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Author
Takeuchi-Demirci, Aiko

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From Radiation Effects to Consanguineous Marriages: American Geneticists and Colonial Science in the Atomic Age

AIKO TAKEUCHI-DEMIRCI
Koç University

In 1947, the US National Academy of Sciences (NAS) established the Atomic Bomb Casualty Commission (ABCC), funded by the US Atomic Energy Commission (AEC), and sent American scientists to Hiroshima and Nagasaki to investigate the late effects of radiation exposure among atomic bomb survivors. James Neel, medical professor at the University of Michigan, headed the genetics team of the ABCC, whose mission was to assess possible genetic mutations caused by radiation. After the termination of the ABCC genetic studies in 1954, Neel and his colleague, William Schull, embarked on another project in Japan: the genetics of consanguinity—marriage among close relatives—in Japan. The radiation and consanguinity studies were ostensibly separate projects. Yet they used overlapping subjects and resources and helped establish Neel's prominent position in human genetics in the postwar period.

This article investigates why studies of inbreeding in Japan became a scientifically significant subject for Neel and other American geneticists of the postwar period. Their special attention to this breeding pattern, based on the data obtained from people residing in the Hiroshima and Nagasaki regions (not necessarily atomic bomb victims), reflected American fears of rising mutations among humans in a changing, "dystopian" world. These fears reflected anxieties that were the product of heightened radiation levels from nuclear weapons, an "exploding" global population, and the further mixing of different population groups as America expanded its empire. The data obtained in Japan helped scientists understand the types and number of genetic diseases that existed in different population groups. The data also helped them to estimate how much mutation human populations could manifest. Furthermore, Neel

used his research for genetic counseling to advise Americans on not just consanguinity, but also the opposite pattern: interracial marriages. While adopting the seemingly color-blind category of "population," rather than "race," Neel and others nonetheless responded to the anxieties of many Americans over changing racial dynamics in the world.

Neel's association with the ABCC—tied to American military and financial power—enabled his access to ample resources and subjects. Neel built his career during the era of regeneration and rapid development in human genetics—from individual-based mendelian genetics to the sprawling entrepreneurial scale of molecular biology. Although the ABCC, formed under the jurisdiction of the Supreme Command of Allied Powers (SCAP), held a joint affiliation with the Japanese National Institution of Health (JNIH), the primary purpose of such bilateral collaboration was to gain easy access to local subjects and experts. Neel's post-ABCC scientific investigations continued to be bankrolled by the AEC and other American organizations. Neel and other American scientists used their superior positions to justify their colonial research—as a mission to "enlighten" the Japanese to the world of freedom and democracy in opposition to the "irrationality" of fascism and communism.[1]

Despite emphasizing the medical, statistical, and democratic nature of their work, Neel and other population geneticists inherited much of the ideology, methods, and institutions used by earlier eugenicists.[2] Neel and Schull's work centered field work as a way to collect "samples" from "culturally homogeneous" isolated groups of humans.[3] In other words, their research depended on "intimate" relationships with their subjects, probing into their family history, marriage patterns, and even sexual/reproductive behaviors.[4] Their research methods were in line with the broader trend in Western research on indigenous peoples, motivated by the idea of the "good of mankind," as illustrated by Linda Tuhiwai Smith.[5] Historians have well documented scientists' complicity in colonial endeavors.[6] These include eugenicists (whose theories served to justify the superiority of the white race), anthropologists (whose mission was to understand the lives and "nature" of the colonial Others), and nuclear scientists and ecologists (whose work helped justify and cement US superiority in the nuclear age).[7] Colonial science, of course, was not limited to Western empires, demonstrated by wartime Japan's use of science for its colonial projects.[8] Geneticists have received comparatively little critical scrutiny regarding their direct role in practicing colonial science, cloaked under the veneer of scientific objectivity. American scientists' preoccupation with their grand mission to investigate the threats facing mankind, I argue, overshadowed the bioethical concerns over dealing with vulnerable subjects.

This article thus highlights the contradictions and dilemmas that American geneticists faced at the dawn of the atomic age—representing the rising power of the United States yet foreseeing the doomed future that such power might bring to the nation, the (white) race, and the entirety of humanity. With increasing background radiation from atomic energy and weapons that Americans had created, genetic

mutations seemed to be on the rise. Furthermore, advancement in human mobility and public health triggered a rapid increase in race mixing and population size, which geneticists postulated might contribute to further unknown mutations among humans and threaten genetic equilibrium. Echoing the discourse of eugenics, these geneticists were ultimately concerned with the purity and hegemony of the white race. Indeed, it was apocalyptic fears about shrinking or disappearing white populations that drove American scientists to search for resources and answers in "deviant" bodies, such as breeding patterns, nonheteronormative sexualities, and genetic abnormalities of nonwestern subjects.[9]

Fears of Mutations

One of the crucial missions given to human geneticists during the 1940s and 1950s was to investigate the effects of radiation on humans. During his graduate studies at the University of Rochester, Neel worked under Curt Stern, a prominent Drosophila (fruit fly) geneticist, who was involved in studies on the biological effects of radiation for the Manhattan Project. It came naturally for Neel, then, to propose a genetic study on mutations among atomic bomb survivors in Japan after World War II. Indeed, as I show below, the issue of mutations was key to both the ABCC and consanguinity studies carried out by Neel and Schull.

