

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-viceoy 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-viceoy 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 viceroalties 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-vicey 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-vicey'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-vicey. 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

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urged the archbishop-vice-roy 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-vice-roy 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-vice-roy’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-vice-roy.

In the end, Valdivieso relented and submitted the skeletons of Loja’s quina trees to the archbishop-vice-roy. 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-vice-roy’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-vice-roy 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

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when other European empires successfully wielded science elsewhere in the eighteenth-century world? *The Andean Wonder Drug* makes two main arguments in response to this question. First, it argues that the Andean and Atlantic contexts mattered. In the mid-eighteenth century, when the Spanish Crown took an explicit interest in it, quina was not an unknown natural object waiting for science to make it intelligible and useful to empire. The bark was already a cultural artifact that was understood and evaluated in different ways at different locations as it made its way from Andean forests to European pharmacies. While *cascañeros* (bark collectors) and *curanderos* (healers) in the Andes had their own methods to identify and evaluate different kinds of bark from various species of cinchona trees and various parts of trees, merchants in Atlantic ports as well as pharmacists and naturalists in Europe used other methods to identify and evaluate quina.¹⁹ Certainly healers, bark collectors, merchants, government officials, pharmacists, and naturalists were well aware of the different ways of knowing quina that coexisted in the eighteenth-century Atlantic World. Yet these different groups did not necessarily agree on which was the *best* way to understand and evaluate the bark. As much as networks of trade and empire facilitated the circulation of the bark and knowledge of it, the different sites of production, exchange, and consumption—Andean forests, Atlantic markets, European pharmacies, and botanical gardens—tended to support and privilege distinctive ways of knowing the cinchona tree and its bark. In other words, quina's Atlantic itineraries gave rise to a distinctive geography of knowledge in which Andean forests and Atlantic ports were as much centers of knowledge production as European pharmacies and botanical gardens.²⁰

In second half of the eighteenth century, when the Spanish Crown attempted to assert greater control over the cinchona tree and its bark, a central challenge was implementing a consistent set of practices and standards for identifying and evaluating the bark throughout the Spanish Empire. It is not surprising then that the Spanish Crown's main response to divergent understandings of the bark was to attempt to export the concepts and practices employed by European pharmacists and naturalists for evaluating botanical materia medica. By emphasizing quina's identity as both a natural object and a cultural artifact embedded in local ways of knowing that were connected by networks of trade and empire, this book argues that the apparent impotence of Spanish pharmacists and botanists as agents of empire was not the result of some inherent deficiency in science as practiced in the Iberian Atlantic but a result of the tenacity of bark collectors, merchants, and local officials in asserting that authority of their own knowledge and expertise. Moreover, by drawing on local and established bodies of knowledge and ways of knowing, healers, bark collectors, and even local government officials were able to resist

and undermine the efforts of Spanish pharmacists, botanists, and imperialists to assert the superiority and universality of European science.

The mere existence of other ways of knowing nature, however, is not sufficient to explain why European science faltered as a tool of empire in the late eighteenth-century Spanish Atlantic World. In many cases, the practitioners of European science did not feel obliged to recognize or even engage with the claims made by indigenous peoples, merchants, or government officials, especially since early modern European sciences increasingly acquired their own institutions and networks of knowledge production such as the scientific societies established in European cities that became the centers of global correspondence and trade networks that supported the circulation of information and objects.²¹ In the Spanish Atlantic World, the colonial government played an important role as a network of knowledge production and, as a result, provided an institutional context in which Spanish representatives of European pharmacy, medicine, and botany not only encountered but also had to engage with other ways of knowing the natural world that existed throughout the Spanish Atlantic. Consequently, *The Andean Wonder Drug* makes a second argument that the structure and style of Spanish colonial governance also undermined the authority and efficacy of European science, especially since science and empire were so profoundly intertwined in the Spanish Atlantic World.²²

