Introduction

The Power and Fragility of European Science in the Spanish Atlantic World

The *Esqueletos* of Empire

In November 1783, Pedro de Valdivieso received an unusual request. The archbishop-viceroy of New Granada needed some "skeletons."[1] As the *corregidor* (royal governor) of Loja, a province in the southern sierra of New Granada (figure 1), Valdivieso was obliged to fulfill this request from his superior in the Spanish colonial government. Fortunately, the skeletons in question were only plant remains. *Esqueletos,* the Spanish term, was a colloquialism for the dried specimens collected by eighteenth-century botanists in order to identify, compare, and classify plants. Although the transformation of plants into specimens was a routine activity for botanists, the production of esqueletos was not necessarily common practice for officials in the Spanish colonial government, who often worried more about transforming plants into useful commodities than into botanical specimens. In this instance, the archbishop-viceroy asked for specimens of the trees that produced Loja's most important export: a medicinal tree bark known as *quina* or *cascarilla*. He had made the request on behalf of the botanists of the Royal Botanical Expedition of New Granada in Bogotá, who needed the specimens in order to determine whether trees recently discovered near Bogotá were the same as Loja's quina trees.[2] Because the botanists were unable to make the nearly 700-mile journey south to Loja, they were counting on Valdivieso, who was in a unique position to help.

Much more was at stake than botanical classification though. In the preceding century, quina had become one of the most valuable and widely used medicaments in the Atlantic World on account of its efficacy in treating intermittent fevers, a prevalent and deadly cluster of ailments in the early modern world that we now recognize as symptoms of malaria.[3] In 1751, the Spanish Crown made this Andean wonder drug an object of empire by converting several of the hills near Loja into an *estanco* or royal reserve. The purpose of the royal reserve was to supply the Royal Pharmacy in Madrid with regular, annual shipments of the best quina available.[4] The trees that produced quina could be found throughout the Andean forests of Spain's viceroyalties of New Granada and Peru; however, quina from Loja was widely regarded as the best (figure 1). By the early 1780s, more than a century of intensive harvesting of the bark from wild trees had taken its toll. Loja's forests were exhausted and its quina trees increasingly scarce. Officials in Madrid and New Granada had come to believe that the empire desperately needed a new source of bark that was comparable to quina from Loja. It is not surprising then that the archbishop-viceroy described the study of quina trees as one of the "primary objectives" of the Royal Botanical Expedition in New Granada.[5]

Things looked different in Loja however. For landowners and laborers in the province, quina had served as major source of income, especially since the bark was one of the few exports connecting Loja to the broader trade networks of Spanish America and the Atlantic World.[6] Pedro de Valdivieso was well aware of this. Unlike other corregidores that were appointees from Spain, Valdivieso was born and raised in Loja as a member of a creole family that had been in South America for several generations by the late eighteenth century.[7] Moreover, many Valdiviesos were active in the quina trade and the wealth derived from bark trading had helped the family achieve a place of prominence among the small number of creole elites in a province of approximately 23,000 people with a majority indigenous population (53.9%) as well as significant populations of creoles and mestizos (23.6%) and free blacks (22.6%).[8] If botanists in Bogotá confirmed that "quina from Santa Fe," as bark from the forests near Bogotá was known, was equivalent to quina from Loja, it would have put the economic livelihood of Loja and its elites in jeopardy. In short, Pedro de Valdivieso must have had some serious reservations about fulfilling the archbishop-viceroy's request for the skeletons of Loja's quina trees.

Although he must have been aware of the stakes for his province, Valdivieso voiced a different concern in the letter that accompanied the skeletons he submitted to the archbishop-viceroy. He questioned whether botanists were the right choice for the job. Valdivieso made clear that he did not doubt "the intelligence of the Botanists" but he was not convinced that they had sufficient experience to perform the comparison properly.[9] Instead, Valdivieso

urged the archbishop-viceroy to send him the "leaves and bark" of the quina trees from the forests near Bogotá.[10] With these materials, the corregidor would then compare them to samples from Loja's trees to determine whether quina from Santa Fé was equivalent to quina from Loja.