Despite their professed goal to illuminate mutations, ABCC scientists expected from the beginning that they would not be able to yield immediate, tangible results. When they initiated their research, ABCC scientists did not have access to cytogenetic methods, which became in widespread use in the late 1960s.[10] They thus had to search for circumstantial evidence based on the reproductive outcomes of pregnant survivors, such as the incidence of malformations, stillbirths, spontaneous abortions, neonatal deaths, birth weights, and newborn sex ratios. Early studies therefore required intimate access to and cooperation from survivors and local midwives who reported on reproductive outcomes and children's physical conditions. Even then, scientists knew that genetic mutations, usually recessive and invisible, would only appear in later generations, if at all.[11]

The ABCC's "negative" results were politically and socially useful, nonetheless. Their studies served to quell public fears about "genetic monsters" produced by radiation exposure.[12] ABCC scientists believed their work provided reassurance to both Japanese and American publics, who were increasingly concerned about fallout from nuclear testing and the possibility of nuclear war.[13] They also provided policy recommendations by estimating genetic damage from nuclear weapons and fallout, as well as from lower-dose, chronic exposures such as those produced by medical X-rays and nuclear-energy plants. In 1956, Neel served on the NAS Committee on the Biological Effects of Radiation. The ABCC data were also used in the UN and WHO scientific committees on radiation effects. There was hardly any consensus among geneticists regarding "tolerable" doses of radiation exposure in humans. In fact, many

scientists criticized the ABCC data for being too conservative, or even concealing some genetic effects.[14] H. J. Muller, who won a Nobel prize in 1946 for his work on radiation-induced mutations, declared that all mutations were recessive and deleterious and warned that increased exposure to radiation would cause more harmful mutations in human populations.[15] Even ABCC scientists agreed that there was no tolerable "threshold" for radiation exposure. The ABCC's "negative" results did not mean that "absolutely no effect ha[d] occurred," but that the effects were either too small to detect or not yet manifested.[16]

As scientists, however, they believed that concluding the studies with "inconclusive" results would be "an abandonment of scientific responsibility."[17] Neel and Schull therefore found another area where they could establish their positions as leaders in human genetics, as an "unusual opportunity" came about—"an opportunity that should not be missed."[18] During the ABCC's genetics studies, Neel and Schull noticed high rates of cousin marriages in Hiroshima and Nagasaki. They decided to exclude those cases from their initial investigation, however, as they worried that they could affect the accuracy of the data—the cases of malformation could be the result of inbreeding rather than radiation exposure.[19] But soon after the termination of the ABCC studies, they re-launched a separate study focusing on consanguinity in Japan.

The first stage of the Child Health Survey, as it was euphemistically called, took place in Hiroshima, Nagasaki, and Kure (as a control city) from 1958 to 1960. Although these were urban areas, Neel and Schull determined that inbreeding was just as common in these cities as in smaller villages.[20] During the next stage, they extended their investigation to nearby and more "isolated" areas: Hosojima (a small island east of Hiroshima) in 1959, and Hirado (an island port in Nagasaki Prefecture) in 1964. Schull was especially interested in exploring the effects of Christianity, a minority religion in Japan, on consanguinity. Hirado, a historical port for foreign trade, was known to have a sizable number of "hidden" (*kakure*) Christians. On one hand, the Christian doctrine against inbreeding made this type of marriage much less frequent; on the other, the religious ban against marriage with non-Christians had secluded Christians from the rest of the population.[21] The physical, social, and historical isolation of the people on these islands thus made them particularly unique and interesting subjects for scientific inquiry.

To access school children of consanguineous parents, the research team relied on networks previously used to recruit pregnant women and children for the ABCC genetics studies. They also used the ABCC facilities for clinical examinations and laboratory studies. Medical examination of children included evaluating visual acuity, hearing, the nervous system, psychometric tests, anthropometric measurements, dental characteristics, and blood and urine tests.[22] Neel and Schull stressed that participating in these studies was voluntary, and that, although they did not conceal their primary interest in the effects of consanguinity, the examination would also benefit the child's own health. Indeed, Neel boasted that their "super-salesmanship" and "jeep rides" to the facilities led to a high participation rate.[23]

Although the results were not exactly "inconclusive," as they were in the ABCC studies, they did not indicate any obvious effects of consanguinity. Neel observed that "intelligence tests" showed that the average child of first cousins was just "slightly inferior." Estimates of infant and childhood mortality also seemed "surprisingly low."[24] If the possible effects of inbreeding were so "slight," then what was the true significance of their work?

Consanguineous marriages attracted the attention of Anglo-American eugenicists since the mid-nineteenth century despite the general decline of the practice in Western societies. The "consanguinity debate" among biologists and eugenicists showed that there was no consensus over the subject. Leonard Darwin, son of Charles Darwin and President of the Eugenic Society of Great Britain, acknowledged that the harm arising from cousin marriages could be small "if the stock is good," but dictated that such marriages should be avoided for most people to err on the safe side.[25] Others saw inbreeding as a useful eugenic means to "canalize and isolate ill-health and undesirable qualities," while protecting the "desirable stock" from "contamination" resulting from "cross-breeding."[26] Scientific data remained anecdotal, however, as one biologist noted: "no phase of biology has been enveloped in such a fog of superstition, old wives' tales, and other sorts of misapprehension as has inbreeding."[27]

In the 1950s, there was a renewed interest in the subject as investigations expanded from familial case studies to broader explorations of the gene pool. In 1956, population geneticists, Curt Stern, Newton Morton, and H. J Muller presented an influential article on the subject in relation to "mutational damage in man," *before* Neel and Schull launched their work in Japan.[28] Inbreeding, like genetic studies of twins, highlights the mechanisms of heredity and the recessive genes that are otherwise "concealed" in broader population groups. Most genetic diseases in humans are inherited from recessive genes. Breeding among blood relatives increases the odds that two recessive genes (homozygous state) will be expressed. Studies of consanguineous marriages could thus provide a better understanding of the frequencies of recessive diseases and the extent of mutational damage that existed in a population.[29] It was because of the heightened concern for increasing mutations—or the "genetic load"—in humans, at a time of changing racial dynamics in America and in the world, that studies on inbreeding came to attract special attention among geneticists in the postwar period.

