Latex and Blood

Science, Markets, and American Empire

Gregg Mitman and Paul Erickson

Three images, made within three years of each other, open this essay. The first (fig. 1) is a photograph taken at a birthday party in 1929 at Fort Myers, Florida. This was no ordinary affair. The entire town was abuzz with parades, fireworks, and picnics. Newspaper reporters and photographers came from across the county. Children lined up at the estate gates, hoping to be part of the festivities in honor of Thomas Edison's eighty-second birthday. The wizard of Menlo Park, whose creation of the industrial research laboratory had ushered in a new era of science-business relations in the United States and led to the commercialization of modern technological wonders from the electric light to the motion-picture camera, looks into the camera with a confident swagger, his features chiseled by age and success. To his left stands Harvey Samuel Firestone, the founder and chief executive of the tire and rubber-processing conglomerate that bore his name. To his right, the automotive king Henry Ford converses with a former mining engineer, the recent secretary of commerce, and the newly elected president, Herbert Hoover. This, then, was more than a gathering of friends: the closeness of the party's guests of honor captures perfectly the overlapping coopera-

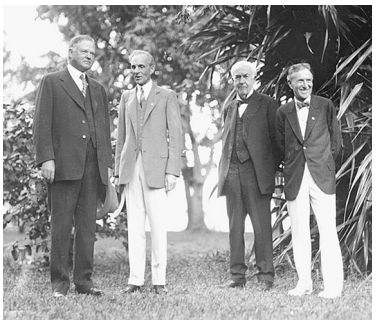

Figure 1. Celebrating Thomas Edison's eighty-second birthday in 1929 at Fort Myers, Florida

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tive relationships among industrial capital, scientific and technological research, and governmental power that had, over the course of the 1920s, transformed the United States' relationship to the world.[1]

The nature of the country's new global relations is suggested by a second image (fig. 2), a still from the 1927 film, *General Motors around the World*. In it, a graph charts the increasing share of automobile sales overseas by the General Motors Corporation (GM), which, by the end of the decade, surpassed Ford in domestic and foreign markets.[2] *General Motors around the World*, made by seven camera crews who traveled more than one hundred thousand miles, treated audiences to a "two hour trip around the world," from the busy streets of Osaka, Japan, to the rugged roads of Lima, Peru. The movie played to a packed house of over five hundred international financiers, diplomats, foreign advisers, and reporters aboard the ocean liner *Aquitania*, docked in New York City's harbor on January 26, 1928.[3] Produced by the Newspaper Films Corporation, and sponsored by the General Motors Export Corporation, *General Motors around the World* capitalized on the public interest in travelogues to market and promote the company's growing presence in 104 countries across the globe.[4] Dots on the map come to life in the film as thriving cities representing markets to be had. General Motors, which shipped twice as many cars abroad in 1926 as it did in 1924, was not alone in seizing on the opportunity of global economic expansion. U.S. foreign investments grew twenty times over, from $500 million to nearly $10 billion, between 1900 and 1926 as U.S. markets expanded to cover much of the globe, establishing an "informal empire" linked by commerce and finance.[5]

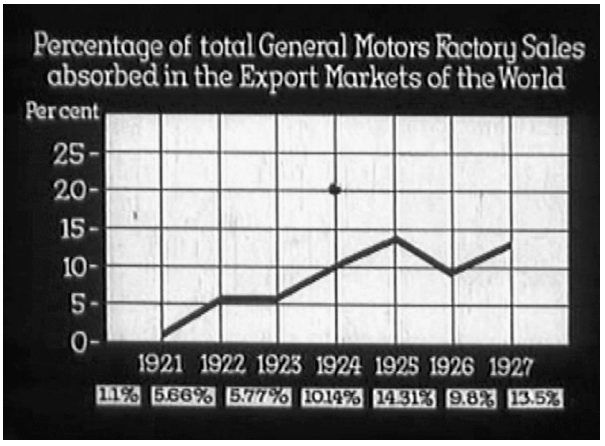

Figure 2. A still from the 1927 film, *General Motors around the World*, documenting the growing markets of U.S. business abroad. Courtesy of Prelinger Archives

A third image (fig. 3) may be somewhat less familiar to historians of the interwar United States. It is a single still taken from over seventy-five hundred feet of film shot on a four-month biological and medical survey of the West African republic of Liberia, undertaken by an eight-member scientific team from Harvard University with sponsorship from Firestone. The date is July 21, 1926. Max Theiler, who would go on to win the 1951 Nobel Prize in physiology and medicine for pioneering work on the development of a yellow-fever vaccine, holds the pricked ear of a Kru boy

with one hand while swabbing a glass microscopic slide with the boy's blood. Residents of Krutown, a tribal municipality on the outskirts of Monrovia, are gathered around. Some appear reluctant, others less so, to give their blood to these white doctors and scientists. Young boys stare not at the alien medical procedure unfolding before them, but at the camera capturing a visual record of their condition. As with Edison's birthday three years later, this is no ordinary event. The expedition's staff does not comprise soldiers, missionaries, or government officials, the traditional agents of European imperial power in Africa; instead, they are doctors, entomologists, botanists, and cinematographers collecting curious materials, asking strange questions, and, of course, endlessly filming and photographing. The acknowledged subjective presence of the photographer, captured in the villagers' returning glances, suggests this is an encounter of intimate relationships and exchanges, forever altering human lives.[6]

Figure 3. Max Theiler extracts blood from a boy in Krutown, while other villagers stare at the camera, unsettling the scientific gaze. Courtesy of Randal Whitman

Three images. Three different subjects. All connected by the economy of a commodity that held particular significance for Americans in the 1920s: rubber. During this decade, Americans owned 85 percent of the world's automobiles and consumed 75 percent of the world's rubber. Eighty percent of the United States' insatiable appetite for this white gold went into the manufacturing of automobile tires.[7] But only 1 percent of the world's rubber grew under the U.S. flag. Britain, which controlled nearly 77 percent of the world's rubber production through its imperial possessions after the First World War, had a near monopoly on the industry. Its hold over U.S. automobile and tire manufacturers tightened further in 1922, when, in an effort to control widely fluctuating market prices, Britain implemented the Stevenson Plan, which restricted the flow of crude-rubber exports. Prices for rubber soared. Within a year the average price per pound of rubber almost tripled, from 26.2 cents a pound in 1924 to 73 cents a pound in 1925.[8] Harvey Firestone railed against the Stevenson Plan's restrictions, warning U.S. car owners that such price hikes in crude rubber would cost them an additional $100 to $300 million in 1925. Consumers were in sticker shock as the average retail price of a tire doubled from $28 to $56 by the end of 1925.[9] Rubber had suddenly become a serious matter

of U.S. foreign relations. In January 1926 the House of Representatives Committee on Interstate and Foreign Commerce launched a series of hearings on the foreign production and control of rubber, coffee, cotton, and other natural resources vital to the U.S. economy. Hoover, then secretary of commerce under Calvin Coolidge's administration, told Congressional members, "the issue before you is much broader than the price of a particular commodity . . . it involves the whole policy that our country shall pursue toward a comparatively new and growing menace in international commerce and relations. This development [the British monopoly] threatens not only the sane progress of the world but contains in it great dangers to international good will."[10]

The U.S. response to its perceived natural resource vulnerability emphasized the transformative possibilities of science and technology when coupled with the dynamism of American business. Hoover, himself a former mining engineer, advised members of Congress that "the best and most permanent cure for this threatening evil in the world" was the utilization of science and capital to "secure freedom in our raw materials," both at home and abroad.[11] A reliance on science and engineering to solve the nation's natural-resource needs was precisely the approach that Edison, Ford, and Firestone would pursue in trying to break the economic stranglehold Britain held on the world's rubber supply and, therefore, on the great industrial fortunes that the three men had built over the preceding decades. In 1927 Edison established the Botanical Research Corporation, with Ford and Firestone as partners, hoping to apply his innovative brilliance to convert some domestic American weed or shrub into a high-yielding rubber source. Ford set his sights on Latin America, gaining concessions that same year for 2.5 million acres of land in the northern Brazilian state of Pará. There he set about carving the short-lived rubber plantations of Fordlandia and Bel Terra out of the tropical rain forest, but these efforts ran into an interrelated mix of complex labor, biological, and political problems that proved too difficult to solve. Ultimately, only Firestone would succeed in creating a viable rubber supply for the United States that was largely free from foreign production and control. He did so by bringing the forces of industrial capital, foreign diplomacy, and science and medicine to bear on the transformation of the West African republic of Liberia into the United States' rubber empire.[12]

The means of this significant political, economic, and cultural transformation are the subject of this essay. While the notion of a unique style of "American empire" has gained significant attention among historians of the United States, the few recent studies of science and U.S. imperialism that have begun to appear are largely based on a European model of empire wedded to territory and political conquest.[13] This essay takes a different tack, decentering the role of the state in creating empire and looking instead at partnerships between science and business that served as the primary drivers in establishing, expanding, and gaining U.S. influence over new spaces of development in foreign lands. The 1926 Harvard African Expe-

dition provides a perfect example of this kind of partnership, sitting at a significant nexus between corporate, academic, and state interests.

