UNIVERSITY OF CALIFORNIA, SAN DIEGO

Empire's Experts:
The Politics of Knowledge in Spain's Royal Monopoly of *Quina* (1751-1808)

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

History (Science Studies)

by

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2009

The Dissertation of Matthew James Crawford is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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PRESENTATIONS

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"Colonial Science in Action: Cooperation and Contention in Spain's Royal Monopoly of *Quina* (1751-1773)." Science Studies Program. University of California, San Diego. La Jolla, CA. February 25, 2008.

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ABSTRACT OF DISSERTATION

Empire's Experts:
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by

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Doctor of Philosophy in History (Science Studies)

University of California, San Diego, 2009

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In the 1630s, Europeans encountered a medicinal tree bark in South America known as *quina*. This bark cured fevers – one of the most prevalent illnesses in the early modern world. While many were interested in *quina*, only one European state had direct access to it. Spain's viceroyalties of New Granada and Peru were the only place in the world to find the cinchona tree, from which the bark was harvested. In 1751, the Spanish Crown capitalized on this situation by establishing a royal monopoly (*estanco*) of *quina* from the province of Loja in New Granada – the region reputed to produce the best bark. Environmental, technological, social, and epistemological obstacles all stood in the way.

The case of Spain's royal monopoly of *quina* enriches our understanding of the ways in which the scientific and imperial enterprises interacted in the eighteenth-century Atlantic World. In comparison to other empires at the time, Spain had a distinctive style of integrating science and empire. Part One of *Empire's Experts*

describes an imperial culture of knowledge production that pervaded imperial governance and influenced the structure and development of the *quina* monopoly. As the Spanish Crown engaged and coordinated many different groups of experts including botanists, bureaucrats, and indigenous bark collectors, tensions and conflicts over natural knowledge and the administration of the monopoly emerged. The role of science in the Spanish empire is best understood with reference to the broader politics of the imperial government.

In the late 1770s, major shifts in the botanical leadership and imperial bureaucracy led to an unprecedented intertwining of botany and state – the other distinctive feature science and empire in the Spanish Atlantic. As a result, imperial governance shifted emphasis from the local expertise of officials and informants in South America to the learned expertise of botanists and pharmacists in Spain. Part Two of *Empire's Experts* examines the nature and consequences of this shift, and shows that bureaucrats as much as botanists played key roles in the production of natural knowledge. Ultimately, the royal monopoly of *quina* not only shows Spain's participation in the larger projects of Enlightenment and modernity but also puts Spain at the forefront of moving science out of the rarified environment of European court culture into the quotidian world of imperial governance.

Introduction

Empire, Expertise, and the *Estanco de Quina* in the Spanish Atlantic World

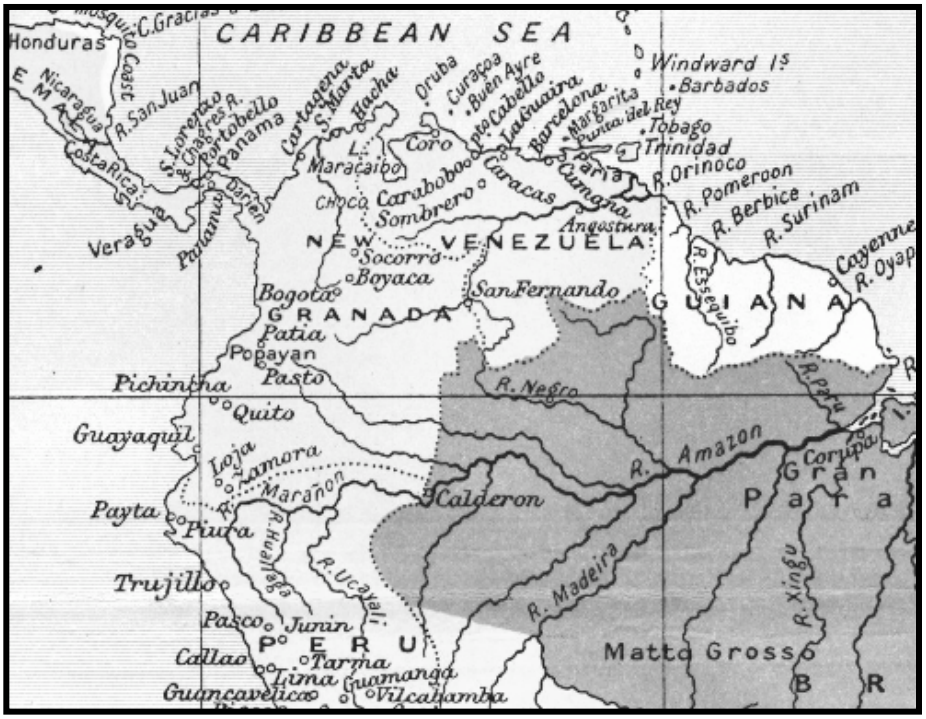
Early modern Europeans were a feverish bunch. Epidemics of fevers plagued various regions of Europe in the early modern period (c. 1500-1800).[1] Consequently, when, in the mid seventeenth century, Europeans encountered a tree bark in Peru that cured fever, news traveled fast. *Quina* – one of the many names for the medicament – traveled too. Jesuit missionaries, Spanish colonial officials, and European merchants all contributed to the dissemination of this new wonder drug.[2] By 1700, it had become a staple in European pharmacies despite a controversy over its medical virtue and mode of action.[3] To this day, the bark remains an important medicinal commodity especially because it is now understood as the main natural source of the alkaloid quinine. Quinine, according to current medical science, is a