Counseling "race" in America

While scientists examined the effects of consanguinity to estimate the fitness of the gene pool in the atomic age, the Japanese data benefitted the American public through genetic counseling. Neel and Schull's access to Japanese subjects through their roles in the ABCC provided them with the largest data set on consanguinity to date, coinciding with the American public's growing interest in genetic counseling as

the ideology of domesticity and pronatalism permeated the postwar society. At the same time, postwar genetic counseling inherited much from prewar eugenic studies and practices.[30] Data on an inbreeding Asian population served to address American anxieties about blurring racial boundaries in the postwar era, providing them with clues on the effects of interracial mixing between whites and nonwhites (especially Asians).

Neel played a pioneering role in establishing genetic counseling as a legitimate medical practice in the United States during the prewar years. He established the Heredity Clinic at the University of Michigan's medical school in 1940, the first of its kind in the United States. These new genetic counseling centers, however, succeeded the practices of prewar eugenics institutions, such as the Eugenic Record Office (ERO) and the Institute of Family Relations directed by eugenicist Paul Popenoe. The records from the ERO were transferred to the Dight Institute, another major genetic counseling clinic established a year after the Heredity Clinic.[31]

The results of genetic studies in Japan were used in these genetic counseling centers, not just for consanguineous marriages, but for a broader understanding about various genes and diseases in different populations.[32] Neel and Schull's work in Japan was a rare opportunity for American scientists to gain first-hand access to data on an Asian population. They highlighted different types of diseases and gene frequencies than those known in Euro-descended populations.[33]

Moreover, studies on inbreeding helped geneticists understand the effects of the opposite phenomenon: interracial mixing. If people from different populations mixed, would they *spread* recessive genes, or *dilute* their effects? In other words, would mixed marriages cause more diseases among populations, or would they produce fitter offspring? Since the prewar years, eugenicists debated the benefits and harms of interracial unions. While some argued that such unions could result in a "hybrid rigor," most eugenicists warned that they would cause a "chaotic constitution."[34] Geneticists in the postwar period continued to disagree about whether interracial mixing was genetically advantageous or harmful. Theodosius Dobzhansky believed that genetic diversity was an advantage, whereas H. J. Muller asserted that all mutated genes, whether heterozygous or homozygous, were deleterious. Although Neel noted that he sided with Dobzhansky's view, he also believed that the "amalgamation of human population into vast interbreeding complexes" had blunted the lineal evolution of genetic frequencies. Moreover, should a population with a higher frequency of heterozygotes "revert to high levels of inbreeding," he argued, its effects could be even more devastating than populations that had maintained the original level of inbreeding.[35] In other words, there was no going back for societies on the path toward racial amalgamation.

The records of postwar genetic counseling indicated that there was a strong interest among the (mostly white) public in the outcomes of interracial marriages. According to the director of the Dight Institute, Sheldon Reed, "the largest single group of requests for information and counseling" concerned the heredity of skin

color in mixed marriages. Most of these requests came from adoption agencies, asking them about the "ability" of children with African or Asian heredity to "pass for white."[36] The chart below, based on the data from the Dight Institute, indicates the public's preoccupation with phenotypical expressions such as skin color and eye color, in addition to topics frequently investigated in prewar eugenics research such as mental deficiency, genealogy, and consanguinity. Neel received similar types of requests at the Heredity Clinic. In an article in *Collier's*, introducing his work at the Clinic, Neel responded to a question from a reader who married a Japanese woman, asking how many generations it would take for their offspring to "look like ordinary Americans."[37] It would depend on the "type of Japanese girl involved," he answered, as there was a great range in "Mongolian features" among the Japanese. While emphasizing the genetic diversity within a race, Neel nonetheless referred to stereotypical characteristics in describing physical features such as the "Mongolian eye fold, skin coloration and high cheekbones."[38] Neel's response revealed his own ambiguity and uncertainty about the unknown effects of race mixing in the distant future.

Frequently Asked Topics at the Dight Institute in the 1950s

1. Education and genealogy	11. Mongolism
2. Skin color	12. Cancer
3. Epilepsy	13. Spina bifida
4. Consanguinity	14. Huntington's chorea
5. Mental deficiency	15. Diabetes
6. Schizophrenia	16. Albinism
7. Harelip and cleft palate	17. Allergies
8. Eye color	18. Hemophilia
9. Twinning	19. Paternity questions
10. Rhesus factors	20. Manic-depressive psychosis

Source: Reed, "Heredity Counseling and Research," *Eugenical News* 37, no. 3 (September 1952): 42.

The public's preoccupation with race mixing in the postwar period reflected the drastic changes in immigration laws and America's new face as a "colorblind" society. The 1945 War Brides Act temporarily lifted the ban on Asian immigrants for spouses and children of military personnel. In 1952, the Immigration and Nationality Act, also known as the Walter-McCarran Act, nullified all anti-Asian exclusion laws, although

immigration quotas remained in place. Furthermore, the Refugee Act of 1953 allowed the adoption of orphans—many of them fathered by American GIs—from countries outside the immigration quotas, mostly from Europe, but also from Asian countries such as Japan and Korea. The 1957 amendments to the Immigration and Nationality Act authorized unlimited visas for orphans. These new immigration measures opened new possibilities for forming interracial families in the United States, serving to advance the image of racial tolerance and freedom in the Cold War ideological battle.[39]

Another perceived threat to the genetic future of humans, or more specifically to white Americans, was the effect of global overpopulation. American eugenicists since the turn of the twentieth century had been alarmed by the idea of "race suicide"—a shrinking white population being replaced by fertile new immigrants. The perception of high birth rates among people of color—breeding "like rabbits"— had thus fueled the birth control movement both at home and abroad, as it aligned with the global eugenics movement. The global population control movement gained further momentum in the postwar decades, targeting women in Asia or in colonial territories like Puerto Rico. Fights against population "explosion" were framed as part of the Cold War struggle, as overpopulation, it was believed, would exacerbate poverty and social unrest, making these developing nations vulnerable to communist propaganda.[40]

