," *Environmental History* 12, no. 4, Special Issue on Canada (2007), 920–50; Peter Kasurak, *A National Force: The Evolution of Canada's Army, 1950–2000* (Vancouver: University of British Columbia Press, 2013); and Andrew B. Godefroy, *In Peace Prepared: Innovation and Adaptation in Canada's Cold War Army* (Vancouver: University of British Columbia Press, 2014).

32 Daniel Heidt and P. Whitney Lackenbauer, "Sovereignty for Hire: Civilian Airlift Contractors and the Distant Early Warning (DEW) Line, 1954-1961," in P. Whitney Lackenbauer, *De-icing Required!: The Histor-*

ical Dimension of the Canadian Air Force's Experience in the Arctic (Ottawa: National Defence and the Canadian Forces, 2012), 95–112.

33 P. Whitney Lackenbauer, *The Canadian Rangers: A Living History* (Vancouver: University of British Columbia Press, 2013), 7.

34 Coates et al., *Arctic Front*, 65.

35 Archie M. Pennie ed, *Defence Research Northern Laboratory 1947–1965: Report No. DR 179* (Ottawa: DRB, Department of National Defence, Canada, 1966), 1.

36 Ibid., 2.

37 LAC RG 85 299, 1009-2[5], *Defence Research Northern Laboratory: Progress Report on Indoctrination Training for Military Operations in the North, DRNL Project Report No. 4* (Ottawa: DRB, Department of National Defence, Canada, 1954), 2.

38 LAC RG 85 299, 1009-2[5], *Annual Report on the Progress of Environmental Protection Research, December 1953: Report No. DR 80* (Ottawa: DRB, Department of National Defence, Canada, 1954), 1.

39 LAC RG 85 299, 1009-2[3], DRBS 3-750-43-2, DRB: Minutes of the 2/51 Meeting of the Arctic Research Advisory Committee, 30 April 1951, "Activities of the Defence Research Northern Laboratory".

40 Ibid.

41 In the December 1950 progress report, Brown listed the following personnel: R.G. Sinclair, L. Bruce Cronk, G.C. Clarke, J.E. Green, John Page, J.E. Gibbons, D.L. (Don) Whittier, Frederick deSinner, J.D. Hatcher, T.J. (Thomas) Boag, L.C. Boag, Donald Delahaye, Morley G. Whillans, and Gordon Bird. Although they did not travel to the North, Dorothy Knapman, Eve Minovitch, Claire McAdam, Shirley Davy, and Mary M. Sleeth assisted biochemical work in Kingston. See LAC, RG 128, Vol. 258, Malcolm Brown, Queen's University Arctic Expeditions 1947, 1948, 1949, 1950: Progress Report, December 1950.

42 For details pertaining to the personal life and professional working career of Malcolm Brown, see LAC, RG 128, Vol. 259, File Dr. G. Malcolm Brown – List of Publications, Curriculum Vitae, etc. (Part 1), Curriculum Vitae – Dr. G. Malcolm Brown, 11 March 1978.

43 For an institutional history covering the early formative years of the DRB, see Captain D.J. Goodspeed, *DRB: A History of the Defence Research Board of Canada* (Ottawa: Queen's Printer, 1958).

44 For a list of the DRB and its advisory committees and panels, see NARA, RG 319, Box 526, DRB: Second Semi-Annual Report 1 October 1947-31 March 1948, 5 June 1984, Appendix "A".

45 Goodspeed, *DRB*, 177.

46 Ibid.

47 Hugh L. Keenleyside, *Memoirs of Hugh L. Keenleyside, Volume 2: On the Bridge of Time* (Toronto: McClelland and Stewart, 1982), 308.

48 Ibid., 310.
49 Ibid., 179.
50 LAC, RG 24, Vol. 4129, File DRBS 4–78–53 vol. 1, Minutes of the First Meeting of the Panel of Arctic Medical Research, DRB, 16 December 1948.
51 LAC, RG 24, Vol. 2529, File 801–100–M91 Vol. 1, Minutes of the Third Meeting of the Medical Research Advisory Committee – Appendix "C": Arctic Medical Research Panel, 3 February 1950.
52 LAC, RG 24, Vol. 2529, File 801–100–M91 Vol. 1, DRB: Arctic Medical Research Panel, 12 January 1949.
53 LAC, RG 85, Vol. 299, File 1009–2[3], DRBS 3–750–43–2 DRB: Minutes of the 1/51 Meeting of the Arctic Research Advisory Committee, Appendix "A" Confidential, 2.
54 For an outline of the security policy of the DRB, see LAC, RG24, Vol. 2529, File 801–100–M91 Vol. 1, DRB: Care and Communication of Classified Information, 10 January 1949.
55 LAC, RG 24, Vol. 2529, File 801–100–M91 Vol. 1, DRB: Care and Communication of Classified Information, 10 January 1949.
56 See LAC, RG 24, Vol. 2484, File HQS–726–40–17–11, Defence Research Northern Laboratory: Acclimatization Research Programme 1949–50, Fort Churchill. For further information on the DRB and northern military science, see Matthew S. Wiseman, "The Development of Cold War Soldiery: Acclimatisation Research and Military Indoctrination in the Canadian Arctic, 1947–1953," *Canadian Military History* 24, no. 2 (Summer/Autumn 2015): 127–55.
57 NARA, RG 319, Box 865, DRB: Annual Report on the Progress of Defence Medical Research, Report No. D.R. 15, December 1949.
58 NARA, RG 319, Box 856, "DRB Second Semi-Annual Report: 1 October 1947 – 31 March 1948," 5 June 1948, 84.
59 NARA, RG 319, Box 856, "DRB Third Semi-Annual Report: 1 April – 30 September 1948," 10 December 1948, 153–8. The five projects included Grants No. 79 (W.H. Johnson, "Physiology of Motion Sickness"), 80 (Malcolm Brown, "Clinical and Biochemical Studies on the Eskimo"), 81 (Louis-Paul Dugal, "Physiological Factors involved in Resistance and Acclimatization to Cold Temperatures"), 82 (C.K. van Rooyen and L. McClelland, "Studies on the Inhibition of Virus Multiplication"), and 83 (J.W. Stevenson, "Studies of the Effects of the Toxin of Clostridium Botulinum type A on the Transmission of Nerve Impulses").
60 Ibid., 153.
61 NARA, RG 319, Box 856, "DRB Second Semi-Annual Report: 1 October 1947 – 31 March 1948," 5 June 1948, 90.
62 Ibid.