[1] Mary Lindemann, *Medicine and Society in Early Modern Europe* (Cambridge: Cambridge University Press, 1999); on intermittent fevers and early modern conceptions of them, see: Saul Jarcho, *Quinine's Predecessor: Francesco Torti and the Early History of Cinchona* (Baltimore: Johns Hopkins University Press, 1993), 14-17 and Appendix A; William F. Bynum and Vivian Nutton, eds., *Theories of Fever from Antiquity to the Enlightenment* (London: Wellcome Institute for the History of Medicine, 1981).

[2] Saul Jarcho argues that the geography of institutions of the Society of Jesus in Europe was a determining factor in the early introduction and dissemination of *quina* in Europe, see: Sabine Anagnostou, "Jesuits in Spanish America: Contributions to the Exploration of the American Materia Medica," *Pharmacy in History* 47 (2005), 3-17; Sabine Anagnostou, "Jesuit Missionaries in Spanish America and the Transfer of Medical-Pharmaceutical Knowledge," *Archives Internationales d'Histoire des Sciences* 52 (2002), 176-197; Steven J. Harris, "Jesuit Scientific Activity in the Overseas Missions, 1540-1773," *Isis* 96 (2005), 71-79; Steven J. Harris, "Long-Distance Corporations, Big Sciences, and the Geography of Knowledge," *Configurations* 6 (1998), 269-304; Jarcho, *Quinine's Predecessor*, Chapters 1-3.

[3] The controversy over the efficacy and mode of action of *quina* was a complex affair reflecting larger rifts in the early modern medical and scientific communities between supporters of Galen and supporters of the new chemical medicine known as iatrochemistry. Since, Spain's *estanco de quina* was established in 1751 several decades after the resolution of this debate, this dissertation does not cover earlier debates over *quina* in detail. For more information on these early debates and controversies, see: Alvar Martínez Vidal and José Pardo Tomás, "Un siglo de controversias: la medicina española de los novatores a la Ilustración," in *La Ilustración y la ciencias. Por una historia de la objetividad*, edited by J. L. Barona, J. Moscoso, and J. Pimentel (Valencia: Universitat de València, 2003), 107-136.

cure for malaria – a disease in which periodic fevers is one of the main symptoms (associated with the lifecycle of the protozoan parasite that causes malaria). For early modern physicians and pharmacists, however, fever was considered a disease in and of itself and not simply a symptom of an underlying illness.