Neel, too, was concerned about the effect of global overpopulation on the genetic fitness of mankind. Uncontrolled human reproduction in an impoverished environment, he warned, would deteriorate the quality of offspring and pose "serious threats to the integrity of the gene pool and its optimal phenotypic expressions."[41] He made sure, however, that he made "no value judgments about any specific group." Rather, he argued, "all people [should] move toward population control simultaneously, thus dispelling deep-rooted fears that some sectors [were] being subjected to a subtle form of genocide."[42] Yet, considering that mostly Third World countries became the target of global population control programs, one can assume that he implicitly blamed nonwhite people for causing "threats" to the gene pool.[43]

Neel believed that modern civilization had jeopardized the natural evolution of humans in many ways. Christianity had discouraged the practice of inbreeding, and imperialism had brought people from different parts of the world in closer contact with one another. The spread of modern public health and technology had relaxed the natural check on population and led to an exponential increase in global population. The nuclear weapons that Americans created to destroy the Other was now threatening to extinguish their own people. Such was the apocalyptic vision of many American eugenicists, but the data of the "genetic past" of nonwestern people offered white Americans clues and hopes for surviving a racially "interbreeding" future.

Justifying Colonial Science

Although the ABCC and consanguinity studies benefited mostly Americans, American scientists also stressed their roles in helping the Japanese. The mission of the ABCC and subsequent scientific investigations was often politicized against the backdrop of the Cold War. Neel and Schull constantly felt the need to distance their work from colonial exploitation or worse, eugenic genocide. Even as they depended on the labor and resources of Japanese scientists and subjects, the American scientists emphasized their roles as mentors in training young Japanese with the "democratic" and "objective" methods of American science and saving them from the "propaganda" of communist science.

The ABCC had always been the target of suspicion and criticism from the Japanese for using them as guinea pigs without providing them with medical treatment.[44] While the use of nonwhite subjects for scientific experiments without the benefit of treatment was nothing new in the United States (as evident in the notorious Tuskegee syphilis study targeting African Americans), the ABCC's no-treatment policy was no secret. As M. Susan Lindee points out, in practice, some ABCC physicians did provide treatment to the survivors, and the ABCC sometimes paid for treatment at facilities where they referred their patients. The true purpose of the no-treatment policy appeared to be a symbolic and political one. While the ABCC provided many explanations for this policy, including a claim that treatment by the ABCC would interfere in the medical practice of local doctors, their main concern seemed that treatment from Americans would suggest atonement for using atomic weapons.[45] It was politically detrimental for the US government to admit responsibility for dropping the bombs when Cold War tensions were escalating.

Neel publicly insisted that all ABCC programs enjoyed "amazing cooperation" and that complaints emanated only from "a politically oriented, vociferous few."[46] Privately, however, he expressed concern for lingering Japanese suspicions during his planning of the consanguinity studies, which continued to receive funding from the AEC. Neel therefore sought additional financial support from "nongovernmental" (although American) sources such as the Rockefeller Foundation to emphasize the "essentially 'civil' character" of their research.[47] The trustees of the Rockefeller Foundation approved the request, agreeing that, despite "a certain degree of sensitivity" surrounding the studies, there seemed "no reason to doubt that the American group ha[d] the advantages of more money, more experience in human genetics and greater organizing ability than [was] currently at the disposal of the Japanese group."[48]

Neel knew that the cooperation of Japanese scientists was crucial to successfully carrying out the project. But he was wary of possible Japanese hostility—something Neel had experienced during his time at the ABCC.[49] "The fact that we propose to carry out a major study in Japan, in an area which the Japanese themselves could investigate," Neel confessed to a Rockefeller Foundation officer, "raises some

real problems in [establishing] working relationships."[50] Neel therefore reached out to the leader of human genetics in Japan, Komai Taku, seeking to set up a binational, collaborative project.[51] Komai had in fact been keen to recover Japanese science from wartime isolation, observing that the center of international science had now shifted from Germany to the United States.[52] Thus he formed a Subcommittee on Consanguinity Studies under the Science Council of Japan (JSC), bringing together the best geneticists in the country.[53] The Japanese team set up a number of case studies in small and remote villages providing Neel and his associates "a cross-section of consanguinity effects from all types of Japanese populations."[54]

Japanese scientists had been investigating the issue of consanguineous marriages since the prewar period. Komai had already conducted extensive research on genetic diseases, including consanguinity effects. Neel's first article on consanguinity in the 1949 issue of the *American Journal of Human Genetics* (*AJHG*) relied heavily on Komai's comprehensive case studies on various recessively inherited traits among the Japanese. [55] During the war, Japanese officials and eugenicists strongly discouraged the practice of cousin marriages on the basis that it was "biologically harmful" and detrimental to the fitness of the Japanese race.[56] As anthropologist Jennifer Robertson illustrates, the Japanese state sought instead to popularize the concept of "eugenic endogamy"—marrying widely among the "pure-blooded" Japanese.[57] The promotion of "eugenic marriages" became even more important after the war as scientists warned of the deteriorating quality of the Japanese race due to wartime and postwar distress. Some Japanese geneticists wrote frequently in popular magazines explaining the ill effects of consanguineous marriages to the lay public.[58]

To justify their leading part in this "collaborative" effort, however, Neel and Schull dismissed extensive case studies of so-called consanguinity villages conducted by the Japanese before the war as scientifically insignificant. They argued that these studies were not "presented in such fashion that one [could] readily compute coefficients of inbreeding."[59] They thus took on a "mentoring" role for Japanese scientists by training them in mathematical methods. During the planning stage of the Child Health Survey, three young Japanese geneticists (Yanase Toshiyuki, Ōkura Kōji, Fujiki Norio) spent a year in Ann Arbor, Michigan, where Neel and Schull maintained their labs, designing the project and learning mathematical methods necessary for data processing.[60]