We argue that the work of the expedition — recorded in reams of reports, personal journals, hundreds of still photographs, and many hours of film — constituted a kind of imperial gaze that specifically sought to promote the growth and development of international markets in commodities. As they moved across the Liberian countryside, expedition members interpreted and communicated what they saw in ways that manifested this goal, envisioning Liberia's people as populations of disease vectors requiring epidemiological intervention or as potential labor pools for U.S. industry, and the country's landscape as a subject for cultivation and commodity production. Doctors and scientists — as much as businesspeople and government officials — thus helped map a future for Liberia in which that nation was bound to the United States less through the formal imposition of political order and control than through dynamic ties of commerce, technology transfer, philanthropic assistance, and material development. Furthermore, in the messy and highly political process of making this vision a reality, expedition members themselves played a significant role, behaving not simply as gatherers of knowledge on behalf of the state but as political actors in their own right, lobbying policy makers and consciously seeking to put a benign and humanitarian face on U.S. business abroad. Thus the ultimate success of Firestone's Liberian venture and of the U.S. bid for influence in western Africa hinged substantially on the unique characteristics and knowledge-making practices of the Harvard African Expedition.

Building Tropical Zones of American Enterprise

In the fall of 1923, C. F. Baker, the dean of agriculture at the University of the Philippines, alerted the Honorable W. Cameron Forbes to a situation he believed to be of serious consequence to the future of the United States. "The United States," Baker warned the former Philippines' governor-general, "is now using more than a billion dollars gold worth of tropical products per year, and many of these products are essential in basic industries. . . . The most important of all these products . . . is rubber." Baker expressed concern that no U.S. institution existed to train young men as experts in the field of tropical agriculture and biology, when such knowledge was quickly becoming economically important to the expansion of U.S. commercial firms and consular offices abroad. Despite the letter's "confidential" stamp, Forbes forwarded the letter to the one person in the United States he knew might help: Richard Pearson Strong.[14]

Strong, while serving as the head of the Philippine Bureau of Science's Biological Laboratory a decade earlier during Forbes's governorship, had also been the latter's personal physician. It was against the colorful backdrop of the colonial-era tropics — on polo playing fields and in officers' clubs — that their lifelong friendship began. This friendship, however, was sustained in large part by the vision these men

shared for the future of the United States in the tropical world. As governor-general of the Philippines, Forbes had been an emphatic advocate of state-directed "material development" for U.S. overseas possessions. The country's technical expertise would be central to this process, bequeathing to the inhabitants of formerly "backward" nations the most modern and up-to-date physical, medical, economic, and political infrastructure. Engineers would seize on the technological levers that drove history into the future, building roads, bridges, and dams to improve transportation and industry; biologists would introduce improved methods of agriculture; medical doctors would implement modern sanitary principles to stamp out exotic diseases such as leprosy, which they saw as vestiges of a premodern past; and finally, financial advisors would lay the foundation for economic growth and progress, implementing currency and fiscal reforms and ultimately putting the country on the path to the gold standard, which would dramatically facilitate free trade and financial exchange with the rest of the world. Many reforms along these lines were implemented during Forbes's tenure as governor.[15]

When both Forbes and Strong left Manila for Boston in 1913, they continued to build careers on their past experience in using U.S. science and industry as a wedge into foreign lands to plan future tropical zones of U.S. economic development. Strong, the doctor, returned to the United States to head the country's first Department of Tropical Medicine at Harvard University, studying the exotic diseases that afflicted humans in hot and humid tropical environments. Forbes returned to become an overseer of Harvard University and a director of the United Fruit Company, the agricultural products marketing conglomerate best known for its extensive holdings of banana plantations throughout Central America. In fact, it was on the recommendation of Forbes, and with the financial backing of Harvard alumni such as Forbes and Edward Atkins, who were making their wealth in the banana and sugarcane industries, that Harvard's Department of Tropical Medicine was founded and flourished.[16] In creating the department, Strong brought together an interdisciplinary team of Harvard faculty in tropical biology and medicine that looked on "tropical America" as "one of the few large areas of the world now awaiting development."[17] For many Harvard faculty, as for the businesspeople sponsoring their research, the tropics became the El Dorado on which they built their professional careers. As the department head and the director of the laboratories of the hospitals and of the research work of United Fruit, Strong planned almost every expedition to Latin America in the 1910s and 1920s to areas of expressed or potential interest to U.S. commercial expansion abroad.

The interwoven careers of Forbes and Strong reflect the confluence of several broader historical trends in the United States' relationship with the rest of the world in the late nineteenth century and the early twentieth. The Spanish-American War of 1898 and the ensuing conquest of the Philippines officially marked the entrance of the United States into the twentieth century as an imperial power. In 1897, as a new MD from Johns Hopkins University, Strong journeyed to the trop-

ics under the flag of military and political conquest, while Forbes served as the official administrator of the U.S. occupation of the Philippines. Nevertheless, in the decades and administrations that followed those of William McKinley and Theodore Roosevelt, "the balance," as Emily Rosenberg notes, "swung away from formal colonialism toward the belief that private institutions would spread the American dream more effectively than conquering armies."[18] Companies like United Fruit, rather than the state, were at the forefront of this economic expansion, striking deals with countries across Latin America for access to land for plantations, favorable tax treatment, and reduced duties on their export products. Also during the later 1800s and the early 1900s, U.S. investment bankers and businesspeople increasingly established themselves as financiers to national governments, especially in the Caribbean. Their loans quickly became a lever for the pursuit of other U.S. political and economic interests in these countries. Thus, in 1912, President William Howard Taft could argue that U.S. diplomacy now substituted "dollars for bullets."[19] This "dollar diplomacy" projected a new vision of empire, built, in the words of the geographer Neil Smith, "on a strategic recalibration of geography with economics." And it was also marked, as Smith argues, by a key shift from an "absolute to a relational concept of space as foundational for global affairs." Ties of trade and exchange—in natural resources and commodities, in manufactured goods, and in the realm of culture—would replace territorial contiguity as the fundamental guiding force of geopolitics.[20]

Strong's Harvard position similarly reflects a significant convergence of interests among private business, wealthy foundations, and universities in mobilizing science to produce a better understanding of the factors affecting life in the tropical regions of the globe. As Warwick Anderson has so compellingly shown, the U.S. occupation of the Philippines and especially the opening of the Panama Canal drove a growing U.S. expansion of university and private foundation interests in tropical biology and medicine.[21] While the initial stimulus to these fields may have come from straightforward economic and military interests—sick canal laborers could not work, nor could sick soldiers fight—by the 1920s these areas would increasingly be guided by what Richard Keller has described as the transition from "the 'civilizing missions' of the colonial era" to "projects for modern 'development.'"[22] In the case of the United States, the discourse and logic of the civilizing mission—wedded to missionary, educational, and philanthropic institutions from the Phelps Stokes Fund to the Rockefeller Foundation—overlapped broadly with appeals to medical humanitarianism and economic uplift espoused by high-minded government officials and enlightened business leaders. Advancing research in biomedicine thus appealed to a broad spectrum of interests, from colonial administrators and directors of philanthropic foundations to businesspeople hoping to profit from the trade in commodities derived from the tropics. Health, international trade, and humanitarian uplift went hand in hand.

Strong clearly recognized that the advancement of tropical knowledge at places like Harvard's Department of Tropical Medicine could prove a significant asset in the dual goals of U.S. commercial expansion and tropical economic development as gunboat diplomacy gave way to dollar diplomacy. Thus, in December 1925, he approached Firestone with a proposal to conduct an extensive medical and biological survey of the interior region of Liberia.[23] Firestone was highly receptive to the idea, having grown ever more interested in a small, two thousand–acre rubber plantation in Liberia when, in the 1920s, his prospects of securing land in the Philippines for rubber production were dashed by anti-American sentiments and an experimental plantation in the state of Chiapas, Mexico, became engulfed in revolution and flames. Situated about twenty miles outside the Liberian capital of Monrovia, the Mount Barclay plantation had been abandoned by a British company shortly after the First World War. By 1925 Firestone had in place tentative agreements granting the company rights to the plantation for experiments in rubber production, a ninety-nine-year concession that gave the company the option to lease up to 1 million acres of Liberian land for rubber plantations, and reimbursement for improvements made by Firestone to the harbor of Monrovia that would permit the use of deep-draft vessels in exporting rubber.

Strong's proposal appeared especially appealing in light of the significant uncertainties surrounding Firestone's pending investment. Although Liberia had been linked to the United States since its founding by the American Colonization Society in 1821, when some of the first freed black slaves from the United States arrived to settle the West African coast, the country had long remained of marginal interest to U.S. science, government, and industry. However, when default on a British loan threatened Liberian independence, the Taft administration intervened. Fearing that European powers would swallow up the small republic in the scramble for Africa, the U.S. government in 1912 negotiated a new $1.7 million loan, backed by the State Department, to pay off the country's debts and established an international financial receivership led by a U.S. financial advisor. Even so, Liberia's public finances remained in limbo throughout the war and the early 1920s, making a careful assessment of the country's economic situation a necessity. But while the political and economic climate seemed relatively congenial to U.S. investment in 1925, natural obstacles nevertheless had the potential to stand in the way of Firestone's success in Liberia. Most significantly, endemic human and plant diseases threatened both the healthy survival and growth of rubber plants imported from Southeast Asia and the health and well-being of the native Liberian population that Firestone was counting on to harvest and process the raw latex these plants produced. Strong had spent the better part of a decade studying tropical diseases in Latin America in the interests of United Fruit, but Africa proved a new, unknown challenge to U.S. biomedicine.