The production of knowledge about the Americas had been an important part of Spanish colonial rule since the early decades of exploration, conquest, and colonization in the late fifteenth and early sixteenth centuries. In order for the Crown as well as its officials in Spain and Spanish America to effectively govern the vast territories of the empire, they needed information and knowledge about the people, places, and potential resources of those regions. In the sixteenth century, the Crown and its Council of the Indies supported a number of initiatives including the first scientific expedition to the Americas under the auspices of Francisco Hernández, a Spanish physician; a project—known as the *relaciones geográficas*—designed to systematically collect geographic, natural historical, and anthropological information from all regions of the Americas, and the institutionalization of the collection and production of cartographic and cosmographic knowledge at the Casa de Contratación in Seville.²³ By the eighteenth century, the Spanish colonial government had developed an identifiable and prevalent “epistemic culture,” a phrase that refers to the values and methods used by officials in the colonial government to collect, circulate, and certify knowledge.²⁴ It is important to recognize that this epistemic culture predated the integration of European science as a regular part of the Spanish imperial enterprise in the eighteenth century.²⁵ Although

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existing studies have highlighted the various ways in which the Crown and its Council of the Indies facilitated the production of knowledge about the Americas through new institutions, the case of quina is useful in that it provides a more holistic account of the ways in which this epistemic culture pervaded the institutions of Spanish colonial governance at all levels on both sides of the Atlantic.²⁶

Historical records of the royal reserve of quina allow us to track generation, circulation, and evaluation of knowledge in the form of reports, letters, and bark samples that wended their way through the colonial government from local town councils in South America to the advisory juntas of viceroys as well as the Royal Pharmacy and the Ministry of the Indies in Spain. In particular, these records highlight three main characteristics of the epistemic culture of the Spanish colonial government that shaped and, at times, undermined the authority and efficacy of European science as part of the Spanish imperial enterprise. First, empiricism was a well-established characteristic of this epistemic culture. Since the sixteenth century, officials in the colonial government valued the reports of individuals or groups that had firsthand experience with the phenomenon in question. In the eighteenth century, this commitment to empiricism was reflected in the reports and testimonies that Spanish officials collected from those groups directly involved with quina and the quina trade. Second, this epistemic culture was often overtly political meaning that officials often solicited information and advice from anyone and everyone with relevant knowledge and experience as well as an interest in the matter at hand. As a result, the production of knowledge within the colonial government could be quite competitive and contentious as the representatives of indigenous, commercial, and scientific bodies of knowledge all claimed the authority to speak for nature and natural resources.

By soliciting information and advice about quina and other natural resources from different interested groups in colonial society, officials insured that the colonial government and the Crown played a central role in the production of knowledge, which is the third main feature of this epistemic culture. Like many other early modern European empires and states, a key component of colonial rule in the Spanish Empire was the consideration and adjudication of competing interests.²⁷ This feature became even more pronounced during the eighteenth-century Bourbon Reforms as the Spanish Crown and its advisers worked to reclaim royal power. Consequently, within the epistemic culture of the colonial government, the Crown and its representatives in the colonial government claimed the ultimate authority to decide between competing claims about natural phenomena like quina. Moreover, because the Spanish colonial government was comprised of many different institutions, officials in

the government did not always agree—a feature of colonial governance that local officials in the quina-producing communities of South America recognized and tried to use to their advantage.

Taken together, the empirical, political, and royalist features of the epistemic culture of the Spanish colonial government help to explain some of the difficulties and challenges that Spanish pharmacists and botanists faced as they came to play a larger role in the Spain's imperial enterprise in the Americas. Ultimately, the case of quina reveals that there was a significant epistemological dimension to Spanish colonial governance and shows how American nature served as a material substrate on which the tensions of empire were articulated and adjudicated through the politics of knowledge. Moreover, these features of the epistemic difficulties and obstacles that Spanish pharmacists and botanists encountered as they became a part of this epistemic culture in which the authority and efficacy of science was not taken for granted but still open for debate.