Map I.1: The Northern Pacific Coast of South America from Bogotá to Lima including Loja southeast of Guayaquil.[4]

In the eighteenth century as European fevers fueled demand, *quina* became an object of scientific, commercial, and state interest. Many in Europe desired this crucial commodity, but only one European state had direct access to it. Spain's viceroyalties of Peru and New Granada were the only place in the world at the time to find the cinchona tree from which *quina* was harvested. In 1751, Spanish officials

[4] Detail of map of "Spanish and Portuguese settlements in America," in: G.W. Prothero, Sir Stanley Mordaunt Leathes, and E. A. Benians, eds., *The Cambridge Modern History Atlas* (London: Cambridge University Press, 1912).

decided to intervene. A royal order was sent to the Viceroy of New Granada, the Viceroy of Peru and the President of the *Audiencia* of Quito. This order proposed the establishment of an *estanco de quina* (royal monopoly) to monopolize the bark from Loja, the region reputed to produce the very best bark (Map I.1).[5]

Much was at stake. Bark collectors working for the *estanco* in South America were to supply the Royal Pharmacy in Madrid with *quina* for use on the Royal Family. The Crown also planned to distribute the pharmacy's bark as gifts to foreign dignitaries and as alms to Spanish hospitals administered by the religious orders. One can only imagine the consequences if the King's *quina* proved lethal to a foreign prince or the large portion of the Spanish population served by the hospitals especially during fever epidemics. The political credibility of the Crown was intertwined with the medical efficacy of the Royal Pharmacy's *quina*. In addition, many Spanish officials regarded the proper management of *quina* as a moral and economic imperative of the Spanish Empire. The Crown had as much a duty to humanity to protect and preserve the bark as Spanish merchants had a right (over foreign merchants) to profit from this natural resource unique to Spain's American territories. Thus, the *estanco de quina* was simultaneously an imperial, Enlightenment, and economic project.

Environmental, technological, social, and epistemological obstacles all threatened and, at times, thwarted the successful implementation of the *estanco de quina*. Cinchona trees started to disappear. Bark degraded in transit. Merchants and bark collectors committed fraud. In addition, the identity and efficacy of different

[5] The *audiencia* of Quito was technically a political subunit within the Viceroyalty of New Granada but it was not uncommon for the President of Quito to have direct links and correspondence with officials in Spain, especially the Minister of the Indies. In many regards, Quito was an autonomous region and this autonomy only increased in the late eighteenth century, see: Kenneth Andrien, *The Kingdom of Quito, 1690-1830: The State and Regional Development* (Cambridge: Cambridge University Press, 1995).

kinds of *quina* remained difficult to determine. Overcoming such obstacles was as much a problem of knowledge as it was a problem of governance. In order to act, imperial officials in Spain first had to know. These officials relied upon a variety of experts – people with specialized knowledge or experience – including bark collectors, bureaucrats, and botanists (among others). As the *estanco* developed in the late eighteenth century, the Crown and its officials gradually shifted from the local expertise of bark collectors and bureaucrats in South America to the learned expertise of botanists in Madrid.[6] The case of the *estanco de quina* provides a useful vantage point to examine the dynamic relationship between science and empire in the early modern Atlantic World.

While much has been written about imperial and colonial science in the early modern period, the role of science in the Spanish empire has received comparatively little attention, especially in Anglophone scholarship. *Empire's Experts* places Spain at the forefront of an eighteenth-century European trend to move science out of the rarified environment of court culture into the quotidian world of imperial governance.[7] The *estanco de quina* exemplifies this shift. In addition to the general myopia of Anglophone scholarship when it comes to Iberian science, the importance of the Spanish empire as a case study has been overlooked as result of a tendency among scholars of Spanish imperial science to focus on Spanish iterations of the most dramatic and high profile imperial scientific activity of the Enlightenment: scientific expeditions. Historical scholarship on expeditions has focused primarily on the practices of collecting and representing non-European natures in published texts and

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[6] The distinction between local and learned expertise will be discussed later in this chapter.
[7] Antonio Barrera's work suggests that Spain had largely completed this process even before the eighteenth century began, see: Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006).

at scientific institutions in European capitals like Madrid, Paris, and London.[8] For sure, such practices were an essential mode of European imperial hegemony and viewed by contemporaries as successes. Successful exhibits, collections, images, and publications were one thing. Direct intervention in the production of a natural commodity was another.[9] For cases prior to the nineteenth century, little scholarship exists on European attempts to instrumentalize their natural knowledge in the service of specific political and economic enterprises in colonized territories.[10]

One methodological tenant of this dissertation is its focus on the scientific object rather than the scientific practitioner or institution.[11] This approach explicitly

