INTRODUCTION

Grosse Île, September 1942

> "Modern bacteriology has brought about a state of affairs which may exert profound influence upon the future economic and political history of the world."
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> **Hans Zinsser, *Rats, Lice and History*, 1935**

Despite its name, it is not big. It is one mile long and a half mile wide, a small island in the middle of the Saint Lawrence River, thirty miles north of Quebec City. Its geography had determined its destiny long before American scientists arrived in the fall of 1942. Grosse Île – Canada's main quarantine station for 105 years – evoked sorrow, thoughts of disease and death. If the Americans had not known the story before they arrived, they would have been told it by the Canadian military personnel and workers who met them on the dock. Moreover, they would have seen it in the cemetery of thousands of coffins marked not by stones with names, but by indentions in the ground itself that had settled into valleys between hills of the dead. The land bore witness to suffering, and to the power of the nonhuman.

Grosse Île was just the right thing (an island), just the right size (large enough), in just the right location (in the middle of the river with a three-mile-wide harbor between it and a neighboring island), and surrounded by just the right depths of water ("7 to 19 fathoms") for the task assigned to it by the Assembly of Lower Canada in 1832. The island was to guard the province from cholera, which had recently broken out of India and onto the global stage. On the recommendation of a local captain who was surveying the river, the assembly rented Grosse Île from its owner. Following the spring thaw, officials made their way to the island, kicked out its sole resident farmer, and started building a quarantine station.

Ships hoping to unload passengers in Quebec had to first get a certificate of health from the officials at Grosse Île. They would drop anchor near its dock and wait for inspection; if there were sick passengers on board, all would have to be rowed to the island for further observation. It was a good idea, but in 1832 it did not work; *Vibrio Cholerae* slipped through the quarantine. Over 3,000 people died of cholera in Quebec that summer. Officials buried twenty-eight victims on Grosse Île; they would be far from its last burials. The year of 1847 was the worst. That year, typhus, courtesy of *Rickettsia Prowazekii*, claimed over 5,000 Irish men, women, and children in flight from the famine. In 1909, the Ancient Order of Hibernians erected a massive stone memorial to them on the highest point on the island, 140 feet above the river. The Celtic cross on the top ever after warned all approaching that the island was a cemetery.[1]

Times changed. Quarantine islands went out of fashion as humans gained more power over microbes. People were now treated instead of isolated. The Canadian government ordered the quarantine station closed in 1937; sick ship passengers now went directly to hospitals in Quebec City and Montreal. Responsibility for the island moved from the Department of Pensions and National Health to the Department of Public Works, and there it stayed until it was transferred to the Department of Defense in 1942. It was a fitting home. The government's involvement with the island had always really been about defense, about humans trying to protect themselves from dangerous nonhumans.

In 1942, several of the same geographical attributes that had made Grosse Île an ideal quarantine station would make it an ideal research station for scientists charged by their governments to find a defense against a pathogen that had never yet reached North America. They called it rinderpest, the German word for "cattle plague." It was a fierce virus that attacked not humans, but their cattle. Strict cattle quarantines had long denied it entry into North America, but they feared that the quarantines were no longer enough, because now they had enemies. They worried that the virus would arrive not in a host who would reveal its unwanted passenger with sickness and death but in a glass vial of frozen infected tissue that could be thawed and unleashed with a single injection. They were preparing to fight a biological attack. They needed a defense.

[1] O'Gallagher, Marianna. *Grosse Ile: Gateway to Canada, 1832–1937*. Quebec City: Livres Carraig Books, 1984, 15–26, 47–58, 85. For more on the island's history, see also, Renaud, Anne. *Island of Hope and Sorrow: The Story of Grosse Île*. Montreal: Lobster Press, 2007.

FIGURE 0.1 Concrete pier and former immigrant inspection building on Grosse Île where researchers worked on rinderpest during World War II.
Author photograph.