The contests over quina within the Spanish colonial government in the eighteenth century and their implications for our understanding of the history of science and empire in the Atlantic World have been largely overlooked in existing scholarship. With the exception of studies the story of cinchona bark as illustrative of developments in European botany or European pharmacology, the eighteenth-century history of cinchona has generally been ignored in favor of emphasizing the more obvious moments of high drama such as the early globalization of the bark in the seventeenth century and the global transplantation of cinchona trees in the nineteenth century.²⁸ In the history of medicine, most accounts of the history of cinchona have focused on the bark's introduction to Europe in the mid-seventeenth century and its impact on early modern European medicine. Beginning with the celebrations of 300th anniversary of the "discovery" of cinchona bark in the 1930s, the culmination of this strand of scholarship was the publication of Saul Jarcho's *Quinine Predecessor* in 1993, a work that meticulously traces the introduction and spread of the use of cinchona bark in Western Europe ending with the work of Italian physician Francesco Torti (1658–1741) in the early eighteenth century.²⁹

In the history of empire, most scholarship has focused on the history of cinchona in the nineteenth century, when cinchona bark and the newly isolated antimalarial alkaloid quinine became tools of European imperialism as the British and the Dutch succeeded in transplanting cinchona trees from Latin America to their colonial territories in South and Southeast Asia.³⁰ Thus, quinine has received considerable attention because of its auspicious role in world history since the early nineteenth century. After all, this plant's alkaloid and its derivatives have alleviated the sufferings of countless individuals afflicted with malaria in the past two centuries, most recently in the

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developing world where malaria remains endemic, despite many efforts to eradicate the disease.³¹ Yet this wonder drug of modern medicine has not always been put to the most benevolent uses. In the late nineteenth century, in one of the most notorious acts of botanical espionage in world history, agents of the British and Dutch governments succeeded in transplanting cinchona trees from South America to their colonies in India and Southeast Asia.³² Once established, these cinchona plantations produced the cinchona bark and quinine that facilitated the advancement of European imperialism around the globe by safeguarding the health of soldiers and settlers.³³ As a result, the story of quina is often reduced to a seemingly inconsequential prelude in the history of quinine, an antimalarial alkaloid that two French pharmacists isolated from cinchona bark in 1820.³⁴

The historical significance of quina as “quinine’s predecessor” is undeniable, but there is much more to the bark’s story, especially in the eighteenth century. Several studies of the trade in cinchona bark have demonstrated the significance of the bark to the economic and social history of specific regions of South America.³⁵ Meanwhile, other studies have demonstrated how the Royal Pharmacy in Madrid took on new importance in the eighteenth century, as it became the clearinghouse for all the cinchona bark imported under the auspices of the Crown.³⁶ Yet, with few exceptions, most of these studies have focused primarily on specific locations and provided little insight into how the story of quina might illuminate the ways in which developments at these different sites were impacted by long-distance connections fostered by the Spanish Empire and the Atlantic World.³⁷

Drawing on a wide array of sources from archives and libraries in Spain and South America, *The Andean Wonder Drug* offers a more comprehensive account of quina as a product of local, imperial, and commercial networks in eighteenth-century Atlantic World. Instead of reducing quina to just *one* of its roles in the early modern world, this book embraces the bark’s multiple identities as natural resource, commodity, and medicament in order to highlight the intimate interactions between the politics of knowledge and tensions of empire at various sites in the Spanish Atlantic World. Although the histories of quina and quinine are intertwined, this book demonstrates that their histories are not interchangeable and that greater emphasis on the story of quina can yield new insights into the history of science and empire. After all, it is important to recognize that these two substances—quina and quinine—were the products of distinctive regimes of knowledge and power. Both were powerful medicaments, but they took different therapeutic forms and had different meanings to people that used them. Both medicaments also became objects of empire, but with one important difference: while quinine became an effective tool for European imperialists in the nineteenth century, quina was an object that

confounded European science and empire in the eighteenth century. The story of quina matters most because it highlights an overlooked, yet fundamental, aspect of European science in the early modern world: its fragility, especially in colonial contexts.