American scientists' paternalism toward Japanese scientists had important political implications during the Cold War. Occupation officials and American scientists frequently expressed concern about the leftist leanings of many Japanese scientists. In particular, they were worried about the influence of Soviet science (represented by Lysenkoism) on Japanese geneticists.[61] Schull speculated that Supreme Commander General Douglas MacArthur invited H. J. Muller, an outspoken critic of Soviet science, to blunt further Marxist thought in Japan.[62] The 1947 organization report clearly stated the political mission of the ABCC as follows:

> Japan at this moment is extremely plastic and has great respect for the occupation. If we continue to handle Japan intelligently during the next few years while the new policies are being established, she will be our friend and ally for many years to come; if we handle her unwisely, she will drift to other ideologies. The ABCC or its successor may be able to play a role in this… Because of the ascendant leadership of science today and because of American position, American science must of necessity accept a large measure of the responsibility for development.[63]

The training of young Japanese scientists in American methods was therefore vital to "keep them on our side."[64] The unequal working relationships between American and Japanese scientists were uncritically endorsed since they dovetailed with America's Cold War mission.

Japanese scientists were rarely acknowledged as scientific collaborators of equal status in official publications; they were usually mentioned as a group—such as the JSC or the JNIH—for their "unqualified endorsement."[65] If they were referred to by individual names, they were usually appreciated for their "assistance in evaluating and interpreting the 'Japanese scene.'"[66] Initially, the American collaborators considered having a "joint publication" with a Japanese team that provided them with consanguinity data, as they believed it could have "a favorable effect on [their] 'morale.'" Neel and Schull, however, decided to publish separately because they considered the Japanese data "weak," even though the American team cited this data extensively in their first *AJHG* article.[67] It was only in the 1960s and 1970s that Japanese scientists started to appear in American journals as collaborating authors. By then, the Japanese teams were tasked with "supplement[ing] and extend[ing] the consanguinity studies previously carried out in Japan by Dr. Neel and Dr. Schull."[68]

Neel and Schull compiled all their consanguinity work and published it as *The Effects of Inbreeding on Japanese Children* (1965) which, they boasted, became "the standard against which all later studies have been judged" and established their reputation as "connoisseurs of consanguinity."[69] While cases of consanguinity existed everywhere in the world, it was the colonial networks and structures that allowed American scientists to access a large set of data in Japan. The extensive contribution of Japanese research subjects and scientists, however, were largely overshadowed by the glorious accomplishments of American scientists in their research for the "good of mankind."

Imperial Intimacies of Research

James Neel continued his quest to understand the gene pool and human evolution after he left Japan. Because he believed most human populations already had too many external influences on their genes, he searched for "the least acculturated"

humans living "in a more ancestrally 'natural' state."[70] He found what he was looking for in the 1960s in the Yanomami, the Indigenous people living in the Amazon rainforests in Venezuela and Brazil. In many ways, Neel's work on the Yanomami mirrored his earlier research in Japan. The "isolated" Yanomami, as well as the atomic bomb survivors, provided American scientists with a "natural experiment" to examine the evolution of gene pools.[71] A sense of urgency to uncover rare and "vanishing" subjects motivated Neel's investigation in both locations. The research on inbreeding in Japan was a time-limited opportunity, as scientists expected that consanguineous marriages would increasingly become rare, even in nonwestern societies, as a result of modernization, industrialization, and migration.[72] Neel felt that the Yanomami community in the current state would also soon disappear; therefore, it seemed imperative that he studied the genetic picture of the group while he had the chance.

Several months after Neel's death in 2000, a book by an investigative journalist Patrick Tierney came out which attacked the fieldwork conducted by Neel and anthropologist Napoleon Chagnon in the Yanomami villages for violating the rights and health of the subjects. The book, *Darkness in El Dorado: How Scientists and Journalists Devastated the Amazon*, alleged, among other things, that Neel purposely imported a measles epidemic in the Indigenous communities to test his theories about immune responses. Tierney also revealed that his experiments, like the consanguinity studies in Japan, were funded by the AEC, raising suspicion that the Yanomami people were used as a control group for Neel's previous work on atomic bomb survivors.[73]

Most of Tierney's accusations turned out to be false or misguided, according to the investigations made by several academic committees.[74] It is true that Neel first visited Brazil as a radiation expert to attend a WHO meeting to discuss the feasibility of biomedical studies in areas of high natural radiation.[75] But there is no evidence that the Yanomami was used specifically for radiation research. The investigations revealed, however, Neel's extensive use of AEC money for various aspects of genetic studies on the Yanomami. The final report by the American Anthropological Association (AAA) acknowledged that the AEC involvement in the project might have interfered with the vaccination program to treat the Yanomami people after the measles outbreak.[76] The *El Dorado* controversy exposed the American scientists' woeful lack of bioethical concerns and protocols in dealing with human—especially nonwhite—subjects.

This article has demonstrated that such unequal—yet "intimate"—relationships between American scientists and nonwhite peoples had long been justified by the financial and military power of American empire. At the same time, American scientists were ambivalent about the future of their civilization. Neel's search for a "lost (genetic) past"—before the devastation brought about by white practices and inventions—was what motivated him to conduct the radiation, consanguinity, and Yanomami studies. The goal of postwar American geneticists, who ostensibly distanced themselves from the overt racism and prejudice of earlier eugenicists, was to restore (or preserve) the genetic fitness of humans, specifically the

white race. In the end, their "humanitarian" research abroad was essentially no different from the racist studies conducted by earlier eugenicists on nonwhite subjects such as African Americans and Puerto Ricans. The postwar genetic studies revealed American scientists' complex and contradictory views about their roles and research in an apocalyptic atomic age.