They needed a vaccine. To make it, they would have to import the very thing they feared: a glass vial of frozen infected tissue. And that is why they needed Grosse Île.

There, in quickly constructed laboratories erected in rooms which had previously witnessed medical examinations and forced "disinfecting" showers, they gave new life to the virus, freeing it from its confines. They had to use hosts to do it, for they could not keep it alive without them. They brought their victims – hundreds of them from the cattle market in Montreal – to the island in boats. They needed the virus to flourish so that they could figure out how to destroy it. Their efforts would be successful. Within nineteen months, the scientists on the island not only produced 100,000 doses of a known vaccine, they created a better one. The United States and Canada ended up not needing either. The feared biological attack never came. The war ended with the vaccines, the virus, and the surviving hosts still on the island. The futures of the virus, the vaccine and the hosts were uncertain, but some of the scientists involved

had plans for them, plans that involved shipping the virus off an island designed to contain it. They had to act quickly, for the virus's days were numbered.

On January 19, 1946, Dominion Animal Pathologist Charles "Chas." Alexander Mitchell, quickly composed a heated memorandum about the imminent closure of the research facility at Grosse Île on behalf of the Deputy Minister at Canada's Department of Agriculture. "When hostilities ceased," Mitchell wrote, "a directive was given in the United States that all war projects would terminate within a month. An exception was made to the Grosse Isle[2] project because of its biological nature, it being self-evident that time is required to inactivate living material." But that time had run out. The United States Department of War, he warned, had announced that it "will no longer be associated with the project" as of midnight on February 28. "Unless the Dominion Department of Agriculture takes over the project immediately, decontamination, that is killing of the virus, will commence in the last week of January." This would, Mitchell insisted, be a grievous mistake. The virus was too precious to lose because it was so dangerous.[3]

Humans still had a great deal left to learn about the rinderpest virus in 1946, but they already knew quite a bit about rinderpest the disease – they had been fighting it for centuries. In 1902, Duncan Hutcheon, Colonial Veterinary Surgeon to the Government of Cape Colony, described it as "a specific malignant and highly contagious fever, characterized by congestion, and a peculiar form of inflammation of the mucous membranes, more particularly of the digestive tract." He charted its progress in its bovine victims. The first symptom was "a rise in temperature," usually "between the third and fourth day, often a little earlier." By the fifth day, "the animal is visibly dull . . . and the appetite less." Sometimes this came with "twitching" and "a mild but rough-sounding cough." On the sixth day, "the characteristic symptoms appear": inflamed mucous membranes turned red and mucous started flowing from the eyes, mouth, and nostrils. Diarrhea followed on the seventh or eighth day. The animal stopped eating, but became desperately thirsty, and "when allowed to get to water . . . will stand and sip continuously, and frequently die in the water," poisoning it with "secretions and excretions." Animals who

[2] At the time, officials referred to the island as Grosse Isle.

[3] Chas. A. Mitchell to the Deputy Minister, Department of Agriculture (January 19, 1946), Diseases of Animals, Rinderpest Control Vaccination Project, Grosse Isle, QC, Record Group 17, Volume 3029, File 37–23, LAC.

could not make it to water simply laid down and died in "a semi-comatose condition." Entire herds could be wiped out in a few days. Many were.[4] Hutcheon labeled the disease behind the devastation as "rinderpest, bovine pest, or cattle plague." He preferred the first term, as did most of his fellow English-speakers in Cape Colony. The French called it peste bovine. Other languages used other names, but most meant the same thing: killer of cattle.[5]

The disease spread quickly and terribly: sometimes only claiming 20 percent of its victims, sometimes 100 percent, depending on the strain and the host species. In the outbreak Hutcheon witnessed – the Great African Rinderpest Panzootic – the mortality rate was over 90 percent for the entire continent. Rinderpest could infect many animals, but was most dangerous to cattle, yaks, wild African buffalos, and Asian water buffalos.[6] It devastated humans by depriving them of their most valuable livestock: the source of their food, their labor, their wealth, their security. It was a dangerous enemy.