Putting Early Modern Science in Its Place

By setting European science in the context of the myriad ways of knowing nature in the early modern Atlantic World and in the context of the epistemic culture of the Spanish colonial government, *The Andean Wonder Drug* shows that early modern European science was not only far from hegemonic but also was, at times, impotent in the face of the heterogeneous social, cultural, and natural worlds that comprised European empires. Rather than a narrative of European science and empire dominating the peoples and places of the globe hand in hand, the case of quina offers a reminder that the entanglements of science and empire were not necessarily destined to succeed. Consequently, this episode challenges the dominant view that has emphasized the successful and symbiotic relationship between early modern European sciences and empires.

In the past few decades, many historical studies have taken as their main objective to demonstrate that European sciences and empires developed an effective and mutually beneficial relationship.³⁸ Such scholarship has played an important role in undermining the myth of science as the disinterested pursuit of knowledge that had little to do with imperialism; it has also exploded the myth of the “civilizing mission” of European empires—an ideological framework that cast science, technology, and medicine as Europe’s gift to the “savage” peoples of the world.³⁹ The majority of this scholarship emphasizes the success stories in which imperial connections provided the practitioners of various sciences—from cosmography to natural history—with access to natural phenomena on a global scale as well as access to the resources and authority of colonial government. In return, the sciences provided the knowledge to facilitate the imperial and economic expansion of Europe as well as new scientific (usually racial) theories to justify European hegemony over peoples and places around the globe.⁴⁰ Much of this work has admirably demonstrated the ways in which the sciences were implicated in Europe’s imperial enterprises and vice versa. However, *The Andean Wonder Drug* suggests that such narratives give a distorted impression of the efficacy of European science and of the synergy between science and empire, especially in the early modern world, a period when imperial states were relatively weak and when many people did not take the authority of science for granted as their counterparts in later centuries would.⁴¹

In addition to calling attention to the fragility of early modern European science, *The Andean Wonder Drug* also demonstrates the importance of the Spanish Atlantic to the histories of science and the Atlantic World. Until relatively recently, the Iberian World (Spain, Portugal, and their colonies) has received little attention in these areas of historical inquiry.⁴² One reason is the persistent perception of the early modern Iberian World as an uncivilized and backward region that remained mired in ignorance, superstition, and brutality, and contributed little to the emergence of the modern world. This perception traces back to the seventeenth and eighteenth centuries when Northern Europeans, mostly in Protestant lands, used the Iberian World as the foil and antihero in historical narratives that placed the development of science, enlightenment, and modernity in other parts of Europe and the Americas.⁴³ Similarly, modern histories of science and of the Atlantic World have, until recently, focused much more on the Northern Atlantic, especially Britain and its empire. While other regions of the Atlantic World, such as the British Empire, can provide useful points of comparison for analogous developments in the Spanish Empire or the Iberian World as demonstrated by J. H. Elliott's magisterial *Empires of the Atlantic*, it is imperative to avoid the tendency to use the histories of the British Empire or other regions of the Atlantic World as yardsticks, benchmarks, or ideal types against which the Iberian World is measured.⁴⁴