Thus, although "purveyors of economic knowledge and practice" would be the first to help establish a U.S. foothold in Liberia via the international financial receivership, Strong would bring other sciences to bear on the transformation of Liberia's people and lands.[24] Within six months after his meeting with Firestone, Strong had organized an eight-member team that included some of the best minds in medical entomology, tropical medicine and botany, mammalogy, and parasitology, as well as the latest experimental drugs in the treatment of tropical diseases. Their mission: to conduct a four-month-long biological and medical survey of the interior region of Liberia, along with an additional four months of travel in the Belgian Congo for comparative purposes. In the opening pages of his expedition diary, Strong expressed hope that, as a result of their efforts, the United States would "exert a more stimulating influence upon the development of the . . . country and its people" than it had in the Philippines, Panama, and Puerto Rico.[25]

Documenting the World, Developing the World

While the scientific survey already had long played a role in Western imperial expansion prior to Strong's expedition in the 1920s, the successful extraction and intensification of biological capital in the tropics on behalf of Firestone would ultimately demand new forms of knowledge and expertise. This fact reflected the novel nature of the rubber empire Firestone hoped to develop in Liberia, a vision of empire based on international commerce and the intensive cultivation of local resources and labor pools rather than on conquest or settlement. No longer did expedition scientists seek solely to study the properties of particular minerals and wildlife in isolation, cataloguing specimens, noting their properties, and preserving them for display in some museum at home; nor did they seek to produce schematics or abstracted maps of reality, the "thin simplifications" that James C. Scott has identified as the basis for high modernist dreams of the total control of human and natural economies.[26] Rather, they pursued the integrated study of Liberia's human and natural economies with an eye toward reordering and guiding their natural growth and development. Perhaps not surprisingly, metaphors drawn from organismal biology and medicine abounded in the language of both the scientific expedition members and the economists and financial specialists advising corporations like Firestone and countries like Liberia. Financial experts, put in place through financial receiverships in countries indebted to the United States, often drew analogies between their work and that of the medical profession. The Princeton economist Edwin Kemmerer, who made his career by introducing currency reforms in the Philippines, Puerto Rico, and Latin America, was almost always introduced to heads of state as the "famed money doctor."[27] These financial missionaries healed "sick" economies, rid the body politic of inflation, and restored financial order to promote economic health and well-being. Strong similarly expressed the belief that the medical and biological knowledge they gathered—from the pervasiveness of malaria, to the ecology of onchocerciasis (river

blindness), to the transmission vectors of yellow fever—would "bring great benefit to the country and redound to the welfare of its people."[28] Understanding tropical relations that led to diseased landscapes and people constituted but a first step in reordering those relationships to generate more "productive" lands.[29]

These new forms of knowledge, grounded in ecological and economic understandings of people, landscapes, and disease, required new tools of seeing.[30] The medical and biological survey of tropical environments, and their transformation into spaces of economic accumulation, necessitated a different cartography than the mapping of territory and conquest. It required a cartography of populations and processes. To aid them in this task, Strong devoted considerable resources to the expedition's survey instrument of choice: the motion-picture camera. Expeditions were weighty affairs, and the Harvard African Expedition proved no exception. Selecting one person out of an eight-member team exclusively to take motion pictures and photographs for almost an entire year was no inconsequential decision. Loring Whitman, the Harvard African Expedition's official photographer, shot over seventy-five hundred feet of film and nearly seven hundred photographs in Liberia. Two porters were needed to carry the film stock alone. And this was but a small fraction of the resources and labor required for shooting in the field. The bulk of photographic equipment was in chemicals. Developing film would prove an immense challenge in a country in which relative humidity ranges from 90 to 100 percent in the rainy season and in which the average rainfall along the coast can reach two hundred inches per year. Frogs and mud in developing trays, film hung out to dry for days on end, rusted and mildewed cameras were just a few of the obstacles Whitman would encounter.[31]

Comparing the African Expedition with previous Harvard expeditions that had employed other new tools of seeing in the interests of commercial development helps illuminate the scientific significance of film and to explain why Strong devoted such exceptional resources to support Whitman's work. In 1924 Strong and members of his team had accompanied the wealthy, Harvard-trained surgeon and explorer, Hamilton Rice, on a much-publicized journey through the Amazon jungle with radio and airship, where they developed new techniques of aerial photography and wireless to map and survey the uncharted headwaters of the Orinoco River. Although the high-altitude photographs offered stunning panoramic views of the Amazonian rain forest and would, Rice hoped, furnish valuable information on the prospects of rubber development in the region, this rendering of physical space gave little insight into life on the ground.[32] But it was the surveying of life that most occupied the attention of the Harvard African Expedition. Recording the movement of life was a task ideally suited for the motion-picture camera. Movement was, after all, the principle of development that guided expanding economies, living organisms, and, one might add, film technology. The motion-picture camera, like the expedition and U.S. capital, was always on the move. Journeying up the Du River, or panning

across the landscape — and such pans are numerous in the surviving footage — the viewer becomes part of an unfolding landscape.

In the film footage shot on the expedition, a view of a movement forward in time, rather than backward, prevails. The mission of the camera on the Harvard African Expedition is not one of salvage ethnography. If it is a record of the past, it is only out of service to the future. A discourse of development, of envisioning what a landscape and people will become, pervades Strong's diaries and official film record of the expedition. Through the vision of Firestone and the promise of science and medicine, "a new era of prosperity in the development of the country and the welfare of its people as a whole" awaited Liberia, wrote Strong. The motion-picture camera captured, more effectively than any static map or still photograph, this anticipation of what lay ahead. Through Whitman's camera, the viewer is transported from virgin rain forest to cleared jungle in a matter of seconds. It is a projection forward — a glimpse into the future — of the environmental, economic, and social changes about to be unleashed by the opening of the Liberian interior to the markets of American empire.

Strong may have insisted on film as the expedition's dominant medium for scientific reasons, but Firestone clearly also grasped the prospects of motion pictures in awakening U.S. investors and the Liberian people to the promise of markets and economic development in Liberia. Not long after the completion of the Harvard African Expedition, while in Monrovia to broker a final deal on a $5 million loan to Liberia, Harvey Firestone Jr. accompanied Whitman to the Mount Barclay plantation to take pictures of "the tapping, collecting, and bringing in of rubber."[33] Throughout the following year, the Firestone Plantations Company used motion-picture cameras and crews to document the transformations underway, as fifteen thousand acres of rain forest were felled, burned, and planted with rubber trees by twenty thousand laborers drawn from Liberia's interior ethnic tribes (fig. 4). The film, shown at large Firestone gatherings of dealers and salespeople in the United States, as well as in Liberia, was, in one viewer's words, a "moving panorama" that provided a "living record" of Liberia's "changing world" in the wake of the Harvard expedition and the expansion of Firestone's corporate interests in Liberia.[34]

Figure 4. Axe and fire begin the transformation of Liberia's landscape. Courtesy of Randal Whitman

From such films—peculiar hybrids of scientific documentary and exuberant advertising—Americans perceived a world rich in adventurous experiences and valuable natural resources. Indeed, "the consumption of the world through images" and through natural resources went hand in hand.[35] From the exploits of Martin and Osa Johnson in East Africa to the journeys of Merian Cooper and Ernest Shoedsack in northern Siam (now Thailand), travelogue-expedition films such as *Simba* (1927) and *Chang* (1928) broke Hollywood box-office records and offered middle-class white Americans a tourist experience of foreign lands and peoples. They simultaneously offered audiences a thinly veiled justification of what "backward" countries might become through the investment of U.S. capital, science, and medicine.[36]

If the film industry offered viewers a glimpse of people and cultures around the world, drumming up U.S. support for trade and development schemes in far-off lands, the cultural exchange worked in the opposite direction as well. By the 1920s Hollywood exerted dominant control over world markets in cinema. And for every foot of film sent abroad, the Department of Commerce remarked, "one dollar in other goods was exported." By "familiarizing South America and Africa, Asia and Europe with American habits and customs," noted a reporter in *Collier's*, "it is educating them up to the American standard of living . . . and subtly but surely creating a desire for . . . American-made articles." "Trade follows the film," became a slogan of business and Hollywood executives after the First World War. One could have easily substituted the word *science* for *trade*.[37]

Ultimately, the footage shot on the Harvard African Expedition never became a part of either the economy or the history of the motion-picture industry. But it was not for a lack of trying. In the footage that survives, we see Whitman playing with framing conventions and subjects clearly aimed at a theatrical release. Shots of Max Theiler with the expedition's pet monkey conformed closely to standardized conventions of depicting explorers with their wilderness pets that had come to characterize the evolving tradition of commercial travelogue-expedition films (fig. 5). On his return to the United States, Strong also sought the advice of Terry Ramsey, who had edited and titled Martin and Osa Johnson's blockbuster, *Simba*, to fur-

Figure 5. Shots, like this one of Max Theiler with the expedition's pet monkey, aimed to connect the footage to the popularity of travelogue-expedition films and their expanding market base. Courtesy of Randal Whitman

ther his hopes of turning the "raw" footage of Liberia into a "creative treatment of actuality."[38]

Although the Liberian footage never found its way into the grand picture palaces, it was shown in more intimate settings: at luncheons of the Harvard Travellers Club, trustee meetings of the American Museum of Natural History, and private gatherings of the Round Table in Saint Louis, where travel, business, and adventure were subjects of the day. And it was in these settings of white, wealthy, mostly Harvard-educated physicians, scientists, politicians, and business leaders where friendships were renewed, future plans discussed, business partnerships started, and deals brokered.[39] In social clubs and parlor rooms, the art of business, the craft of science, and the medium of film combined to create new spaces of global economic expansion. Film became an integral part of an economy forged across science, commerce, and medicine in the quest to find export markets and supplies of raw materials to satiate the United States' growing consumer needs.