The virus Mitchell was terrified of losing to decontamination was a strain of rinderpest that had proven amenable to being turned into a live vaccine: a living weapon whose presence in a host would render it immune to attack by one of the other deadly strains that roamed freely throughout Africa and Asia. It was not enough just to save the vaccine, Mitchell warned; the strain it had come from also needed to be preserved because it was "the only one which has been proved capable of propagation and its loss would be a major catastrophe having regard to the future protection of food supplies of the world." The United States and Canada no longer had any need of it, Mitchell acknowledged, but other nations did. Mitchell begged for a stay of execution: six months "for the purpose of permitting representatives from other parts of the world . . . to visit the Station and train in the methods of vaccine production, also so that the particular strain which has been propagated will not be lost."[7] He got it and, in the process, the world got a new weapon against a deadly foe.

[4] Hutcheon, Duncan. "Rinderpest in South Africa." *Journal of Comparative Pathology and Therapeutics* 15:4 (December 31, 1902): 300–305.

[5] Ibid., 300–305; Scott, Gordon R. "Rinderpest," in *Advances in Veterinary Science*, v. 9, ed. C. A. Brandly and E. L. Jungherr. New York: Academic Press, 1964)114–115.

[6] OIE, Rinderpest Technical Disease Card, available at http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/Disease_cards/RINDERPEST.pdf.

[7] Chas. A. Mitchell to The Deputy Minister, Department of Agriculture (January 19, 1946), Diseases of Animals, Rinderpest Control Vaccination Project, Grosse Isle, QC, Record Group 17, Volume 3029, File 37–23, LAC.

This book is in part a history of that weapon and others like it: the vaccines that fought rinderpest. On one level, it is the story of how humans manipulated a virus to make cattle and buffalo immune to it, but it is also the story of how the vaccines that were the product of that manipulation affected human behavior. The technology exerted influence that reached far beyond the virus and its bovine victims, because the virus had always reached beyond them as well.[8] Mitchell wanted to save the virus for scientific purposes, but also for political ones. He wrote openly about his concern regarding global food security. He did not mention his concern about biological warfare but in the fall of 1946, when they shut down the facility at Grosse Île, they left seed virus and vaccine in a freezer, in case they needed them again. Mitchell and his team sent vaccines off the island and they kept some on it; both decisions were the product of a recognition of the biological connections that bound humans, bovines, and the virus together. It was an act of global consciousness – the idea, as Akira Iriye defined it, "that there is a wider world over and above separate states and national societies, and that individuals and groups, no matter where they are, share certain interests and concerns in that wider world."[9]

Rinderpest had played a role in the creation of that consciousness of connection. During the nineteenth century, the virus had used the expansion of global trade to spread further and faster than ever before, bringing devastation in its wake. Outbreaks in virgin territories often produced mortality rates of 90 percent. The virus sparked fear and encouraged international cooperation for resistance. That cooperation took a highly nationalistic form. European nations worked together to drive rinderpest out. North and South American nations worked together to keep it out altogether. (Their efforts were successful with the exception of a quickly contained outbreak in Brazil in 1920.) Meanwhile, the same European governments that organized to control the disease at home actually furthered its spread abroad through the construction of imperial networks of trade and

[8] For broader thoughts on this connection between technology and politics, see Hecht, Gabrielle. "Introduction," in *Entangled Geographies: Empire and Technopolitics in the Global Cold War*. ed. Gabrielle Hecht. Cambridge, MA: MIT Press, 2011), 1–12.

[9] Iriye, Akira. *Global Community*. Berkeley: University of California Press, 2004, 8.

conquest. The quest for empire helped to make rinderpest endemic in much of Asia and Africa.