By highlighting the epistemic culture of Spanish colonial government, this book demonstrates that the relationship between science and empire in the Spanish Atlantic was not derivative or deficient relative to similar activities in other regions of the Atlantic World. Instead, it shows that things in the Spanish Empire were simply different. After all, every European enterprise in the Atlantic World—commercial or imperial—wrestled with the challenges of acquiring and accumulating the knowledge and expertise necessary to exploit natural resources, coordinate trade, and administer colonial territories across vast expanses of land and sea. Is it any wonder then that a distinctive epistemic culture developed in the Spanish Atlantic World? And just as there is no reason to expect that the integration of science and empire would take the same form in different parts of the Atlantic World, there is no reason to expect that Spanish efforts to wield European botany would achieve the same results as in other imperial contexts, especially at a time when there were few models to emulate and when it was far from clear that science could be an effective tool of empire (something we can only appreciate in hindsight). Moreover, as this book shows, one of the distinguishing features of science and empire in the Spanish Atlantic was that the two enterprises were more intimately intertwined than elsewhere in the Atlantic World.

Nature and the Politics of Knowledge in the Spanish Empire

What makes the case of quina especially vexing is that studies have demonstrated that the shortcomings of botany and natural history as imperial sciences in the Spanish Atlantic World cannot be attributed to a lack of interest and resources or a lack of engagement with the intellectual currents of the Scientific Revolution and the Enlightenment.⁴⁵ Officials, reformers, and elites in Spain and Spanish America supported scientific endeavors and embraced the utility of science to government as much as their contemporaries in other regions of the Atlantic World.⁴⁶ In the late eighteenth century, the Spanish Crown and its advisers sought to challenge contemporary perceptions of Spain as an uncivilized nation mired in ignorance and superstition, a view promulgated by Enlightenment thinkers beyond the Pyrenees. In the second half of the eighteenth century, royal patronage supported the establishment of a Royal Botanical Garden (1755) and a Royal Cabinet of Natural History (1772) in Madrid as well as nearly sixty scientific expeditions to Spanish America between 1759 and 1808.⁴⁷ Consequently, in the early nineteenth century, Alexander von Humboldt (1769–1859), the renowned Prussian scientific traveler, observed, “No other European state has invested a greater sum to advance the knowledge of plants than the Spanish government.”⁴⁸

To Humboldt, one result was clear: science benefited from empire. The reverse, however, was not necessarily the case. The new confluence of science and empire that took shape in the late eighteenth-century Spanish Atlantic World offered few, if any, of the practical or economic benefits that botanists promised and imperial reformers envisioned. Much of the vast corpus of images and text produced by Spanish naturalists did not make it into print.⁴⁹ Moreover, Spanish botanists identified many new genera and species of plants including some species of cinnamon and tea that they hoped would substitute for similar products from the East, but it proved quite difficult to put this knowledge into action. By the end of the eighteenth century, the grandiose new vision of science and empire promulgated by botanists, imperial reformers, and the Crown was revealed as little more than rhetoric.⁵⁰

The case of quina offers new insight into this historical mystery by elucidating the various material, social and intellectual challenges associated with converting nature into an imperial natural resource. In the case of quina, a variety of obstacles threatened and thwarted the Crown’s efforts to control the bark. Cinchona trees became harder to find. The bark degraded and lost its medical efficacy while in transit. Merchants committed fraud and adulterated quina shipments by mixing other barks with their cinchona bark. They also traded the bark as contraband to foreign merchants. To make matters worse, there were many different kinds of bark whose medical efficacy

varied depending on the variety of cinchona tree from which it was harvested or whether the bark came from the trunk of the tree or its branches. Ultimately, effective exploitation of quina required more than a set of policies that asserted government control of its production and distribution. It also required knowledge—specifically reliable knowledge of how to identify, distinguish, and evaluate the different varieties of cinchona tree and different kinds of quininas.