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[8] Daniela Bleichmar, "Painting as Exploration: Visualizing Nature in Eighteenth-Century Colonial Science," *Colonial Latin American Review* 15 (2006), 81-104; Daniela Bleichmar, "Visual culture in eighteenth-century natural history. Botanical illustrations and expeditions in the Spanish Atlantic.," Ph.D. Dissertation (Princeton University, 2005); Schiebinger and Swan, eds., *Colonial Botany*; Schiebinger, *Plants and Empire*; Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven: Yale University Press, 2000); Mauricio Nieto Olarte, *Remedios para el imperio: Historia natural y la apropiación del nuevo mundo* (Bogotá: La Imprenta Nacional de Colombia, 2000); N. J. Jardine, A. Secord, and E. C. Spary, eds., *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996); D. P. Miller and P. H. Reill, eds., *Visions of Empire: Voyages, Botany, and Representations of Nature* (Cambridge: Cambridge University Press, 1996); Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992).

[9] Simon Schaffer, "Golden Means: Assay instruments and the geography of precision in the Guinea trade," in *Instruments, Travel, and Science: Itineraries of Precision from the Seventeenth to the Twentieth Century*, eds. Marie-Noëlle Bourguet, Christian Licoppe, and H. Otto Sibum (New York: Routledge, 2002), 20-50.

[10] Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca: Cornell University Press, 1989); Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981); Lucile Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Garden* (New York: Academic Press, 1979).

[11] This methodology is innovative only its application to the case of science and empire. Following objects as they move through networks is of course a classic element of Latourian anthropology of science and Actor Network Theory, see: Bruno Latour, *The Pasteurization of France* (Cambridge: Harvard University Press, 1988); Bruno Latour, *Science in Action: How to follow scientists and engineers through society* (Milton Keynes: Open University Press, 1987); Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and Fisherman of St. Brieuc Bay," in *Power, Action and Belief: A New Sociology of Knowledge?*, edited by John Law (London: Routledge and Keegan Paul, 1986), 221-240. Also, recent work in the history of technology and the historical ontology of scientific objects has employed a similar approach, see: Lorraine Daston, ed., *Things that Talk: Object Lessons from Art and Science* (New York: Zone Books, 2004); Lorraine Daston, ed., *Biographies of Scientific Objects* (Chicago: University of Chicago Press, 2000). Finally, there are also

avoids *a priori* assumptions of the authority and efficacy of science or of a natural alliance between science and the state. When Spanish officials proposed the *estanco de quina* in 1751, they collected information from many sources, without privileging the knowledge and expertise of botanists over bureaucrats, pharmacists over bark collectors, or physicians over merchants. Why would they? European imperialists in the eighteenth century took neither the applicability nor the necessity of science to imperial and colonial enterprises for granted as the counterparts in the nineteenth century would. Instead, scientific practitioners prior to 1800, especially botanists, had to actively promote their expertise and its utility to the empire and its projects. Recently, Shiela Jasanoff has introduced the term "co-production" to describe those processes whereby scientific knowledge and the social order mutually construct and, at times, reinforce each other. Co-production also serves a means for conceptualizing those interactions between science and the state in which nature and society emerge simultaneously.[12]

Yet, before naturalists and other scientific practitioners can go about producing knowledge and social order, they need to achieve positions of authority and influence within the relevant institutions of society – in this case, the Spanish

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several studies of commodities and their circulation, see: Clifford M. Foust, *Rhubarb: The Wondrous Drug* (Princeton: Princeton University Press, 1992); Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 1986); Sidney Mintz, *Sweetness and Power: The Place of Sugar in Modern History* (New York: Viking, 1985).

[12] Sheila Jasanoff, "The idiom of co-production," in *States of Knowledge: The co-production of science and social order*, edited by Sheila Jasanoff (New York: Routledge, 2004), 1-12. Jasanoff defines "co-production" as "shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. Knowledge and its material embodiments are at once products of social work and constitutive of forms of social life; society cannot function without knowledge any more than knowledge can exist without appropriate social supports. Scientific knowledge, in particular, is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions – in short, in all the building blocks of what we term the *social*. The same can be said even more forcefully of technology."

imperial government. Much of *Empire's Experts* focuses on this process and, with *quina* as our protagonist, we can more fully explore how it occurred. In addition, this story is not just a special case of Spanish imperial science. Rather, I argue that *quina* was the central object around which the interconnections between science and empire in the Spanish Atlantic emerged and developed. To put it counterfactually: without the cinchona tree and its bark, Spanish imperial science in the eighteenth century would have been a different enterprise.