Impediments of Labor

Examining the practices of looking employed on the Harvard African Expedition allows us to glimpse a new economy that was just emerging, an economy structured by practices of valuation that saw tropical life in relation to productive capacities and economic efficiency. As we have seen, Strong saw the luxuriousness of life in Liberia—in particular, its exceptional capacity for reproduction, growth, and development—as its greatest asset. Yet in his view, life was also Liberia's greatest impediment to progress. As the expedition moved from village to town, Strong and his colleagues were continually on the watch for tropical diseases, moving easily between children with schistosomiasis and diseased cassava plants. Correspondingly, their film footage reveals an eye searching for diseased landscapes, whereby tropical pathologies would have to be overcome for Liberia's natural resources—people, plants, and animals—to be fully realized. Indeed, Strong regarded the high rate and severity of malaria infection along the coast, and the prevalence of tropical diseases such as yellow fever, schistosomiasis, and onchocerciasis, as some of the greatest obstacles to development. Overcoming these obstacles would be the payoff of Firestone's support for tropical biology and medicine.[40]

This preoccupation with disease reflects a broader challenge facing Firestone's Liberian venture: although raw materials appeared abundant in the tropics, for a number of reasons, labor was not. Maintaining an able-bodied population of workers would prove the greatest impediment to the commercial expansion of U.S. industry in the tropics. Not surprisingly, next to examples of plants and humans afflicted by tropical diseases, native Liberians at work—constructing roads, weaving cotton, pounding rice—dominate the images contained in the expedition films and photographs (fig. 6).

In seeking to overcome the difficulties involved in cultivating a tropical workforce, the extensive film footage of Liberian labor served multiple ends. First and

Figure 6. Native Liberians at work dominate the images contained in the expedition films and photographs. Courtesy of Randal Whitman

foremost, Strong sought to produce knowledge that would help identify the best possible recruits for Firestone's plantations. In the official published record of the expedition, he therefore included a lengthy discussion of the ethnological groupings of interior Liberian tribes — Mandingo, Kru, and Gola. His valuation of different ethnic groups looked to blood relations, dress, literacy, religion, and craft skills to create an explicitly hierarchical classification scheme that appealed to science in reinforcing attitudes of racial superiority and difference. The Vai, a subgroup of the Mandingo, were, Strong reasoned, "superior intellectually" and "one of the most progressive groups in the native population." Their knowledge of Arabic, their own written language, their skills in farming and weaving, all made them, Strong wrote, "an important civilized and important civilizing element in Liberia."[41] Compare this description to what Strong had to say about Americo-Liberians, who ruled the country and lived on the coast: "The Americo-Liberians are not good agriculturalists or gardeners. Physically they are lazy. . . . Nothing of any importance has been done by [them] to improve the conditions of the natives. On the other hand, much has been done which has actually retarded their development. Liberia," Strong concluded, "cannot be successfully developed without the aid of interior tribes."[42] The visual survey of labor amassed by Whitman offered up evidence for Strong's subjective valuation of ethnic tribes and their potential worth to Firestone. This information would prove fantastically important for the implementation of Firestone's plans: restrained by practical limitations and by treaty obligations to the Liberian government from importing a white labor force, he by 1928 had twenty thousand Liberian men working fifteen thousand acres of his rubber plantations.

The expedition's records also contained evidence that Strong accumulated about the extent of labor abuses committed by the Americo-Liberian government against native ethnic tribes. During the 1920s thousands of men from Sinoe and Maryland counties in the southeastern part of Liberia were being recruited through coercive bounty systems and forced to work the cocoa plantations on the Spanish island of Fernando Po, located in the Gulf of Guinea on Africa's west coast. Exten-

sive road building using corvée drew another estimated six thousand men from their native villages during the same decade.[43] News of these indignities leaked out periodically into the international press during the 1910s and 1920s, prompting widespread outrage. Marcus Garvey, the leader of the Universal Negro Improvement Association and of the back-to-Africa movement, lambasted the military and political supremacy of black Americo-Liberians "who keep the Natives poor, hungry, shelterless and naked, while they parade themselves in the tropical sun in English frock coats and evening dress."[44] Among African Americans in particular the complicity of Liberian government officials — many of whom descended from former slaves — in forced-labor practices made the politics of any U.S. economic involvement with Liberia potentially explosive. And ultimately, a complex cascade of events and racial politics and motives would lead to a 1930 investigation by the League of Nations into the existence of slavery and forced labor in Liberia.[45] Yet Strong and the leadership of the 1926 expedition viewed as equally worrisome the effect of these policies making male labor a scarce commodity in the Liberian interior. Indeed, in the eastern and southern sections of Liberia, the expedition resorted to the use of women porters due to the absence of available men. Such a situation suggested that, in proposing to locate his rubber plantation in Liberia, Firestone had massively underestimated the challenges of labor.

Ultimately, the footage of road crews, women working on government farms, women in pawn, and the porterage of district commissioners became part of a documentary record Strong amassed to convince U.S. government officials to take a more active stand against labor abuses in Liberia (figs. 7 and 8). This stand against the most blatant instances of forced labor clearly made sense to Strong (and presumably, to Firestone) on political, practical, and humanitarian grounds. While the forced labor trade proved immensely lucrative to the Americo-Liberian elites in the government, ending it would significantly enhance the labor pool available to Firestone within Liberia.[46] Moreover, such an action resonated with an ideology of corporate welfare promoted by Firestone in which science and medicine played an important role. For

Figures 7 and 8. Footage of road crews and women in pawn were just a few of the images collected by Strong to document alleged labor abuses by the Liberian government. Courtesy of Randal Whitman

example, while Firestone staunchly opposed unionization in his factories at home, he nevertheless saw himself as a pioneer in labor relations, providing his employees with numerous benefits like health care. The image of plantations worked by forced labor simply did not fit with this carefully crafted image of benevolent capitalist paternalism, and transparent instances of slavery of the sort captured by Strong's cameraman were clearly incompatible with a vision of empire grounded in free markets.

Although we cannot be certain what impact the expedition footage and photographs had, Strong was deeply troubled and moved to action by these encounters of labor abuse documented on film. Before departing from Monrovia in November of 1926, Strong wrote to the assistant secretary of state, William Castle: "The original purpose of my visit to Liberia was solely to make a biological and medical survey of a little known country. The distressing conditions found to exist here, particularly in the interior, . . . have been a very great surprise to me, and I feel it has become my duty upon my return to take up with the Department of State a discussion of the situation."[47] Strong followed through on his plan. His friend and patron Forbes arranged for Strong to be an overnight guest of President Coolidge at the White House in February 1928. On that occasion Strong impressed on Coolidge the conditions of the people living in the interior of the country and the "excessive abuses" inflicted on them by the government's Liberian Frontier Force, without any "redress."[48] Castle reported shortly after the meeting that the "President was most interested and that those talks have very much roused his concern for that country."[49] One year later, on June 8, 1929, the U.S. State Department dispatched a memorandum to the American minister in Liberia that would set the League of Nations inquiry into motion. It read:

> I am directed by the Secretary of State to advise your Excellency that there have come to the attention of the Government of the United States from several sources reports bearing reliable evidence of authenticity which definitely indicate that existing conditions incident to the so-called "export" of labor from Liberia to Fernando Po have resulted in the development of a system which seems hardly distinguishable from organized slave trade, and that in the enforcement of this system the services of the Liberian Frontier Force, and the services and influences of certain high Government officials, are constantly and systematically used.[50]

Ironically, while Strong may have been moved to action by what he believed to be humanitarian intentions, he himself resorted to forced labor practices. As the expedition reached Towya, a town near the southeastern Liberia coast, the expedition became desperate. Few men could be found in the villages, and those hired often ran away, abandoning their cargo. At times, Whitman alone transported the loads across rivers that proved unmanageable for shorter women and children. When the expedition members finally secured a group of men, they tied them up with

strings or vines. "It was quite a merry caravan," Whitman wrote in his diary. "Eighteen men in chains (I mean ropes) with three white men armed to the teeth — ready to shoot to kill — a pretty picture." Whitman could not help but reflect on how the image was not unlike "years ago when many such scenes took place," where "whites with whips and crude guns drove their way thru [*sic*] the forests: the slave traders." It was a haunting image, but one Whitman chose not to document on film. Perhaps, in the cameraman's mind, this scene already belonged to Liberia's past, not the future whose development he sought to narrate.[51]

Intimate Resistances

Surveying the landscape for disease and labor constituted but a first step in the projected transformation of Liberia's people and economy. The Harvard African Expedition documented the world of Liberia as it was — or so expedition members believed — and in their eyes created a justification for what it might become. The narrative of development was intrinsic to the expedition's mission. This narrative demanded more than just a record, more than just a detached survey like that generated by Strong's aerial photographs of the Orinoco, shot from hundreds of feet overhead; it also required the scientists to experiment, to probe, to intervene. As a result, the expedition sometimes slowed its movement. In Krutown on the outskirts of Monrovia, on Mount Barclay Plantations #2 and #3, in Gbanga, and in Tappitown, among other villages, medical clinics were set up, populations were sampled, and experimental drugs were given.[52]