Undoubtedly, economic and personal interest motivated Valdivieso, but there is no reason to think that he was any more or less interested in the outcome of this comparison of quinas than the botanists in Bogotá, who had ties to the archbishop-viceroy and the Crown. More than that, Valdivieso *did* have a point. After a lifetime of ties to the local quina trade and more than a decade as the director of the royal reserve of quina in Loja, Valdivieso was one of the world's foremost experts on quina trees and their bark. Meanwhile, none of the members of the archbishop-viceroy's "Company of Botanists" had even visited Loja to observe its quina trees in situ.[11] In other words, the corregidor of Loja had good reason to propose that he was a better choice than botanists to perform a comparison of quinas for the archbishop-viceroy.

In the end, Valdivieso relented and submitted the skeletons of Loja's quina trees to the archbishop-viceroy. In an accompanying letter, he emphasized the importance of local knowledge to the production of these botanical specimens. Valdivieso noted that he relied on one of his sons to collect samples of the quina trees "in order to avoid any fraud." He knew that he could trust a family member to find the very best bark from Uritusinga, the name of one of the hills in Loja that produced "the most select cascarilla."[12] He also noted that the specimens were shipped to Bogotá only after they had been prepared and packaged according to his exacting standards. Such statements not only reinforced Valdivieso's reputation as a fastidious imperial servant but also signaled that these esqueletos were not simply products of nature. These samples were artifacts of local knowledge and expertise. Valdivieso also included a set of instructions for the archbishop-viceroy's botanists explaining how to compare quinas.[13] If he could not perform the comparison himself, he could at least advise the botanists how to do it correctly. Ultimately, Valdivieso wanted to make sure that the archbishop-viceroy recognized that the local knowledge of bark collectors remained just as important to the empire as the learned knowledge of botanists.

A Microcosm of Science and Empire in the Atlantic World

Quina, a medicinal tree bark harvested from various species of cinchona trees in the Andean forests of South America, was a unique natural resource but its story reflects many of the important developments in the early modern Atlantic World. In this opening vignette, the presence of botanists at the vice-regal court in New Granada illustrates one of these developments that would have significant consequences in modern world history: the entangle-

ment of European sciences and empires. Yet, at the same time, Valdivieso's resistance to transforming Loja's quina trees into botanical specimens is emblematic of the challenges in transforming European botany into an imperial science. *The Andean Wonder Drug* elucidates these challenges and their significance by exploring an overlooked chapter in the entangled histories of science, empire, and nature in the early modern Atlantic World: the Spanish Empire's struggles in the second half of the eighteenth century to control the cinchona tree and its bark.

In 1751, when the Spanish Crown established the royal reserve of quina in Loja, the main purpose of this enterprise must have seemed quite modest and even admirable. In the royal order that established the royal reserve, the Crown emphasized the health of its people and their access to effective medicaments as central concerns.[14] The royal order further explained that by regulating the harvesting of bark in Loja, the royal reserve would ensure a regular supply of the highest quality quina so that the king's vassals—in both Spain and Spanish America—could have reliable access to this important medicament. Undoubtedly, this justification was saturated with prevailing European notions of a ruler's obligation to promote public health as well as ideas of the healing powers of royalty.[15]

How could anyone question, let alone reject, such a seemingly noble cause? Many did because, even with the best of intentions, the royal reserve was still an imperial enterprise. In that same royal order, the Crown drew on prevailing European notions of empire and asserted the Spanish Empire's right to exploit and derive direct benefit from the natural resources of its colonial territories in the Americas. Such rhetoric signaled that this project was part of the broader imperial reforms initiated under the auspices of the Bourbons, the new ruling family of Spain and its empire since the death of Charles II, the last Habsburg king, in 1700.[16] In this context, the Crown and its reformers imbued the royal reserve of quina with great political and symbolic meaning and it was understood as a pilot project in pursuit of a new vision of the Spanish Empire revitalized by science and commerce.[17] Like their contemporaries elsewhere in Enlightenment Europe, officials in Spain hoped that with the help of European science their imperial designs would have greater authority and greater efficacy.[18] Consequently, the royal reserve of quina became a microcosm for enacting a new synergy of science and empire as the Crown and its advisers in Madrid turned to Spanish pharmacists, physicians, and botanists to improve the royal reserve and strengthen imperial control over the cinchona trees and their bark. Ultimately this project failed. This book explains why and why understanding this failure offers new insight into the histories of science, empire, and the environment.

Why did science prove so ineffective in this Spanish imperial enterprise