Because the cinchona tree and its bark were objects of interest to many groups in Spanish colonial society and the Atlantic World, *The Andean Wonder Drug* shows how the ineffectiveness of European science was, in part, a result of the active role that different groups in Spanish colonial society took in challenging and undermining the new vision of science and empire promulgated by the Spanish Crown and imperial reformers. As noted above, firsthand experience was highly valued with the episteme culture of the colonial government. Consequently, the Crown often ordered officials in South America to seek information and advice from *hombres péritos* (experts), who had direct experience of the matter in question.⁵¹ When it came to natural resources like quina, officials throughout the colonial government consulted indiscriminately with indigenous healers, missionaries, bark collectors, merchants, and local officials as well as physicians, pharmacists, and botanists. As a result, the documentary record of the royal reserve of quina contains an impressive range of voices and perspectives. Anyone with relevant experience and expertise was a potential adviser to the empire. It is a testament to a surprising amount of promiscuity and pragmatism that existed in the epistemic culture of the colonial government. At the same time, the various groups, on whom imperial officials relied for information and knowledge, represented distinct and, at times, discordant political and economic interests. In this way, the colonial government provided an institutional context in which colonial subjects not only challenged imperial reform as well as European science but also coopted the mechanisms of colonial governance for their own ends. In other words, knowledge of the natural world was not prior to but a product of the tensions and competing interests that pervaded the Spanish colonial government.

These features of the case of quina are significant because they provide new perspective on the environmental history of colonial Latin America.⁵² As noted by Mark Carey, the history of environment in colonial Latin America has largely been a tragic tale of the environmental degradation and destruction due to the allegedly “outside” forces of capitalism and colonialism that took hold in the wake of the arrival of Europeans.⁵³ The case of quina challenges such narratives by showing that it was the colonial government that first recognized the destructive environmental effects of bark harvesting and

attempted to take steps to promote the conservation of cinchona trees.⁵⁴ It also shows how local interest groups took an active role in the exploitation of this natural resource not out of ignorance but out of a clear sense of their own priorities and local interests. This book further highlights the inadequacy of framing the analysis of complex phenomena like environmental degradation and resource extraction in terms of overly simplified oppositions of local versus imperial, indigenous versus foreign, or Creole versus European.

Organization of the Book

This book is divided into two parts that are organized chronologically and thematically. Part I explores the complexities of knowing nature in the early modern Atlantic World as manifested in the transformation of quina from a local Andean remedy into a botanical commodity and an imperial natural resource in the Spanish Atlantic World from the mid-seventeenth to the mid-eighteenth centuries. The chapters in this part show how each dimension of the bark's identity— as medicament, as commodity, as natural resource— was not necessarily inherent to the bark itself but was, in some sense, a consequence of the bark's integration into Andean, Atlantic, and imperial networks that supported the movement of people, objects, texts, and images. The first chapter suggests that the persistent association of the bark with the Andean province of Loja was not just an accident of history or biogeography but also a reflection of the region's long tradition as a center of medical knowledge and practice as well as the ingenuity and expertise of indigenous healers, who employed a sophisticated understanding of the nature, disease and the body to cinchona bark. An understanding of the centrality of the Andean World and the sophistication of Andean medicine provides the foundation for making sense of later challenges faced by Spanish pharmacists and botanists in their efforts to assert the superiority of their knowledge of the cinchona tree and its bark.

By the mid-eighteenth century, when the Spanish Crown formally declared its interest in the bark as an imperial natural resource, quina had become a product as much of the Atlantic World as the Andean World. Chapter 2 goes on to show how epidemiological, environmental, and economic developments in the wider Atlantic World facilitated the bark's transformation from a local remedy into a global botanical commodity. The consequences of this transformation were significant. First, to meet increasing demand, quina had to be produced on an unprecedented scale— a development that was, on the one hand, an economic boon to the quina-producing regions of South America and that, on the other hand, put increasing pressure on the cinchona forests of the Andes. Second, the transformation of quina into a botanical commodity gave rise to new understandings of the bark as physicians and pharmacists in

Europe tried to explain its medical effects, as merchants and healers beyond the Andean World developed their own techniques for assessing its medical efficacy, and as travelers from Europe sought new information on the trees and region that gave rise to this early modern wonder drug. Just as in the case of the Andean World, ideas about the cinchona tree and its bark that circulated along Atlantic trade networks provided another vantage point from which the members of Spanish colonial society could challenge the authority of European science.