In the aftermath, rinderpest became a largely imperial disease, existing primarily in parts of the world that had been claimed by nations in other parts of the world. Its existence there was largely tolerated until a 1920 outbreak, in a quarantine stable in Antwerp from infected Indian cattle, reminded European officials that the virus's existence anywhere was a potential threat to cattle in their nations; they began organizing against it. Researchers waged war against it in imperial laboratories and moved vaccines along imperial networks, but they also published the results of their work in open journals and visited each other's laboratories, sharing the technical knowledge of their creations outside imperial boundaries. The vaccines encouraged an inter-imperialism made tangible with the establishment of the Office International des Épizooties, or OIE, in 1924, to collect and publicize information about epizootic diseases and how to control them, to support research about those diseases, and "to prepare and stimulate international agreements on sanitary regulations, and to assist governments in the pursuit and enforcement of such measures."[10]

World War II, with all its devastations, only heightened this sense of global interconnectedness. The United States and Canada sent their scientists to Grosse Île in 1942 to prepare for a biological attack. If the enemy had access to rinderpest, then it had access to a potentially devastating weapon; it would not have to do anything to it except unleash it in a North America that had never had an outbreak. Such a threat was particularly ominous at that moment because North America was the Allied world's primary source of food. Cattle were part of the war effort. When the war was over, the new vaccine created at Grosse Île opened the door to a different way of thinking about interconnectedness. The United States and Canada had previously not been involved in the global struggle against rinderpest, but now they had something to contribute. They also had the machinery through which to do so.

[10] FAO Standing Advisory Committee on Agriculture, Minutes of Meeting of Subcommittee on Animal Health (March 31–April 4, 1947), Sub-Committee on Animal Health, 1946–1947, Animal Production and Health Division, 10AGA407, FAO. On "inter-imperialism," see Akami, Tomoko. "A Quest to be Global: The League of Nations Health Organization and Inter-Colonial Regional Governing Agendas of the Far Eastern Association of Tropical Medicine 1910–25." *The International History Review* 38:1 (2016): 1–23.

While the scientists had been at work on Grosse Île building the vaccine, their governments, struck by a sense of both economic and biological interconnectedness, had been constructing international machinery for not only winning the war, but for making the postwar world a better, safer place, calling for freedom from want and freedom from fear. Their efforts initially focused on the immediate relief of liberated areas and here the scientists at Grosse Île found the machinery that allowed them to share their vaccine, sending it via the United Nations Relief and Rehabilitation Administration to China to fight hunger by fighting rinderpest. The success of the subsequent rinderpest campaign there encouraged those involved to expand their vision of what the struggle to secure freedom from want could look like in the postwar world. Growing confidence in technological innovation helped to broaden confidence that the international machinery created during the war could provide more than relief, more even than rehabilitation: that it could provide development. Here, once again, the rinderpest vaccines played an important, yet now largely forgotten, role.

Starting in the late 1940s, the Food and Agriculture Organization of the United Nations (FAO) made the fight against rinderpest a core part of its mission to fight hunger around the world. It did so because the vaccines convinced its leadership that it was a fight that humanity could win. Its struggle was against more than just the virus, it was also a struggle for the United Nations system and for the sense of a global community. Leadership at FAO hoped to use the rinderpest campaign to demonstrate the point that the world's biological interconnectedness required human political interconnectedness. It was not an easy fight. Throughout the 1950s FAO was both helped and hindered at different turns by the Cold War and by imperialism, but it persevered, determined to eradicate the virus and, in the process, to provide undeniable proof of the new international system's value.

The postwar recognition of global interconnectedness encouraged FAO to fight rinderpest, but that was not humankind's only response. Biological interconnectedness was both a source of inspiration and a source of concern in the postwar era. The same worries that had led Canada and the United States to send scientists to Grosse Île in 1942 led them to send scientists back to the island in 1950, tasked to produce both vaccines and a biological weapon. The story of that effort reminds us that the mid-twentieth-century sense of global interdependence inspired multiple kinds of imaginings and actions. How one viewed it depended upon one's larger mission: building a global community, maintaining an

empire, or ensuring national security. The rinderpest vaccines played a role in all of them.