In these close-up, documented encounters, where something needed to be extracted from another's life — blood, urine, tumors, or photographs — the subjective valuation that treats humans simply as capital, as biological reserves of rare diseases or as cheap labor to be integrated into emerging global markets, is unsettled. And the unsettling occurs because "the magical fact of the camera is," as the documentary filmmaker John Grierson observed, "that it picks out what the director does not see at all, that it gives emphasis where he did not think emphasis existed."[53] We see, in this documentary record, not simply a catalog of populations and processes to be organized into a new economy of nature and nation. We also see the material traces of past encounters that reveal movements of individual lives and relationships not so easily ordered by the marketplace of U.S. science, medicine, and industry. Whitman's diary is full of descriptions of the expedition cajoling people into getting pictures or samples taken. In Krutown, "we had to coax our subjects to have their spleens palpated and their ears pricked," he recorded. In Towya, Strong longingly eyed a "charming little tumor" that he hoped to excise from the town's chief. "We cajoled, we threatened, we vowed he would die," wrote Whitman, "and still he coyly refused to part with that most . . . cherished treasure."[54] The inquiring looks of children, the frozen stare of a woman, are reminders that extraction always entails some form of resistance (figs. 9 and 10). And many layers of extraction were at work on the

Figures 9 and 10. The inquiring looks of children and the frozen stare of a woman serve as reminders that extraction always entails some form of resistance. Courtesy of Randal Whitman

expedition, from the taking of photographs to the harvesting of blood, tumors, and latex. The Harvard African Expedition was in Liberia, albeit unofficially, to open the interior of Liberia to the markets of a U.S. extractive industry.

The population view that so informed the Harvard African Expedition—where people became vectors of disease or pools of labor—calibrated readily with the tools, language, and visions of economic development projected by the Firestone Plantations Company. But where Strong saw people as biological abstractions, the camera, deployed in the service of science and industry, unsuspectingly captured elements of individual human lives. Among the 476 still photographs of people, customs, crafts, diseases, and landscapes in the published account of the expedition, only one contains a caption with an actual person's name. The caption reads, "Plenyono Wolo, son of a Vai chief, and his wife" (fig. 11). In the Harvard University archives, another photograph exists. It too is of Wolo, this time not dressed in native costume but in Harvard graduation robes (fig. 12). The juxtaposition of these two shots reveals a story quite different from the photo caption, one underscoring that humans are never simply biological capital, and that markets are rarely truly open and free.[55]

No. 33. — Plenyono Wolo, son of Vai chief, and his wife

Figure 11. "Plenyono Wolo, son of a Vai chief, and his wife"

Wolo was not the son of a Vai chief. He was the son of an esteemed paramount chief of the Kru tribe. He was educated by American missionaries, graduated from Harvard University in 1913, and earned his doctorate at Union Theological Seminary in 1922. In 1919 he helped conduct an economic survey

in Liberia for U.S. commercial interests. Three years later he returned to Liberia, with financial backing from a number of U.S. patrons including the Harvard president Abbott Lawrence Lowell, to open a day school in his native village of Grand Cress. His patrons believed that Wolo, like his Harvard brethren in science or U.S. missionaries in finance, had returned to Liberia as an emissary of U.S. education and religion to guide "his people" into the "acceptance of such elements of . . . civilization as are adapted to his people's psychology and situation."[56] But neither Wolo's patrons nor Strong displayed much, if any, respect or appreciation for Wolo's own motives and aspirations in returning to Liberia. To them, he was an instrument of U.S. commercial and educational interests abroad. Correspondence among his U.S. patrons reveals their fears that he had, on his return, "succumbed to the drag of native inertia" or "reverted" to the ways of witch doctors and devil spirits.[57]

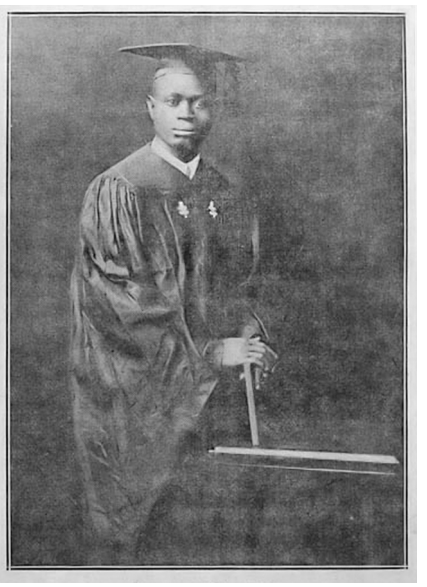

Figure 12. Plenyono Wolo in Harvard graduation robes. Courtesy of Harvard University Archives, call # HUG 4879.405, f. 7

But Wolo had hopes and desires of his own. He had already navigated a difficult road. The Methodist missionaries who had educated him looked on him, and on other aboriginal peoples of Liberia, as "children," thereby reinforcing their own paternalistic beliefs about Wolo.[58] He worked his way through Harvard as a waiter in hotels and dinner clubs, reminded that the upper-class white men and women he served were his classmates but never his equals in their eyes. He traveled to North Carolina, working for a summer as a common laborer, to see for himself and experience what blacks faced in the Jim Crow South. He returned home to Liberia to confront the harsh reality that the "moral attitude of the United States toward" his country worked "chiefly for the advantage of" those in power and not for the welfare of his people. The Kru for over a century had been locked in conflict with the Americo-Liberian government, whose ruthless treatment and repressive native policies had led to a Kru rebellion in 1915. The revolt was violently suppressed by the Liberian Frontier Force, backed by a U.S. gunboat. Despite, or perhaps because of, this history, Wolo worked hard to enlist the interests of the U.S. government and industry in ways that would leverage greater power, educational opportunities, and economic security for the interior tribes of Liberia.[59]

Although Wolo brokered many of the arrangements in Liberia for the Harvard African Expedition, walked with Strong through the streets of Monrovia, and

sat among his Harvard "brothers" at a dinner organized by the Liberian president, Charles Dunbar King, Strong never acknowledged what the camera recorded: the traces of Plenyono Gbe Wolo's individual life. Wolo's biography did not quite fit with Strong's mental and visual map of the ethnic tribes of Liberia, in which the Kru people are "deemed not particularly intelligent as a race" and are only ever displayed photographically as medical subjects.[60] Perhaps Kru was not a lineage Strong believed suited to a Harvard alum, and so, whether purposefully or born of disregard, he dressed Wolo in a different life. The magic of the camera, revealed in the haunting expedition footage and still photographs, is not that it recorded an objective, scientific record of Liberia, as Strong had intended. The magic is that it recorded the expedition's own, subjective valuation of Liberia and its people, viewed through the lens of U.S. science and commerce, that would forever alter, for good or ill, the lives and landscape transformed by an expedition on the move.

Affairs of State

In November 1926, after four months traversing dense tropical rain forest, the expedition members once again found themselves comfortably housed in Monrovia as guests of the Firestone Plantations Company. Yet even as the expedition members prepared to depart, an explosive incident would put them squarely at the center of a political crisis with reverberations felt across the Atlantic. Thus Strong would note in his diary in early November 1926, "I have been thrown as a necessity into state affairs since my return."[61] It was these affairs of state that would ultimately cement the United States' new relationship with Liberia, and the expedition's doctors and scientists would play a central, albeit unanticipated, role in their resolution.

Strong's diary entry referred to the following circumstances. On returning to Monrovia, he found that negotiations between Firestone and the Liberian government, ongoing since 1924, had stalled. The essential aspects of the initial agreement drafted in 1924—an experimental lease on the Mount Barclay plantation, the option to lease up to a million acres of Liberian land, and government reimbursement for improvements made to the harbor of Monrovia—seemed relatively settled, albeit with a few exceptions. The major sticking point was a demand added by Firestone in 1925 that the Liberian government accept a new loan to pay off its debts under the 1912 receivership and thereby ensure adequate protection from outside creditors of Firestone's "large capital investment" in a "far-off country."[62] The loans for up to $5 million were to be offered by the Finance Corporation of America (an organization that was only later publicly revealed as a subsidiary of the Firestone Tire and Rubber Company), payable at an interest rate of 7 percent over forty years. More onerous than the interest payments were the attached terms, which significantly constrained the sovereignty of the Liberian government. Among other things, Firestone demanded an auditor (appointed by the U.S. president) with significant power to shape the government's budget; conditions forbidding the Liberian government

to issue debt other than that purchased by the Finance Corporation of America; and the appointment of American-recommended officials to oversee the Liberian Frontier Force as well as customs and revenue collection. Disputes over the terms of the agreement would not be settled in Liberian courts but in arbitration panels dominated by American appointees. Firestone was determined to ensure that no nation or business other than his own could exercise control over many of the essential functions of the Liberian government; in practice, this meant that Firestone and the U.S. government would exercise much of this control.[63]