It was only in the wake of its transformation into a botanical commodity that quina became an object of empire with the establishment of a royal reserve of quina in Loja in 1751. As officials in Spain realized that they needed to know a lot more about quina and the quina trade, the Crown mobilized the individuals and institutions of Spain's colonial government to provide that knowledge. Chapter 3 then examines this process and describes the distinctive epistemic culture of the colonial government—the set of values and techniques employed by officials throughout the Spanish Empire to make natural resources, like quina, intelligible and, more importantly, amenable to imperial administration. Collectively, the chapters in part I elucidate the indigenous, Atlantic, and imperial networks that facilitated the circulation and production of the bark itself and knowledge about the bark as well. In short, these chapters show how quina was an object of Andean medicine, Atlantic commerce, and imperial policy at the same time as it was an object of European science and medicine. Appreciation of the bark's multiple identities in the Atlantic World is important because its simultaneous existence as a meaningful object to different communities of knowers and users influenced the possibilities for Spanish pharmacists and botanists to know the bark and to assert their authority speak for the cinchona tree and its bark later in the eighteenth century.

Part II describes the conflicts that emerged in the late eighteenth century as the Spanish Crown tried to use the European sciences of pharmacy and botany more exclusively to assert greater control over the cinchona tree and its bark. These episodes provide useful insight into the politics of knowledge of the natural world and into the fragility of European science in the contexts of colonial society and colonial governance. The first chapter in part II examines the relationship between the Royal Pharmacy in Madrid, which received and examined much of the quina from South America, and the royal reserve in Loja, which produced the annual quina shipments for the Crown. In particular, it explores a disagreement that erupted between pharmacists in Madrid and bark collectors in Loja over which kind of quina was the best. This disagreement was a pivotal moment as bark collectors emerged victorious and reasserted the importance of local knowledge to the Spanish Empire relative

to the claims of Spanish pharmacists. Chapter 5 goes on to explore one of the main consequences of this episode: the expansion of the community of experts in Spain involved with the testing and examination of cinchona bark. With the authority of the Royal Pharmacy in question, officials in Madrid in the 1770s and 1780s began looking to other medical experts and botanists to provide the authority and certainty that the Royal Pharmacy apparently lacked. Such evidence shows how the practical problems associated with quina led to the further intertwining of science, especially botany, and empire. It also shows how earlier disagreements over the identity of quina encouraged the Crown to alter its tactics in its efforts to assert greater control over cinchona trees and their bark.

The final two chapters of the book look specifically at the experience of botanists acting as agents of empire. In the final decade of the eighteenth century, the Crown's interest in quina provided an opportunity for Spanish botanists to make good on the promises of their predecessors that their science was useful to the empire. In 1789, the Crown appointed a "botanist-chemist" as the new director of the royal reserve of quina in Loja. Such an appointment was virtually unprecedented in the history not just of Spanish imperial governance but European imperial governance in the early modern Atlantic World. Yet, as chapter 6 shows, this botanist-chemist soon discovered that the utility and authority of European science had limited efficacy in the face of the larger challenges of colonial society. Science, on its own, was not enough to guarantee effective imperial control of the cinchona tree and its bark. Finally, chapter 7 offers new insight into a major debate among Spanish naturalists over the classification of quina. While there were real intellectual questions and issues of scientific methodology at stake, this debate was also fueled by competing visions of the imperial order. This episode shows how intimately intertwined science and empire had become in the Spanish Atlantic World in the twilight of Spanish imperial rule. Taken together, the chapters in part II demonstrate the ways in which preexisting networks of knowledge production and the epistemic culture of the colonial government could actually undermine the effectiveness of European science as a tool of empire. Rather than suggesting some kind of deficiency in Spanish science or imperial rule, these episodes offer a more important insight: that there was no natural affinity between science and empire. They also provide an appreciation for how much work it took to transform European sciences into the sciences of empire.