The Fragility and Impotence of European Science in Imperial Contexts

European science in imperial contexts was not only far from hegemonic but also was at times impotent in the face of the heterogeneous social, cultural and natural contexts that comprised European empires. My argument here challenges a central assumption of the power of European imperial science.[13] Since George Basalla's seminal essay on colonial science, many strands of scholarship on science and empire have located the power of science in its universality and its ability to bring modernity from European centers to colonial peripheries.[14] Drawing on the broader currents of the social and cultural history of science as well as science studies, more recent scholarship has challenged every aspect of this account of colonial and imperial science. Instead of assuming the unity, universality, and modernity of science, historians now focus on local negotiations of natural knowledge at multiple sites and by multiple actors as objects, texts, and people circulated within Europe's

[13] For a concise statement of the Baconian vision of science and its implications, see: Peter Dear, "What is the History of Science the History Of? Early Modern Roots of the Ideology of Modern Science," *Isis* 96 (2005), 390-405.
[14] Lewis Pyenson, *Empire of Reason: Exact Sciences in Indonesia, 1840-1940* (Leiden: Brill, 1989); Lewis Pyenson, *Cultural Imperialism and Exact Sciences: German Expansion Overseas, 1900-1930* (New York: Lang, 1985); George Basalla, "The Spread of Western Science," *Science* 156 (May 1967), 611-622;

commercial and colonial empires. As a result, the term "colonial science," which used to refer only to science in Europe's colonies, is now generally used to indicate any scientific knowledge and practices which facilitated or were facilitated by European imperialism.[15] Much of this work admirably highlights how the sciences were implicated in Europe's imperial enterprise and vice versa. Yet, most of this scholarship emphasizes the symbiotic and successful relationship between European scientific and imperial enterprises.[16] Indeed, many accounts consist of success stories in which the relationship between science and empire results in the production knowledge and, in turn, the establishment of European hegemony over non-European natures and societies.[17] I argue here that such work has produced a distorted impression of the efficacy of European science in colonial contexts. In

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[15] Claudia Swan and Londa Schiebinger, "Introduction," in *Colonial Botany*, 1-16; Londa Schiebinger, "Forum Introduction: The European Colonial Science Complex," *Isis* 96 (2005), 52-55; The new definition of "colonial science" is useful in that it more clearly highlights the extent to which science was implicated in European colonial enterprises and vice versa. Such a broad definition, however, does sacrifice some of the term's analytical power. George Basalla provided the original definition of "colonial science" and also proposed a model of the diffusion of science from Europe to its colonies, see: George Basalla, "The Spread of Western Science," *Science* 156 (May 1967), 611-622.

[16] More recently, Jorge Cañizares-Esguerra and Antonio Barrera drawing on the earlier work of Antonio Maravell have emphasized that Bacon borrowed his modern rhetoric and images, especially the notion that the "moderns" had superseded the "ancients," from Iberian authors and texts of the early sixteenth century, see: Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006); Jorge Cañizares-Esguerra, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World* (Stanford: Stanford University Press, 2006).

[17] Scholarship on early modern colonial science is vast. The list of works cited here is representative but not exhaustive, see: James Delbourgo and Nicholas Dew, eds., *Science and Empire in the Atlantic World* (New York: Routledge, 2008); Miruna Achim, ed., "Science in Translation: The Commerce of Facts and Artifacts in the Transatlantic Spanish World," Special Issue of *Journal of Spanish Cultural Studies* 8, no. 2 (2007); Londa Schiebinger, ed., "Focus: Colonial Science," *Isis* 96 (2005), 52-63; Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005); Ralph Bauer, *The Cultural Geography of Colonial American Literatures* (Cambridge: Cambridge University Press, 2003); Ruth Hill, *Sceptres and Sciences in the Spains: Four Humanists and the New Philosophy (ca. 1680-1740)* (Liverpool: Liverpool University Press, 2000); Roy MacLeod, ed., "Nature and Empire: Science and the Colonial Enterprise," *Osiris* 15 (2000); A. Lafuente, A. Elena, and M. L. Ortega, eds., *Mundialización de la ciencia y la cultura nacional* (Madrid: Doce Calles, 1993); Patrick Petitjean, Catherine Jami, and Anne Marie Moulin, eds., *Science and Empires: Historical Studies about Scientific Development and European Expansion* (Dordrecht: Kluwer Academic Publishers, 1992).

contrast, the case of the *estanco de quina* highlights an overlooked aspect of the relationship between science and empire in the early modern world – its fragility and failures.