This book argues that the rinderpest vaccines encouraged humans to think differently and to act differently at a global level, and that those thoughts and actions had ramifications that went well beyond the struggle against the virus. The vaccines affected what humans thought they could do, what they wanted to do, and what they tried to do. Following the vaccines off the island and around the globe enhances our understanding of development, internationalism, and national security in the postwar world by revealing the biological component that played a role in all of them. These concepts were not just framed by economic and political concerns; they were also framed by environmental ones. Rinderpest, and the vaccines humans created to fight it, helped to ensure that.[11]

They were not alone. Scholars studying twentieth-century international relations have recently begun talking and writing more about its nonhuman participants.[12] This book is a contribution to that ongoing conversation. It argues that we get a fuller picture of twentieth-century international relations when we bring rinderpest and the vaccines humans

[11] In this, this book finds inspiration in John R. McNeill's *Mosquito Empires*, in which he wrote, "The book provides a perspective that takes into account nature – viruses, plasmodia, mosquitoes, monkeys, swamps – as well as humankind in making political history" (McNeill, John R. *Mosquito Empires*. Cambridge: Cambridge University Press, 2010), 2.

[12] Dorsey, Kurk. "Bernath Lecture: Dealing with the Dinosaur (and Its Swamp): Putting the Environment in Diplomatic History." *Diplomatic History* 29:4 (September 2005): 573–587; Hamblin, Jacob Darwin. *Arming Mother Nature: The Birth of Catastrophic Environmentalism*. New York: Oxford, 2013; Dorsey, Kurkpatrick. *Whales and Nations: Environmental Diplomacy on the High Seas*. Seattle: University of Washington Press, 2013; McNeill, J. R. and Corinna R. Unger, ed. *Environmental Histories of the Cold War*. Cambridge: Cambridge University Press, 2010; Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley: University of California Press, 2002; Cullather, Nick. *The Hungry World*. Cambridge: Harvard University Press, 2010; Biggs, David. *Quagmire: Nation-Building and Nature in the Mekong Delta*. Seattle: University of Washington Press, 2010; Cueto, Marcos. *Cold War, Deadly Fevers: Malaria Eradication in Mexico, 1955–1975*. Washington, DC: Woodrow Wilson Center Press, 2007; Manela, Erez. "A Pox on Your Narrative: Writing Disease Control into Cold War History." *Diplomatic History* 34:2 (April 2010): 299–323; Manela, Erez. "Globalizing the Great Society," in *Beyond the Cold War: Lyndon Johnson and the New Global Challenges of the 1960s*. ed. Francis J. Gavin, and Mark Atwood Lawrence. New York: Oxford University Press, 2014, 165–181; Reinhardt, Bob H. "The Global Great Society and the US Commitment to Smallpox Eradication." *Endeavour* 34:4 (December 2010): 164–172; Reinhardt, Bob H. *The End of a Global Pox: America and the Eradication of Smallpox in the Cold War Era*. Chapel Hill: University of North Carolina Press, 2015.

created to fight it into the narrative, primarily because doing so helps us to think more about the role of the idea of biological interconnectedness, but not only because of that.

The history of the rinderpest campaigns adds a new dimension to the rapidly expanding historiography of twentieth-century internationalism, or, as some scholars have persuasively argued, *internationalisms*, for internationalism was never just one thing. It took many forms and had many genealogies.[13] There were, as Sunil Amrith recently wrote, many different paths to internationalism. This book helps to recover a largely forgotten one. Amrith insisted that "histories of international institutions, internationalist ambitions and international initiatives all need to be embedded in the broader political debates to which they emerged as a response."[14] This author wholeheartedly agrees, and adds that they need also to be embedded in the physical environment that helped to give them life. The history of the rinderpest campaigns enhances our understanding of both the origins and the outcomes of twentieth-century international imaginings and international actions by explicitly tying them to a virus, to vaccines, and to animals.