Notes

[1] The political consciousness of leading Anglo-American geneticists, including H. J. Muller and Theodosius Dobzhansky, was expressed in the so-called "Geneticists' Manifesto" in 1939, which argued against both "extreme environmentalism" and the race- and class-based eugenics executed by the Nazis. For the full text of the manifesto, see "Plan for Improving Population Drawn by Famed Geneticists," *Science News Letter*, August 26, 1939, 131–33.

[2] Historian Daniel Kevles, in *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York: Knopf, 1985), has called them "reform eugenicists," as opposed to the "mainline eugenicists" of the earlier period.

[3] Jenny Reardon, *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton: Princeton University Press, 2005), 67.

[4] Although the "biochemical wave" was beginning to gather momentum, especially in Britain, in the 1950s, according to Neel, "there were not very many reputations being made at the bedside." In other words, American genetics still centered around extensive field studies and practical applications, rather than primarily laboratory work. Kevles, *In the Name of Eugenics*, 233; James V. Neel, *Physician to the Gene Pool: Genetic Lessons and Other Stories* (New York: John Wiley and Sons, 1994), 54.

[5] Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples*, 2nd ed. (London: Zed Books, 2012), 2, 26.

[6] Medicine and public health were an integral part of the United States' colonial endeavors. See for example, Warwick Anderson, *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines* (Durham: Duke University Press, 2006); John Farley, *To Cast Out Disease: A History of International Health Division of the Rockefeller Foundation (1913-1951)* (London: Oxford University Press, 2003).

[7] See for example, Laura Briggs, *Reproducing Empire: Race, Sex, Science, and U.S. Imperialism in Puerto Rico* (Berkeley: University of California Press, 2002); David Price, *Anthropological Intelligence: The Deployment and Neglect of American Anthropology in the Second World War* (Durham & London: Duke University Press, 2008); Eric Wakin, *Anthropology Goes to War: Professional Ethics and Counterinsurgency in Thailand* (Madison, WI: Center for Southeast Asia Studies, University of Wisconsin-Madison, 1992); Jacob Darwin Hamblin, *Poison in the Well: Radioactive Waste in the Oceans at the*

Dawn of the Nuclear Age (New Brunswick, NJ: Rutgers University Press, 2008); Elizabeth M. DeLoughrey, "The Myth of Isolates: Ecosystem Ecologies in the Nuclear Pacific," *Cultural Geographies* 20, no. 2 (2012): 167–84.

[8] See for example, Akitoshi Shimizu and Jan van Bremen, eds., *Wartime Japanese Anthropology in Asia and the Pacific* (Osaka: National Museum of Ethnology, 2003).

[9] Laura Briggs illustrates how Puerto Rican women have been defined by their sexual "deviance" in American welfare policies and birth control measures. *Reproducing Empire*, 4.

[10] Cytogenetic and electrophoretic studies conducted by the ABCC (renamed the Radiation Effects Research Foundation in 1975) have also been "inconclusive." M. Susan Lindee, *Suffering Made Real: American Science and the Survivors at Hiroshima* (Chicago: University of Chicago Press, 1994), 244.

[11] Lindee, *Suffering Made Real,* 74.

[12] Lindee, *Suffering Made Real*, 60.

[13] Neel, *Gene Pool*, 85; William J. Schull, *Effects of Atomic Radiation: A Half Century of Studies from Hiroshima and Nagasaki* (New York: Wiley-Liss, 1995), 266; John Beatty, "Genetics in the Atomic Age: The Atomic Bomb Casualty Commission, 1947–1956," in *The Expansion of American Biology*, ed. Keith Rodney Benson, Jane Maienschein, and Ronald Rainger (New Brunswick: Rutgers University Press, 1991), 288, 296, 300.

[14] Lindee, *Suffering Made Real,* 239; Beatty, "Genetics in the Atomic Age," 311.

[15] Kevles, *In the Name of Eugenics,* 259. Diane Paul indicates that Muller's strong position against nuclear weapons could also be attributed to his postwar anticommunism, disavowing his earlier experience working in the USSR. "H. J. Muller, Communism, and the Cold War," in *Perspectives on Genetics: Anecdotal, Historical, and Critical Commentaries, 1987–1998*, ed. James F. Crow and William F. Dove (Madison: University of Wisconsin Press, 2000), 53.

[16] Schull, *Effects of Atomic Radiation*, 266; Neel, *Gene Pool*, 245; Beatty, "Genetics in the Atomic Age," 309; Hamblin, *Poison in the Well*, 13–15, 19–20.

[17] Schull, *Effects of Atomic Radiation*, 262.

[18] William J. Schull and James V. Neel, *The Effects of Inbreeding on Japanese Children* (Harper & Row: New York, 1965), 348; "Bulletin, Atomic Casualties," 1956, 417, folder 102, box 9, RG 2A.2, John C. Bugher Papers, Rockefeller Foundation Archives, Rockefeller Archive Center, Sleepy Hollow, New York (hereafter, RFA).

[19] Lindee, *Suffering Made Real,* 208.

[20] Schull and Neel, *Effects of Inbreeding*, 14.

[21] Schull, "The Effect of Christianity on Consanguinity in Nagasaki," *American Anthropologist* 55, no. 1 (1953): 74–88.

[22] Schull and Neel, *Effects of Inbreeding*, 1–10.

[23] Neel, *Gene Pool*, 98.

[24] Neel, *Gene Pool*, 102.

[25] Quoted in Alan H. Bittles, *Consanguinity in Context* (New York: Cambridge University Press, 2012), 55.

[26] A. M. Ludovici, "Eugenics and Consanguineous Marriages," *Eugenics Review* 25 (1933): 147–55.

[27] Raymond Pearl, Review of *Inbreeding and Outbreeding, Their Genetic and Sociological Significance* by Edward M. East, *Science* 51, no. 1321 (1920): 416.