What can we learn from instances where the processes of knowledge production from cooperative negotiation to coercive extraction broke down? Londa Schiebinger has recently discussed the non-transfer of knowledge of a New World botanical abortifacient – the peacock flower – from African slaves in the Caribbean to doctors and naturalists in England.[18] Her study is exemplary in the new field agnotology, the study of culturally induced ignorance.[19] In her account, the culture of European (predominantly male) naturalists acted as a filter blocking the transmission of certain kinds of knowledge about natural objects. More recently, Neil Safier has addressed this theme under the rubric of "thwarted knowledge."[20] In his essay, "Fruitless Botany: Joseph de Jussieu's South American Odyssey," he recounts the various environmental, social, and technological factors that served as obstacles to efforts of Joseph de Jussieu, a French naturalist with the joint French-Spanish expedition to Quito (1735-1744), at collecting, producing, and circulating natural knowledge in the eighteenth-century Atlantic World. In concert with existing historical accounts of European imperial science, these studies of the production of ignorance and thwarted knowledge further emphasize the selectivity and contingency of European science in imperial and colonial contexts. They also highlight congeries of

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[18] Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004). For another example of the non-transfer of knowledge, see: Neil Safier, "Fruitless Botany: Joseph de Jussieu's South American Odyssey," in *Science and Empire in the Atlantic World*, eds. James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 203-224.
[19] Robert N. Proctor and Londa Schiebinger, eds., *Agnotology: The Making and Unmaking of Ignorance* (Stanford: Stanford University Press, 2008).
[20] Safier, "Fruitless Botany."

factors necessary to make the production of natural knowledge by Europeans abroad possible (let alone successful).[21]

While sympathetic to the work of Schiebinger and Safier, *Empire's Experts* explores different epistemological and sociological explanations of the limits of European science in colonial contexts. In terms of epistemology, this account assigns a different role to culture in the non-production of knowledge. In *Plants and Empire*, Schiebinger argues that the cultural assumptions of European naturalists determined their selective assimilation of non-European natural knowledge. In this case, I argue that culture could not act as filter since, in many cases, knowledge did not move with *quina*. Even when examining the same bark sample with similar techniques, bureaucrats and bark collectors in South America and botanists and pharmacists in Madrid created knowledge of *quina* anew according to their own distinctive sociocultural contexts. In terms of social interactions, this account emphasizes the importance of the broader political culture of the Spanish imperial state. During botanists' rise to prominence as advisors to imperial officials, they had to work with and within this culture in which the political influence of bureaucrats and existing structures of natural knowledge production influenced the efficacy of botany and botanists in the Spanish Empire. My second main argument illuminates the significance of these claims.

Imperial Cultures of Knowledge Production in the Atlantic World

To speak of the fragility and failure of science in relation to the Iberian World is delicate historiographical territory. In the early modern period, Spain's empire was

[21] See also Safier's recent book: Neil Safier, *Measuring the New World: Enlightenment Science and South America* (Chicago: University of Chicago Press, 2008).

the empire that everyone loved to hate (even for other European imperialists like the British). While the *conquistadores* wrote celebratory letters and chronicles of their deeds, Bartolomé de las Casas condemned the brutality of the Spanish and initiated the debate over the legitimacy of Spain's enterprise in the New World. Northern Europeans used such accounts as fodder for the so-called Black Legend of Catholic Spain. When this originally Protestant propaganda was transposed into the more (but not entirely) secular register of Enlightenment discourse, Spain and Spanish America were cast as places of superstition and backwardness – the anti-heroes to European myths of science and modernity.[22] As Jorge Cañizares-Esguerra has pointed out most forcefully, the history of science, especially in the Anglophone world, still labors under the influence of the Black Legend even as other fields of history have moved beyond it.[23] Since the mid twentieth century, scholars in Spain and Latin America have copiously documented and described various scientific traditions in the early modern Iberian World. As a result, the important question is no longer: was there science in the early modern Iberian World? Instead, it is: what does the Iberian case add to our understanding of science and empire in the Atlantic World?