Bringing rinderpest into the story also enhances the accepted narrative of twentieth-century development.[15] It does so in three main ways. First, it

[13] Sluga, Glenda and Patricia Clavin, ed. *Internationalisms: A Twentieth-Century History*. Cambridge: Cambridge University Press, 2017 and Sluga, Glenda. "Turning International: Foundations of Modern International Thought and New Paradigms for Intellectual History." *History of European Ideas* 41:1 (2015): 103–115. See also, Sluga, Glenda. *Internationalism in the Age of Nationalism*. Philadelphia: University of Pennsylvania Press, 2013; Amrith, Sunil and Glenda Sluga. "New Histories of the United Nations." *Journal of World History* 19:3 (2008): 251–274; Kott, Sandrine. "International Organizations – A Field of Research for a Global History." *Zeithistorische Forschungen* 8 (2011): 446–450; Pedersen, Susan. "Back to the League of Nations." *The American Historical Review* 112:4 (October 2007): 1091–1117.

[14] Amrith, Sunil S. "Internationalising Health in the Twentieth Century," in *Internationalisms*, ed. Sluga and Clavin, 246.

[15] Key texts in this literature (not already cited in Footnote 12) include Gilman, Nils. *Mandarins of the Future: Modernization Theory in Cold War America*. Baltimore: Johns Hopkins Press, 2003; Latham, Michael E. *Modernization as Ideology: American Social Science and "Nation Building" in the Kennedy Era*. Chapel Hill: University of North Carolina Press, 2000; Latham, Michael E. *The Right Kind of Revolution: Modernization, Development, and U.S. Foreign Policy from the Cold War to the Present*. Ithaca: Cornell University Press, 2010; Staples, Amy L. S. *The Birth of Development: How the World Bank, Food and Agriculture Organization, and World Health Organization Changed the World, 1945–1965*. Kent: Kent State Press, 2006; Ekbladh, David. *The Great American Mission: Modernization and the Construction of an American World Order*. Princeton: Princeton University Press, 2010; Immerwahr, Daniel.*Thinking Small: The United States and the Lure of Community Development*.

moves attention away from the American-led and Soviet-led efforts that have dominated the literature to focus on the role of international institutions, who approached development differently than did the two major powers. The history of the rinderpest campaigns broadens our understanding of development as an international, rather than as a Cold War act. Doing so puts development into a different timeline – one that begins at the turn of the twentieth century and that continues today.[16] In highlighting the inter-imperial origins of the vaccines themselves, it also reaffirms the point that we need to think more seriously about the lasting impact of colonial development efforts.[17]

Cambridge: Harvard University Press, 2015; Engerman, David C., Nils Gilman, Mark H. Haefele, and Michael E. Latham, *Staging Growth: Modernization, Development, and the Global Cold War*. Amherst: University of Massachusetts Press, 2003; Adas, Michael. *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*. Ithaca: Cornell University Press, 1990; Adas, Michael. *Dominance By Design: Technological Imperatives and America's Civilizing Mission*. Cambridge: Harvard University Press, 2006; Simpson, Bradley R. *Economists with Guns: Authoritarian Development and U.S.-Indonesian Relations, 1960–1968*. Stanford: Stanford University Press, 2008; Engerman, David C. *Modernization from the Other Shore: American Intellectuals and the Romance of Russian Development*. Cambridge: Harvard University Press, 2003; Nunan, Timothy. *Humanitarian Invasion: Global Development in Cold War Afghanistan*. Cambridge: Cambridge University Press, 2016; Macekura, Stephen J. *Of Limits and Growth: The Rise of Global Sustainable Development*. Cambridge: Cambridge University Press, 2015; Westad, Odd Arne. *The Global Cold War: Third World Interventions and the Making of Our Times*. Cambridge: Cambridge University Press, 2005; Helleiner, Eric. *Forgotten Foundations of Bretton Woods: International Development and the Making of the Postwar Order*. Ithaca: Cornell University Press, 2014; McVety, Amanda. *Enlightened Aid*. New York: Oxford University Press, 2012; Parmar, Inderjeet. *Foundations in the American Century: The Ford, Carnegie, and Rockefeller Foundations in the Rise of American Power*. New York: Columbia University Press, 2012; Hodge, Joseph Morgan. *Triumph of the Expert: Agrarian Doctrines of Development and the Legacies of British Colonialism*. Athens: Ohio University Press, 2007; Escobar, Arturo. *Encountering Development: The Making and Unmaking of the Third World*. Princeton: Princeton University Press, 1995; Packenham, Robert A. *Liberal America and the Third World: Political Development Ideas in Foreign Aid*. Princeton: Princeton University Press, 1973; Arndt, H. W. *Economic Development*. Chicago: University of Chicago Press, 1987.