When the administration of President King informed the Liberian legislature of the details of the proposed loan in January 1926, Firestone's Liberian dealings rapidly moved from the supposedly neutral realm of private business dealings, philanthropy, and scientific inquiry into the full spotlight of international politics. Not surprisingly, Firestone's terms exposed deep divisions within the Liberian government. On the one hand, Liberian officials had entered the negotiations knowing full well, as the statesman C. L. Simpson observed, that the loan was a form of "economic domination by a company belonging to a traditionally friendly country."[64] But, as Wolo himself wrote, there were "selfish reasons for accepting the loan," since U.S. investment would help stave off the very real security threats to Liberia from encroaching European countries, notably France and Great Britain. With the Firestone agreement foundering and threatening to bring down King's administration with it, the State Department, long quietly involved in the negotiations, suddenly found itself in the middle of everything, beseeched by both Firestone and the King administration for help in hammering out the final details. But although the assistant secretary of state Castle penned in his diaries hopes that the loan agreement would mark the opening to a larger U.S. role in West Africa, the U.S. government was also divided on how to proceed.[65] Consequently, Strong expressed disappointment with the seeming lack of State Department action in pushing the loan through on Firestone's behalf, a lack he believed was "mixed up with politics and the American negro vote in the United States."[66]

Although Harvey Firestone Jr. had arrived in Monrovia in July to do whatever he could to bring closure to the deal, ultimately it was the actions of George Shattuck, Strong's close friend and an expedition member, that did the most to cut through this web of interlocking domestic and international politics. Accounts of the incident vary widely, but some facts are consistent. On the morning of November 6, Shattuck and the Firestone employee M. A. Cheek, whom Strong described as "too high strung for the tropics," beat John Quincy Adams, a black Liberian chauffeur who showed up late to drive the two white men to a scheduled quail hunt at 5 a.m. A passerby watched it happen. A few hours later, the Liberian police arrested the men and took them off to jail. Strong accompanied the group through the streets of Monrovia, while a mob gathered and hurled epithets against "Americans, white men, and the Firestone Plantations Company."[67] The Liberian William Wollo gave a

more descriptive account of the crowd and its cries: "Hang them! Kill them! Lynch them! These and worse," he alleged, "came from the throats of the scathing mob that surrounded the jail." Firestone's attempt to cultivate rubber in Liberia seemed on the verge of following his earlier ventures in Mexico and the Philippines into oblivion from the force of a violent political backlash.[68]

Yet remarkably, after several days of intense diplomatic cabling between Monrovia and Washington, Shattuck and Cheek were released. The Liberian president King, fearing "international complications," invited Strong to the executive mansion, where King apologized and explained that the affair was "a demonstration of a few people against the Firestone Plantations Company and the proposed loan by people who do not wish the loan to go through."[69] Apparently, Shattuck's presence had made the difference. Castle admitted to Strong that if "Cheek had been the only one involved or Cheek and some other Firestone employee, it would have put the Department in an exceedingly difficult position, but as the Liberians attacked also people who were in Liberia for purely humanitarian and scientific reasons, it enabled us to take a very different stand from what we might have taken otherwise."[70] The apparently apolitical nature of science proved a much more valuable tool than the interests of industry in the affairs of dollar diplomacy—a striking irony, given the obviously political settlement that followed. Within a matter of weeks the Liberian legislature ratified the Firestone planting and loan agreements, opening the door to U.S. investment, philanthropic institutions, and medical and scientific research and propelling immense economic, social, and environmental change.

. . . . .

Eleven years later, in 1937, Harvey Firestone Jr. presented the Booker Washington Agricultural and Industrial Institute (BWAII), located in Kakata, Liberia, with an unusual gift. Founded in 1928, with the aid of Firestone and the Phelps-Stokes Fund, the BWAII was modeled on Washington's Tuskegee Institute in Alabama, with the express purpose of introducing vocational and agricultural education as a "civilizing agent" in the small African republic. The gift, *Views of Liberia*, was a limited-edition coffee-table book of stunning, mostly aerial, photographs documenting the transformation of the Liberian landscape and its peoples under the guiding hand of U.S. industry, science, and medicine.[71] Firestone had indeed reordered the economy of nature and a nation, making real his vision for the country's material development. Over seventy thousand acres of Liberian forests had given way to neatly planted, straight rows of rubber trees, extending as far as the eye could see (fig. 13). By 1940 these trees would yield more than seven thousand tons of latex. And by 1955 the Firestone Plantations Company accounted for 70 percent of Liberia's total export revenues and the single largest proportion of "total wage income in the private sector of the Liberian economy."[72]

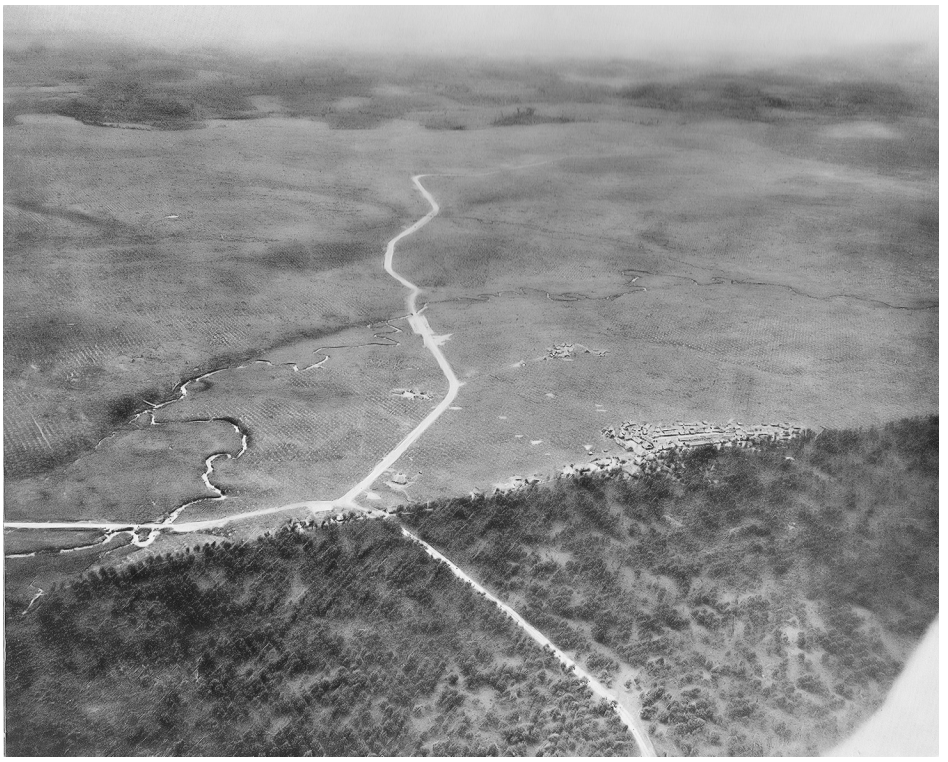

Figure 13. Seventy thousand acres of Liberian rain forest had given way to neatly planted rows of rubber trees, extending as far as the eye could see.

The episode of the 1926 Harvard African expedition reveals several significant features of how this transformation of Liberia was accomplished. In particular, science and medicine emerge in a new light. No longer are they simply neutral providers of material benefits—vaccines, better roads, higher-yielding crops, and more efficient technologies—whose adoption by individuals is an unproblematic force in establishing an American style of empire bound together by the markets and commerce. Instead, it is remarkable how deeply the narrative of development was ingrained in the practices of viewing and observation employed by the members of the Harvard African Expedition. These scientists radically reinterpreted the Liberia they encountered, seeing in it disease-bearing populations and labor pools instead of individual people, and imagining resources awaiting cultivation and extraction in place of landscapes endowed with a more complex range of uses and meanings. Moreover, the materials produced by these practices of seeing and valuation—scientific reports, photographs, and film—functioned on several levels, capturing technical knowledge for the internal use of the Firestone Plantations Company while also potentially stimulating the interest of a broader public audience. The

vision they projected could be resisted and complicated, but as Firestone's *Views of Liberia* suggests, it ultimately emerged victorious. Finally, the very institution of the scientific expedition itself, with its claims to political neutrality and humanitarian benevolence, would become a major actor in the international politicking that ultimately allowed Firestone to obtain the concessions he desired in Liberia.

Science, medicine, and film thus mattered in creating Firestone's rubber empire in Liberia, but in ways that other histories of the United States' peculiar form of empire have overlooked. In its mature form, this kind of empire is defined by markets, finance, and exchange, but scientists, doctors, and cinematographers often envisioned and rehearsed these institutions and relationships far ahead of time. They helped set in motion the movement of capital, latex, tumors, blood, people, and drugs that created the conditions for markets to flow, intensifying spaces of economic accumulation, growth, and development as U.S. industry expanded into foreign lands. Indeed, without them, the success of U.S. business in the tropics remained a tenuous proposition, as Ford would discover in his failed attempt to carve a rubber plantation out of the Amazonian rain forest. Financiers, politicians, and businesspeople are often credited with making American empire a reality, but they could not have done so without the tools, language, and vision of tropical biology that emerged hand in hand with the economic transformation of nature and nations.