As in the case of the distorted conception of the efficacy of science, the problem is a historiographical one. Both the history of science and the history of the Atlantic World have been dominated by scholarship on Northern Europe, especially Britain and its former empire. Emphasis on the British Empire has often led to the assumption (implicit or explicit) that the details of the British case can be taken as a

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[22] Jorge Cañizares-Esguerra offers an excellent overview of this process and its historiographical implications in *Nature, Empire, and Nation*. See also: Anthony Pagden, *The Uncertainties of Empire:Essays in Iberian and Ibero-American Intellectual History* (Aldershot: Variorum, 1994); Anthony Pagden, *European Encounters with the New World from Renaissance to Romanticism* (New Haven: Yale University Press, 1993); Anthony Pagden, *Spanish Imperialism and the Political Imagination: Studies in European and Spanish-American Social and Political Theoary, 1513-1830* (New Haven: Yale University Press, 1990).
[23] Cañizares-Esguerra, *Nature, Empire and Nation*, chapter 2.

representative of complex phenomena such as science, modernity, industrialization, capitalism, and globalization. By using Britain and its empire as a yardstick, some historical scholarship – dating back to the eighteenth century – has argued that Iberian science failed because it was derivative.

My claim is that Iberian science in general and Spanish imperial science in particular were distinctive, independent, and original – not derivative. Consider how awkward it would be to say that the Spanish Empire was derivative compared to the British Empire.[24] Why would we say the same about science in the Iberian Atlantic versus the British Atlantic? While comparison and contrast within the empires of the Atlantic World can be fruitful and productive, there is a better way to frame the problem.

A more useful comparison emerges from discarding the teleological yardstick and instead framing the comparison as between distinctive regimes or cultures of natural knowledge production. Every European enterprise in the Atlantic World – commercial, colonial, and imperial – wrestled with the intertwined challenges of knowing and governing.[25] The coordination of long distance trade and administration of territories at a distance required the systematic collection and circulation of knowledge and expertise in the form of objects, texts, images, and people.[26] By considering the Spanish empire as an imperial culture of knowledge production on its own terms, this case enriches our understanding of the variety of ways in which

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[24] J. H. Elliott, *Empires of the Atlantic World: Britain and Spain in America, 1492-1830* (New Haven: Yale University Press, 2006).

[25] For more on colonial and imperial enterprises as knowledge-making enterprises, see: Brian Keith Axtel, ed., *From the Margins: Historical Anthropology and Its Futures* (Durham: Duke University Press, 2002).

[26] Harold Cook's recent book explores the connections between histories of science and the commercial expansion of the Dutch Republic in the early modern period, see: Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007); see also: Steven J. Harris, "Long-Distance Corporations, Big Sciences, and the Geography of Knowledge," *Configurations* 6 (1998), 269-304.

science and empire interacted in the early modern Atlantic World.[27] While important cultural and institutional differences distinguish the Spanish from the British empires, this does not mean one was defective or derivative relative to the other. They were simply different.

How might we characterize the culture of knowledge production in the Spanish Empire? The second overarching argument of *Empire's Experts* provides an answer to this question. The key characteristic of this culture of knowledge production in the late eighteenth century is that it was fully embedded in the political culture of Spanish imperial governance. As a result, relative to other imperial enterprises in the Atlantic World, science and empire in the Spanish Atlantic were more closely and profoundly intertwined. Existing scholarship on Spanish imperial science has tended to draw a stark boundary between science and empire. Such accounts treat the sciences, such as botany, as either a tool of empire or an opportunistic (but not integral) partner in imperial enterprises.[28] In contrast, this dissertation argues that science in the Spanish empire can best be understood with reference to the broader culture of imperial governance and the structures of production, exchange, and consumption of the broader early modern Atlantic World. In the later decades of the eighteenth century, botanists and other scientific practitioners were so completely integrated into the empire that political culture of Spanish imperial governance exerted a strong influence in defining the role and efficacy of science and, in some instances, the very content of natural knowledge. This is a level of intertwining of science and the state was not witnessed in the other imperial and colonial enterprises of the Atlantic World.