[16] For more on this see, Wang, Jessica. "Colonial Crossings: Social Science, Social Knowledge, and American Power from the Nineteenth Century to the Cold War," in *Cold War Science and the Transatlantic Circulation of Knowledge, History of Science and Medicine Library*, v. 51, ed. Jeroen van Dongen. Leiden: Brill, 2015, 184–213.

[17] There is an expansive literature on colonial development. For some examples, see Hodge, *Triumph of the Expert*; Headrick, Daniel R. *Power over Peoples: Technology, Environments, and Western Imperialism, 1400 to the Present*. Princeton: Princeton University Press, 2010; Iyer, Samantha. "Colonial Population and the Idea of Development." *Comparative Studies in Society and History* 55:1 (2013): 65–91; Tilly, Helen. *Africa as a Living Laboratory: Empire, Development, and the Problem of*

The history of the rinderpest campaigns additionally broadens our understanding of development by challenging us to think about development as an environmental, rather than just an economic, act. The rinderpest campaigns were biological campaigns. They revolved around injecting bovines with living, mutated virus that was often transported in the bodies of living carrier animals: rabbits and goats whose infected bodies became the source of hundreds of vaccines. This was a very different kind of development from building dams and schools, and it worked (although not without many twists and turns along the way). And that is the third way that the rinderpest campaigns changed the accepted narrative of development: they took what is most often told as a story of failed dreams and unintended consequences and turned it into a story of achieved dreams and intended consequences. FAO announced rinderpest's eradication in 2011.

Scientific Knowledge, 1870–1950. Chicago: University of Chicago Press, 2011; Cooper, Frederick. "Development, Modernization, and the Social Sciences in the Era of Decolonization: The Examples of British and French Africa." *Revue d'Histoire des Sciences Humaines* 10 (2004): 9–38; Wolton, Suke. *Lord Hailey, the Colonial Office and the Politics of Race and Empire in the Second World War*. New York: St. Martin's Press, 2000; Moon, Suzanne. "Empirical Knowledge, Scientific Authority, and Native Development: The Controversy over Sugar/Rice Ecology in the Netherlands East Indies, 1905–1914." *Environment and History* 10:1 (2004): 59–81; Buesekom, Monica M. van. *Negotiating Development: African Farmers and Colonial Experts at the Office du Niger, 1920–1960*. Oxford: James Currey, 2002; Lewis, Joanna. *Empire State-Building: War & Welfare in Kenya, 1925–52*. Oxford: James Currey, 2000; Havinden, Michael and David Meredith, *Colonialism and Development: Britain and Its Tropical Colonies, 1850–1960*. London: Routledge, 1993; Cooper, Frederick. "Modernizing Bureaucrats, Backward Africans, and the Development Concept," in *International Development and the Social Sciences: Essays on the History and Politics of Knowledge*. ed. Frederick Cooper and Randall Packard. Berkeley: University of California Press, 1997, 64–92; Constantine, Stephen. *The Making of British Colonial Development Policy*. London: Frank Cass, 1984; Gonzalo, Javier. *The Idea of Third World Development: Emerging Perspectives in the United States and Britain 1900–1950*. New York: University Press of America, 1987.