Notes

1. "Edisoniana," *Time*, February 25, 1929, 54; L. C. Speers, "Prepared to Honor Hoover with Edison," *New York Times*, February 11, 1929.
2. On the surpassing of Ford by GM, see Mira Wilkins, *The Maturing of Multinational Enterprise: American Business Abroad from 1914 to 1970* (Cambridge, MA: Harvard University Press, 1974), 72–75.
3. "Auto's Varied Uses Shown," *New York Times*, January 27, 1928. See also "Auto Film Shows World on Wheels," *New York Times*, January 26, 1928; Rick Prelinger, *The Field Guide to Sponsored Films* (San Francisco: National Film Preservation Foundation, 2006).
4. There has been a surprising absence of historical scholarship on industrial film, given the amount companies invested during the 1920s in sponsoring films such as *General Motors around the World*. See, e.g., Eric Guy Nowlin, "A Survey of the Development of the Business and Industrial Film," (PhD diss., Northwestern University, 1976). There is, however, a growing body of scholarship on the history of other forms of early nonfiction film. See Lisa Cartwright, *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995); Patricia R. Zimmerman, "Geographies of Desire: Cartographies of Gender, Race, Nation, and Empire in Amateur Film," *Film History* 8 (1996): 85–98; Daan Hertogs and Nico de Klerk, eds., *Uncharted Territory: Essays on Early Non-fiction Film* (Amsterdam: Nederlands Filmmuseum, 1997); Paula Amad, "Cinema's 'Sanctuary': From Pre-documentary to Documentary Film in Albert Kahn's *Archives de la Planète* (1908–1931)," *Film History* 13 (2001): 138–59; Hannah Landecker, "Cellular Features: Microcinematography and Film Theory," *Critical Inquiry* 31 (2005): 903–37; Alexandra Schneider, ed., *Virtual Voyages: Cinema and Travel* (Durham, NC:

Duke University Press, 2006); Karen L. Ishizuka and Patricia R. Zimmerman, eds., *Mining the Home Movie: Excavations in Histories and Memories* (Berkeley: University of California Press, 2008).

5. These figures come from Stuart Chase, "The Dollar Now Encircles the Globe," *New York Times*, December 12, 1926.
6. On Theiler, see Erling Norrby, "Yellow Fever and Max Theiler: The Only Nobel Prize for a Virus Vaccine," *Journal of Experimental Medicine* 204 (2007): 2779–84; and Greer Williams, *The Plague Killers* (New York: Charles Scribner's Sons, 1969). Loring Whitman was the expedition photographer and discusses the filming of the medical survey in Krutown in "Harvard African Expedition, 1926–1927," 17, Loring Whitman Papers, Diary, courtesy of Randal Whitman (hereafter cited as LWD). On the establishment of Krutown, see L. B. Breitborde, "City, Countryside, and Kru Ethnicity," *Africa: Journal of the International African Institute* 61 (1991): 186–201.
7. Harvey S. Firestone, *Men and Rubber: The Story of Business* (Garden City, NY: Doubleday, 1926), 254–55. See also Richard Tucker, *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World* (Berkeley: University of California Press, 2000).
8. See *Crude Rubber, Coffee, Etc.: Hearings before the Committee on Interstate and Foreign Commerce House of Representatives on H. R. 59*, 69th Cong., 1st sess., January 6–22, 1926; Silas Bent, "Rubber—A New 'Gold' in World Finance," *New York Times*, March 31, 1925.
9. "Predicts Big Rise in Rubber Prices," *New York Times*, April 4, 1925. Tire prices for 1925 come from *Crude Rubber, Coffee, Etc.*, 269.
10. *Crude Rubber, Coffee, Etc.*, 2.
11. Ibid., 6.
12. For Edison's Botanical Research Laboratory, see Mark R. Finlay, *Growing American Rubber: Strategic Plants and the Politics of National Security* (New Brunswick, NJ: Rutgers University Press, 2009); and Alfred Lief, *The Firestone Story: A History of Firestone Tire and Rubber Company* (New York: McGraw-Hill, 1951), 166. On Fordlandia, see Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History* (Cambridge: Cambridge University Press, 1987); Elizabeth D. Esch, "Fordtown: Making Race and Nation in the American Empire, 1925–1945," (PhD diss., New York University, 2003); and Greg Grandin, *Fordlandia: The Rise and Fall of Henry Ford's Forgotten Jungle City* (New York: Metropolitan Books, 2009). During the Second World War, as the United States was cut off from Malaysian markets, Liberia proved a strategic military outpost and major rubber supplier to the United States thanks to Firestone. See Wayne Chatfield Taylor, *United States Business Performance Abroad: The Case Study of the Firestone Operations in Liberia* (Washington, DC: National Planning Association, 1956).
13. See, e.g., Warwick Anderson, *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines* (Durham, NC: Duke University Press, 2006); and Michael Adas, *Dominance by Design: Technological Imperatives and America's Civilizing Mission* (Cambridge, MA: Belknap, 2006). Despite the increasing amount of scholarship on American imperialism through the lens of cultural history, the place of science and technology remains relatively absent. See, e.g., Amy Kaplan and Donald E. Pease, eds., *Cultures of United States Imperialism* (Durham, NC: Duke University Press, 1993); Ann Laura Stoler, ed., *Haunted by Empire: Geographies of Intimacy in North American History* (Durham, NC: Duke University Press, 2006).
14. Baker to Forbes, September 3, 1923, Ames Oakes Folder, Box 20, Richard Strong Papers, Countway Medical Library, Harvard University (hereafter cited as RSP).

15. Paul A. Kramer, *The Blood of Government: Race, Empire, the United States, and the Philippines* (Chapel Hill: University of North Carolina Press, 2006), 309; Anderson, *Colonial Pathologies*; on Forbes's conception of "material development," see Adas, *Dominance by Design*, esp. 48–50. On the Philippine currency reforms, see Emily Rosenberg, *Financial Missionaries to the World: The Politics and Culture of Dollar Diplomacy, 1900–1930* (Durham, NC: Duke University Press, 2003); on leprosy eradication, see Michelle T. Moran, *Colonizing Leprosy: Imperialism and the Politics of Public Health in the United States* (Chapel Hill: University of North Carolina Press, 2007).
16. On the various stages of Strong's professional career, see Marcos Cueto, "Tropical Medicine and Bacteriology in Boston and Peru: Studies of Carrión's Disease in the early Twentieth Century," *Medical History* 40 (1996): 344–64; Eli Chernin, "Richard Pearson Strong and the Manchurian Epidemic of Pneumonic Plague, 1910–1911," *Journal of the History of Medicine and Allied Sciences* 44 (1989): 296–319; Kristine A. Campbell, "Knots in the Fabric: Richard Pearson Strong and the Bilibid Prison Vaccine Trials, 1905–1906," *Bulletin of the History of Medicine* 68 (1994): 600–638.
17. Thomas Barbour, "Institute for Research in Tropical America," 1, Barbour, Thomas Folder, Box 20, RSP; Richard P. Strong, "The Modern Period of Tropical Medicine," *American Journal of Tropical Medicine* 17 (1937): 2.
18. Emily S. Rosenberg, *Spreading the American Dream: American Economic and Cultural Expansion, 1890–1945* (New York: Hill and Wang, 1982), 62.
19. Quoted in David Kilroy, "Extending the American Sphere to West Africa: Dollar Diplomacy in Liberia, 1908–1926" (PhD diss., University of Iowa, 1995), 45. The subject of dollar diplomacy and American empire was first taken up by William Appleman Williams and his students at the University of Wisconsin in the 1960s and 1970s. See, e.g., the classic study, William Appleman Williams, *The Tragedy of American Diplomacy*, rev. ed. (New York: Delta, 1962). Frank Chalk, a Williams student, was the first to explore the history of U.S. foreign relations in Liberia from this perspective. See Frank Chalk, "The Anatomy of an Investment: Firestone's 1927 Loan to Liberia," *Canadian Journal of African Studies* 1 (1967): 12–32; and Chalk, "The United States and the International Struggle for Rubber, 1914–1941" (PhD diss., University of Wisconsin, Madison, 1970).
20. Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization* (Berkeley: University of California Press, 2003), xvii, 13.
21. Anderson, *Colonial Pathologies*; Joel Hagen, "Problems in the Institutionalization of Tropical Biology: The Case of the Barro Colorado Island Biological Laboratory," *History and Philosophy of the Life Sciences* 12 (1990): 225–47; Sharon Kingsland, *The Evolution of American Ecology, 1890–2000* (Baltimore: Johns Hopkins University Press, 2005); and Paul Sutter, "Nature's Agent or Agents of Empire? Entomological Workers and Environmental Change during the Construction of the Panama Canal," *Isis* 98 (2007): 724–54.
22. Richard Keller, "Geographies of Power, Legacies of Mistrust: Colonial Medicine in the Global Present," *Historical Geography* 34 (2006): 26–48.
23. Strong began considering an expedition to Africa in the summer of 1924, with the intent of testing "Bayer 205," a German preparation against sleeping sickness, whose secret formula had recently been discovered by the French pharmaceutical firm Poulenc Freres. See Strong to Forbes, June 23, 1924, bMS AM 1364, Folder 279, William Cameron Forbes Papers, Houghton Library, Harvard University (hereafter WCFP). On his meetings with Firestone, see Strong to Joseph Grew, January 19, 1926, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP.