The Objects and Politics of Historical Knowledge

To some readers, it might seem unusual to write the history of science and empire from the perspective of an object like tree bark.⁵⁵ A more obvious approach might have been to focus on a scientific discipline, institution,

or individual. But such approaches often provide only part of the story, especially because such approaches often start with an implicit definition of what counts as “science” or as “scientific.” By working from the perspective of an itinerant object defined by many bodies of knowledge beyond European science, we reduce the risk of reinscribing an imperial politics of knowledge in which European ways of knowing nature are implicitly labeled “science,” while other (i.e., non-European) ways of knowing are labeled “non-science” or “superstition.”⁵⁶ The documentary traces of the movements of cinchona bark in the early modern Atlantic World make visible a heterogeneous network of people, places, texts, images, and objects that supported the production of knowledge about nature. Quina was not just a botanical specimen; it was also a medicament, a commodity, and an object of imperial policy. One of the main advantages of this approach is that it sets European science, without privileging it, among the many different ways of knowing nature in the early modern Atlantic World.⁵⁷ Such an approach also makes clear the ways in which the authority of European science was still uncertain and its practical application largely untested.

Knowledge of nature was an artifact of European imperialism as much as it was an artifact of any of the other worldviews and enterprises that existed in the early modern Atlantic World. Consequently, the politics of knowledge remain a challenge for historians, who work with the archival traces of an empire’s knowledge.⁵⁸ The question of who gets to speak for nature in historical narratives is just as important as it was in the debates that took place in the eighteenth-century Atlantic World. The central conundrum is how to recognize the asymmetries and inequalities produced by European imperialism while being sensitive to the agency of those whose knowledge and culture was marginalized or assimilated by imperial regimes. Like many other early modern and modern European empires, the effective mobilization and exploitation of natural resources of colonized territories was as central to the Spanish imperial enterprise in the Americas as was the mobilization and exploitation of human resources, especially indigenous peoples and African slaves. Knowledge of these resources was essential to the survival and success of the colonial project. Some of this knowledge was knowledge that Europeans brought with them across the Atlantic Ocean (knowledge that itself was the product of cross-cultural encounters in the Afro-Eurasian World in the preceding centuries). In the late fifteenth and early sixteenth centuries, for example, systematic knowledge of the stars and seas made the European voyages of exploration possible and facilitated the encounters between Europeans and the indigenous peoples on the Atlantic islands and coasts of the Americas. When it came to the sustained exploration, colonization, and exploitation of the Americas in the sixteenth century and beyond, Spanish colonialism—like

that of contemporary European states—relied on and assimilated the knowledge of Amerindians and Africans. After the period of the earliest encounters and exchanges between Africans, Amerindians, and Europeans in the Americas and elsewhere, much of the “science” in the Atlantic World was the result of the interactions between the efforts of Africans, Amerindians, Europeans to produce systematic knowledge about the natural world.⁵⁹

In many ways, quina—as an object—is a good metaphor for European science in colonial contexts of the Atlantic World. Both were powerful but fragile. And it required a significant amount of labor from different groups of people to ensure that both retained their efficacy across long distances. Cinchona bark had the power to restore health, but as early modern healers knew, its medical virtues were fickle. Sometimes the bark worked, and at other times it did not. The same was true for science. In many cases, European sciences and their representatives proved powerful agents of empire. In other instances, this was not the case. Just as the forces of nature (humidity) and society (fraud) could undermine the integrity of quina, myriad forces could undermine the authority and efficacy of European science in colonial contexts. Both a fuller understanding of science and empire and a more global history of science emerge from exploring the shortcomings, in addition to the successes, of European science in the eighteenth century, a transitional period to the modern era in which European sciences and empires would achieve unprecedented global reach and influence.