63 NARA, RG 319, Box 856, "DRB Third Semi-Annual Report: 1 April – 30 September 1948," 10 December 1948, 146.
64 "Northern Research Reports – Medicine: Queen's University Expedition to Southampton Island," 65.
65 Ibid.
66 See Mosby, "Administering Colonial Science."
67 Brown, Bird et al., "Cold Acclimatization," 259.
68 Figures 1 and 2 are only two of many data charts from the experiments. See LAC, RG128, Vol. 237, File Ascorbic acid – the response to cold and other Dugal work. For additional data charts, see Baugh, Bird, Brown, et al., "Blood Volumes of Eskimos and White Men Before and During Acute Cold Stress;" G. Malcolm Brown, G.S. Bird et al., "The Circulation in Cold Acclimatization," *Circulation: Journal of the American Heart Association* (1954): 813–22; and Brown, Bird et al., "Cold Acclimatization."
69 Brown, Bird et al., "Cold Acclimatization," 260.
70 LAC, RG 128, Vol. 237, File Acclimatization, Alan C. Burton, Abstract of Discussion on Acclimatization to Cold. For details on Burton, see Western University, Medical Biophysics, "A.C. Burton Day," http://www.schulich.uwo.ca/biophysics/research/A.C.%20Burton%20Day/index.html, <viewed 6 May 2015>.
71 Farish, "The Lab and the Land: Overcoming the Arctic in Cold War Alaska," *Isis* 104, no. 1 (March 2013): 1–29.
72 Ibid., 3.
73 Ibid., 19.
74 Committee on Evaluation of 1950s Air Force Human Health Testing in Alaska Using Radioactive Iodine ^{131}, Polar Research Board Commission on Geosciences, Environment, and Resources in cooperation with Board on Health Promotion and Disease Prevention Institute of Medicine, Board on Radiation Effects Research Commission of Life Sciences, National Research Council, *The Arctic Aeromedical Laboratory's Thyroid Function Study: A Radiological Risk and Ethical Analysis* (Washington: National Academy Press, 1996).
75 For instance, see LAC, RG 128, vol. 238, file Thyroid Diseases, Henry M. Thomas Jr., "Effect of Thyroid Hormone on Circulation," *The Journal of the American Medical Association* 163, no. 5 (1957): 337–41; and James W. Hendrick, "Diagnosis and Management of Thyroids," *The Journal of the American Medical Association* 164, no. 2 (1957): 127–33.
76 LAC, RG 128, vol. 259, file Dr. G. Malcolm Brown – List of Publications, Curriculum Vitae, etc. (Part 1), Letter from Malcolm Brown to Dr. K.J.R. Wightman, 2 November 1954. Keith John Roy "Kager" Wightman succeeded Ray Farquharson as chair of the Department of Medicine at the University of Toronto in 1960. In the same year, he

also became Physician-in-Chief at Toronto General Hospital, a position he retained until 1970. For details on Wightman, see Wightman-Berris Academy, University of Toronto, "Dr. Keith JR Wightman," http://wbacademy.utoronto.ca/about-us/dr-keith-jr-wightman, <viewed 5 May 2015>.

77 Mann wanted to co-publish Brown's results with that of his own from similar research conducted in the United States, but Brown refused because it would be "unsatisfactory" to have the data combined. See LAC, RG 128, vol. 259, file Dr. G. Malcolm Brown – List of Publications, Curriculum Vitae, etc. (Part 1), letter from Malcolm Brown to Dr. George V. Mann, 2 March 1955.

78 LAC, RG 24, Vol. 4129, File DRBS 4–78–53 vol. 1, Minutes of the First Meeting of the Panel of Arctic Medical Research, DRB, 16 December 1948.

79 LAC, RG 24, Vol. 4129, File DRBS 4–78–53 vol. 2, DRB Panel on Arctic Medical Research: Minutes of the Tenth Meeting, 15 January 1954.

80 For instance, see LAC, RG 24, Vol. 4206, File 270 –0–89–6, Winter Exercise "Sun Dog One," June 1951. Also see, for the civilian application of DRB clothing science, CBC News Roundup, "Nylon fur coats introduced," 3 June 1949, http://www.cbc.ca/archives/entry/nylon-fur-coats-introduced, <viewed 21 June 2015>.

81 In the many published reports of the acclimatization research documented extensively in this article, the Canadian government goes unmentioned, save for the odd footnote that credits financial support from Grant DRB No. 80 (see note 4) and the Department of National Health and Welfare.

82 For an extensive and well-crafted study of postwar Inuit relocation, see Marcus, *Relocating Eden*.

83 These persons include, but are not limited to, Omond Solandt (Director of DRB), L.P. Dugal (Director of DRB's cold acclimatization research), and Hugh Keenleyside (Chairman of Arctic Research Advisory Committee).

84 G. Malcolm Brown, "Cold Acclimatization in Eskimo," *Arctic* 7, nos. 3 and 4 (1954): 344.

85 Ibid., 351.