24. Emily S. Rosenberg, "Ordering Others: U.S. Financial Advisers in the Early Twentieth Century," in Stoler, *Haunted by Empire*, 406. The written history of African American relations with Liberia is extensive. Some good starting points include Claude A. Clegg III, *The Price of Liberty: African Americans and the Making of Liberia* (Chapel Hill: University of North Carolina Press, 2003); Ibrahim Sundiata, *Brothers and Strangers: Black Zion, Black Slavery, 1914–1940* (Durham, NC: Duke University Press, 2003); David McBride, *Missions for Science: U.S. Technology and Medicine in America's African World* (New Brunswick, NJ: Rutgers University Press, 2002), 103–26. On dollar diplomacy in Liberia, see Kilroy, "Extending the American Sphere to West Africa"; and Chalk, "The United States and the International Struggle for Rubber."
25. Richard Pearson Strong Diary (hereafter RPSD), 4, typescript, 1926–1927, GA82.4, Francis A. Countway Library of Medicine, Harvard University.
26. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998).
27. Rosenberg, "Ordering Others," 410. See also Rosenberg, *Financial Missionaries to the World*.
28. RPSD, 160.
29. See Richard P. Strong, "The Importance of Ecology in Relation to Disease," *Science* 82 (1935): 307–17. On the history of disease ecology as an outgrowth of the economy of empire, see Warwick Anderson, "Natural Histories of Infectious Disease: Ecological Vision in Twentieth-Century Biomedical Science," *Osiris* 19 (2004): 39–61; Helen Tilley, "Ecologies of Complexity: Tropical Environments, African Trypanosomiasis, and the Science of Disease Control Strategies in British Colonial Africa, 1900–1940," *Osiris* 19 (2004): 21–38; Gregg Mitman, "In Search of Health: Landscape and Disease in American Environmental History," *Environmental History* 10 (2005): 184–210.
30. Anderson, *Colonial Pathologies*, 45–52.
31. Information on film stock and transport was calculated from notes in Loring Whitman's diary, courtesy of Randal Whitman, and Loring Whitman, "Photography," in *The African Republic of Liberia and the Belgian Congo, Based on the Observations Made and Material Collected during the Harvard African Expedition, 1926–1927*, ed. Richard P. Strong, 2 vols. (Cambridge, MA: Harvard University Press, 1930), 2:1048–52.
32. See A. Hamilton Rice, *Through Amazon Jungles with Radio and Airship* (Boa Vista, Alto Rio Branco, Amazonas: Privately printed, 1924?); A. Hamilton Rice, "The Rio Branco, Uraricuera, and Parima: Surveyed by the Expedition to Brazilian Guyana from August 1924 to June 1925," *Geographical Journal* 71 (1928): 113–43, 209–23, 345–56; "Expedition to Use Planes for Survey," *New York Times*, August 24, 1924; Walter Hinton, "On a Smashed Plane in a Jungle River," *Los Angeles Times*, December 20, 1925; "Fly over Jungle to Unknown Land," *New York Times*, April 29, 1925; "Exploring Amazonia," *New York Times*, July 11, 1925.
33. LWD, 99.
34. James C. Young, *Liberia Rediscovered* (Garden City, NY: Doubleday, 1934), 70. "Tells Firestone Dealers about Liberian Rubber," *New York Times*, April 3, 1927; "Firestone Rubber on the Screen," *New York Times*, March 10, 1927, 40. Although 250,000 feet of film were shot, no lasting record of this film document seems to have survived.
35. Tom Gunning, "Before Documentary: Early Non-fiction Films and the View Aesthetic," in Hertogs and de Klerk, *Uncharted Territory*, 9–24.
36. On travelogue-expedition film in the twenties, see Gregg Mitman, *Reel Nature: America's Romance with Wildlife on Film* (Cambridge, MA: Harvard University Press, 1999); Pascal

James Imperato and Eleanor M. Imperato, *The Married Adventure: The Wandering Lives of Martin and Osa Johnson* (New Brunswick, NJ: Rutgers University Press, 1992); Fatimah Tobing Rony, *The Third Eye: Race, Cinema, and Ethnographic Spectacle* (Durham, NC: Duke University Press, 1996); Robert J. Gordon, *Picturing Bushmen: The Denver African Expedition of 1925* (Athens: Ohio University Press, 1997).

37. Quoted in Kristin Thompson, *Exporting Entertainment: America in the World Film Market* (London: British Film Institute, 1985), 122–23.
38. The phrase comes from John Grierson's definition of documentary in *Grierson on Documentary*, ed. and comp. Forsyth Hardy (London: Faber and Faber, 1966), 13.
39. See, e.g., George Shattuck to Richard Strong, September 29, 1927, E. Mallinckrodt to Richard Strong, December 15, 1927, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP.
40. See Strong, *African Republic of Liberia and the Belgian Congo*, 198–386.
41. Ibid., 56.
42. Ibid., 40, 46.
43. Sundiata, *Brothers and Strangers*; Ibrahim Sundiata, *Black Scandal: America and the Liberian Labor Crisis, 1929–1936* (Philadelphia: Institute for the Study of Human Issues, 1980).
44. Quoted in Sundiata, *Brothers and Strangers*, 79.
45. Cuthbert Christy, Charles S. Johnson, and Arthur Barclay, *Report of the International Commission of Inquiry into the Existence of Slavery and Forced Labor in the Republic of Liberia* (Washington, DC: Government Printing Office, 1931).
46. Sundiata, *Brothers and Strangers*, 97–139. In 1928 Raymond Leslie Buell, the director of the Foreign Policy Association, suggested that by establishing a Labor Bureau that agreed to supply "annually a total of 10,000 men to the Firestone Plantations," a system would result that employed methods no different from those used to secure men for "road work or for Fernando Po." Raymond Leslie Buell, *The Native Problem in Africa*, 2nd ed. (London: Frank Cass, 1928), 834. Strong took exception to Buell's allegations and told the assistant secretary of state, William Castle, that he seriously considered attending "The Problems of Africa" conference at the Institute of Politics held in Williamstown, Massachusetts, in August 1928 to rebut a speech Buell was planning to make indicting Firestone's operations in Liberia. In the end, Strong thought his presence would only draw further attention to Buell's talk, and so he stayed home. See Richard Strong to William Castle, September 26, 1928, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP.
47. Richard Strong to William Castle, November 1926, RSPD, 159.
48. Richard Strong to the President, February 21, 1928, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP. Richard Strong to William Cameron Forbes, February 4, 1928, Folder 280, bMS Am1364, WCFP.
49. William Castle to Richard Strong, February 24, 1928, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP.
50. Christy, Johnson, and Barclay, *Report of International Commission of Inquiry*, 4.
51. LWD, 84.
52. The ethics of drug testing on the expedition are beyond the scope of this essay. Strong, however, had a questionable and disturbing history of using native subjects to test new therapies and drugs. See Campbell, "Knots in the Fabric."
53. John Grierson, "Flaherty," in Hardy, *Grierson on Documentary*, 141.
54. LWD, 17, 91.

55. Strong, *African Republic of Liberia and the Belgian Congo*, 57.
56. ? to Rev. Anson Phelps Stokes, April 18, 1922, Folder 4, P. G. Wolo Papers, HUG 4879.405, Harvard University Archives (hereafter PGWP). Biographical information on Wolo's life has been gathered from the P. G. Wolo Papers. See also "Plenyono Gbe Wolo," *Harvard Class of 1917: 25th Anniversary Report* (Cambridge, MA: Harvard University Press, 1942), 1018–20.
57. A. B. Parson to President A. Lawrence Lowell, August 7, 1926, Folder 433, UAI5.160, Series 1925–1928, Harvard University Archives; Ross to Dickerson, April 1, 1929, Folder 7, PGWP. See also Caroline Ross to Walter ?, August 18, ??, Folder 2, PGWP.
58. C. K. Bolten to C. E. Dickerson, April 17, 1922, Folder 4, PGWP.
59. "Confidential: Memorandum for Conference with Hon. William Phillips," n. d., 2., Folder 1, PGWP. On the Kru rebellion, see Sundiata, *Black Scandal*, 18–19.
60. Strong, *African Republic of Liberia and the Belgian Congo*, 50.
61. RPSD, 142.
62. "Statement of Harvey S. Firestone," January 15, 1926, in *Crude Rubber, Coffee, Etc.*, 254. Details of the loan negotiations are covered extensively in Kilroy, "Extending the American Sphere to West Africa"; and Chalk, "The United States and the International Struggle for Rubber."
63. Chalk, "The United States and the International Struggle for Rubber," 135–38.
64. C. L. Simpson, *The Memoirs of C. L. Simpson: The Symbol of Liberia* (London: Diplomatic Press and Publishing, 1961), 141.
65. Wolo to Dickerson, October 14, 1928, Folder 7, PGWP. On Castle's interests, see Kilroy, "Extending the American Sphere to West Africa," 364–365.
66. RPSD, 147.
67. Ibid., 146, 151. See also LWD, 98.
68. "Shattuck Dinner," December 4, 1935, "Colleagues and Friends: George Shattuck, M.D." Folder, Box 6, Harold Jefferson Coolidge Papers, HUG (FP) 78.10, Harvard University Archives.
69. RPSD, 146.
70. William Castle to Strong, January 3, 1927, African Expedition—Correspondence, State Department and White House Folder, Box 2, RSP.
71. See James Hardy Dillard et al., *Twenty Year Report of the Phelps-Stokes Fund, 1911–1931* (New York: Phelps-Stokes Fund, 1932), 26–29; and Firestone Plantations Company, *Views in Liberia* (Chicago: Lakeside Press, R.R. Donnelley & Sons, 1937).
72. Taylor, *United States Business Performance Abroad*, 90.