[28] Curt Stern, *Principles of Human Genetics* (San Francisco: W.H. Freeman, 1949), 340–65; Newton E. Morton, James F. Crow, and H. J. Muller, "An Estimate of the Mutational Damage in Man from Data on Consanguineous Marriages," *Proceedings of the National Academy of Sciences* 42 (1956): 855–63.

[29] Neel, *Gene Pool*, 95; Morton, "An Estimate of the Mutational Damage," 855; Schull and Neel, *Effects of Inbreeding*, 330.

[30] Wendy Kline demonstrates that the popularity of eugenic "marriage counseling" in the prewar years paved the way for pronatalism in the United States in the 1950s. *Building a Better Race: Gender, Sexuality, and Eugenics from the Turn of the Century to the Baby Boom* (Berkeley: University of California Press, 2005), 132–42.

[31] Ian H. Porter, "Evolution of Genetic Counseling in America," in *Genetic Counseling: A Monograph of the National Institute of Child Health and Human Development*, ed. Herbert A. Lubs and Felix de la Cruz (New York: Raven Press, 1977), 22–25.

[32] Neel, *Gene Pool*, 101.

[33] Neel, "The Incidence of Consanguineous Matings in Japan," 156. John Embree, who was the first American anthropologist to conduct extensive field work in a rural village in Japan in the 1930s, noted that "cousin marriages [were] frequent" but chose not to further investigate the issue. *Suye Mura: A Japanese Village* (Chicago: University of Chicago Press, 1939), 88.

[34] In response to a letter from a Japanese statesman seeking advice on race mixing between the Japanese and Westerners, Herbert Spencer, known for his doctrine of social Darwinism, claimed that the result would "invariably be a bad one in the long

run." "Herbert Spencer on Race Mixture," *Eugenics* 3, no. 2 (Feb. 1930): 63. In 1927, Charles Davenport launched a systematic study on race crossing across the world. See his preliminary report in "The Meeting of the International Federation of Eugenic Organizations," *Eugenical News* 14, no. 11 (Nov. 1929): 156–57.

35 Neel, *Gene Pool*, 187–88, 322–23; Neel, "Lessons from a 'Primitive' People," *Science* 170, no. 3960 (1970): 816.

36 Sheldon C. Reed, *Counseling in Medical Genetics* (Philadelphia: Saunders, 1955), 153–55.

37 James V. Neel, "Brown-eyed Parents, Blue-eyed Child, Why?" *Collier's,* March 7, 1953, 14.

38 Despite their preference to use the term "population," rather than "race," postwar geneticists still relied on physical and mental characteristics that were often associated with "race." The overlap became evident in geneticists' critical response to the 1950 UNESCO Statement on Race, in which geneticists defended the validity of race as a scientific category. See, Reardon, *Race to the Finish*, 60–61.

39 Christina Klein, *Cold War Orientalism: Asia in the Middlebrow Imagination, 1945–1961* (Berkeley: University of California Press, 2003), 174–75; Yoshiko Koshiro, *Trans-Pacific Racisms and the US Occupation of Japan* (New York: Columbia University Press, 1999), 183–91; Arissa Oh, *To Save the Children of Korea: The Cold War Origin of International Adoption* (Stanford: Stanford University Press, 2015), 23–31, 67–73.

40 For studies on the nexus of the eugenics movement and the population/birth control movement on the global scale, see Matthew Connelly, *Fatal Misconception: The Struggle to Control World Population* (Cambridge, Mass.: Harvard University Press, 2010); Briggs, *Reproducing Empire*; Aiko Takeuchi-Demirci, *Contraceptive Diplomacy: Reproductive Politics and Imperial Ambitions in the United States and Japan* (Stanford: Stanford University Press, 2018).

41 Neel, *Gene Pool*, 281; Kevles, *In the Name of Eugenics*, 260–61.

42 Neel, "Lessons from a 'Primitive People,'" 820.

43 Historians have illuminated the continuity between wartime Nazi eugenics and the postwar global population control programs. See for example, Connelly, *Fatal Misconception*, 117–8.

44 Nakazawa Kenji's *Hadashi no Gen* [Barefoot Gen] featured children in Hiroshima after the atomic bomb. This popular comic book series also depicted negative sentiments surrounding the ABCC among the Japanese. Kenji Nakazawa, *Barefoot Gen*, vol.5 (San Francisco: Last Gasp, 2008), 159–212.

45 Lindee, *Suffering Made Real*, 117–42; Beatty, "Genetics in the Atomic Age," 289.

[46] Neel, *Gene Pool*, 85.

[47] "Appropriation of Fund to National Academy of Sciences—National Research Council—Genetics Study," February 27, 1958, box 138, folder 1240, series 200A, RG 1.2, RFA. The Rockefeller Foundation had actively ventured into many public health projects abroad since the prewar decades. See, Farley, *To Cast Out Disease*; Takeuchi-Demirci, *Contraceptive Diplomacy*, 99.

[48] Robert S. Morison, diary, April 4, 1958, folder 1240, box 138, RG 1.2, RFA.

[49] Many Japanese scientists refused to associate with the ABCC. Kida Fumio, head of the Japanese genetics team, was reportedly frustrated for being treated as a "technician." He later resigned from his position at the ABCC. Ray C. Anderson**,** *A Sojourn in the Land of the Rising Sun: Japan, the Japanese, and the Atomic Bomb Casualty Commission, My Diary: 1947–1949* (Sun City, AZ: Elan Press, 2005), 140, 160.

[50] James Neel to Robert Morison, December 20, 1957, folder 1240, box 138, RG 1.2, RFA.

[51] I adopt Japanese naming conventions, with last names followed by given names, when referring to Japanese nationals, except when their names appear in English-language publications.

[52] In the postwar issues of Japanese genetics journals, Komai wrote a series of reports and updates on the state of genetics in the United States. Komai Taku, "Senji-chū no Amerika idengaku" [American genetics during wartime] *Iden* [Heredity] 1, no. 1–2; 2, no. 1 (1947; 1948).

[53] Taku Komai, "Genetic Studies on Inbreeding in Some Japanese Populations: I. Introductory Remarks," *Japanese Journal of Human Genetics* 17 no. 2 (1972), 99.

[54] Neel to Morison, December 20, 1957.

[55] James V. Neel, Masuo Kodani, Richard Brewer, and Ray C. Anderson, "The Incidence of Consanguineous Matings in Japan," *AJHG* 1, no. 2 (December 1949): 166–7; Komai Taku, *Idensei shippei oyobi kikei kakei hyō* [Pedigrees of hereditary diseases and abnormalities found in the Japanese race] (Tokyo: Maruzen Co., 1934).

[56] Embree, *Suye Mura*, 88.

[57] Jennifer Robertson, "Blood Talks: Eugenic Modernity and the Creation of New Japanese," *History and Anthropology* 13, no. 3 (2002): 208.

[58] See, for example, Komai Taku, "Ketsuzoku kekkon" [Consanguineous marriages] *Iden* 2, no. 8 (1948): 14–16; Kida, "Nihon no ketsuzoku kekkon to inseki kekkon no jitsujō" [The reality of consanguineous marriages and inbreeding in Japan], *Fujin no Sekai* [Women's sphere] 10, no. 8 (1949): 51–57; Tanaka Katsumi, "Osoroshii kinshin kekkon" [The danger of consanguineous marriages] *Iden* 9, no. 3 (1955): 12–15.

[59] Schull and Neel, *Effects of Inbreeding*, 16.

[60] William J. Schull, *Song Among the Ruins* (Cambridge, MA: Harvard University Press, 1990), 160. For an example of work conducted by one of the mathematically trained Japanese scientists, see Toshiyuki Yanase, "The Study of Isolated Populations with Special Reference to Methodology. I. Breeding Structure," *Japanese Journal of Human Genetics* 5, no. 1 (1960): 25–43.

[61] A Marxist-oriented organization of scientists, the Association of Democratic Scientists (abbreviated in Japanese as "Minka"), was formed in 1946. For Minka, see Shigeru Nakayama, "The Association of Democratic Scientists (Minka)," in *A Social History of Science and Technology in Contemporary Japan*, vol. 1, ed. Shigeru Nakayama (Melbourne, Australia: Trans Pacific Press, 2001), 470–81.

[62] Schull, *Song among the Ruins*, 98.

[63] NAS, "ABCC General Report," January 1947, ABCC Collection, NAS Archives, Washington D.C., http://www.nasonline.org/about-nas/history/archives/collections/organized-collections/atomic-bomb-casualty-commission-series/abcc-general-report-1947.html.

[64] John Beatty, "Scientific Collaboration, Internationalism, and Diplomacy: The Case of the Atomic Bomb Casualty Commission," *Journal of the History of Biology* 26, no. 2 (1993): 213.

[65] William J. Schull, "Inbreeding and Maternal Effects in the Japanese," *Eugenics Quarterly* 9, no. 1 (March 1962): 22. In personal correspondences, however, Neel acknowledged Komai's longtime contribution in genetics and his status as an "international treasure." James V. Neel to Mrs. Taku Komai, July 12, 1972, box 41, James van Gundia Neel Papers, American Philosophical Society Library, Philadelphia, PA.

[66] William J. Schull, "Empirical Risks in Consanguineous Marriages: Sex Ration, Malformation, and Viability," *AJHG* (1958): 341.

[67] Neel to Masuo Kodani, December 16, 1948, "Genetics: 1948," box 20, NAS Archives.

[68] Arno G. Motulsky, "Medical Genetics in the Pacific Area," *Eugenics Quarterly* 9, no. 1 (March 1962): 1. Other publications with Japanese "collaborators" include: N. Ishikuni, H. Nemoto, J. V. Neel, L. Drew, T. Yanase, and Y. S. Matsumoto, "Hosojima," *AJHG* 12, no. 1 (1960): 67–75; William J. Schull, Hideyo Nagano, Manabu Yamamoto, and Ichita Komatsu, "The Effects of Parental Consanguinity and Inbreeding in Hirado, Japan. I. Stillbirths and Prereproductive Mortality," *AJHG* 22, no. 3 (1970): 239–62.

[69] Schull, *Effects of Atomic Radiation*, 97; Neel, *Gene Pool*, 103.

[70] Neel, *Gene Pool*, 117; National Academy of Sciences, "James van Gundia Neel," *Biographical Memoirs* 81 (Washington, DC: The National Academies Press, 2002), 220–21.

[71] American Anthropological Association, "El Dorado Task Force Papers, Volume I," May 18, 2002, 24, available on Douglas W. Hume, "AnthroNiche: Darkness in El Dorado," https://dwhume.com/darkness_documents/0598.pdf.

[72] Komai, "Introductory Remarks," 94; Schull and Neel, *Effects of Inbreeding*, 19, 341.

[73] Patrick Tierney, *Darkness in El Dorado: How Scientists and Journalists Devastated the* Amazon (New York: W. W. Norton and Company, 2000), 307–09; A. Magdalena Hurtado and Francisco M. Salzano, "Introduction," in *Lost Paradises and the Ethics of Research and Publication*, ed. Francisco M. Salzano and A. Magdalena Hurtado (Oxford: Oxford University Press, 2004), 7.

[74] Hurtado and Salzano, "Introduction," 6.

[75] M. Susan Lindee, "Voices of the Dead: James Neel's Amerindian Studies," in *Lost Paradises*, 63.

[76] AAA, "El Dorado," 27.

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