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[27] Antonio Lafuente has also emphasized the need for examination of the "peculiar mechanism of the institutionalization of modern science in Spain." I consider the Spanish imperial enteprise to be one of these mechanisms for the institutionalization of science in Spain, see: Antonio Lafuente, "Las politicas y los metodos de internacionalizacion de la Ciencia española durante el siglo XVIII," *Revista del occidente* 82 (1988), 29-42.

[28] See, for example, many of the contributions in: Schiebinger and Swan, *Colonial Botany*.

This is a significant revision to existing accounts of the role of science in the eighteenth-century Spanish empire and highlights the importance and independence of the imperial cultures of knowledge production of the Southern Atlantic vis-à-vis those of the Northern Atlantic.[29]

This argument also explains the fragility of science in the Iberian Atlantic and suggests at least one reason why science in the Iberian Atlantic has been overlooked, if not ignored, for so long. In practical terms, to say that Spanish science and empire were deeply and profoundly intertwined is to emphasize that the imperial state – in its various guises – was the key site for the production of natural knowledge in the Spanish Atlantic. If this institution failed to achieve consensus on what constituted natural knowledge or how to act on that knowledge, then the production and instrumentalization of knowledge broke down. The reason that such phenomena have been overlooked is that it is only recently that historians of science have taken seriously the argument of historical anthropologists that colonial states *were* sites of knowledge production.[30] Such work pushes history of early modern science beyond its comfort zone of the study of printed texts, canonical figures, and royal societies

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[29] A selection of recent work on Spanish imperial science in the eighteenth century includes: Daniela Bleichmar, "Painting as Exploration: Visualizing Nature in Eighteenth-Century Colonial Science," *Colonial Latin American Review* 15 (2006), 81-104; Bleichmar, "Visual Culture;" Andrew Schulz, "Spaces of Enlightenment: Art, Science, and Empire in Eighteenth-Century Spain," in *Spain inthe Age of Exploration, 1492-1819*, edited by Chiyo Ishikawa (Lincoln: University of Nebraska Press, 2004), 189-227; José de la Sota Ríus, "Spanish Science and Enlightenment Expeditions," in *Spain in the Age of Exploration, 1492-1819*, edited by Chiyo Ishikawa (Lincoln: University of Nebraska Press, 2004), 139-158; Antonio Lafuente, "Enlightenment in an Imperial Context: Local Science in the Late-Eighteenth-Century Hispanic World," *Osiris* 15 (2000), 155-173; Mauricio Nieto Olarte, *Remedios para el imperio: Historia natural y la apropiación del nuevo mundo* (Bogotá: La Imprenta Nacional de Colombia, 2000); Manuel Sellés, José Luis Peset, and Antonio Lafuente, eds., *Carlos III y la ciencia de la Ilustración* (Madrid: Alianza Editorial, 1988); Antonio Lafuente, "Las politicas y los metodos de internacionalizacion de la Ciencia española durante el siglo XVIII," *Revista del occidente* 82 (1988), 29-42.

[30] Brian Keith Axtel, ed., *From the Margins*; James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition have Failed* (New Haven: Yale University Press, 1998).

into new manuscript sources from colonial archives that related less glamorous but more prevalent forms of natural knowledge production. While gentlemanly society may be the key to understanding science in other early modern contexts, if we were to only look for such phenomena in the Spanish case, we would miss an important institution and culture of knowledge production: the imperial bureaucracy.[31] Recent scholarship provides a mere glimpse of potentially vast new sources for history of science contained the colonial archives of Europe, Latin America, and elsewhere.

Bark, Expertise, and Political Economy in the Spanish Atlantic World

Empire's Experts follows the historical development of three intertwined phenomena: the ontological status of *quina*, the sociology of expertise in Spanish imperial governance, and the political economy of the Spanish Atlantic World. These three registers point to three main questions of historical interest and of interest to the actors in the late eighteenth century Spanish Atlantic: What was *quina*? Who had the authority to answer that question? What were the stakes (political, social, economic) involved in the answers to these questions?

In the early modern period, *quina* was an unstable entity. It came in many different forms and went by many different names. Fraud and physical degradation further contributed to its instability. As a result, a primary objective for the Crown and its *estanco de quina* was to impose stability on the bark. In Latourian terms, the central challenge was to make *quina* into an "immutable mobile" – an object that would resist degradation while in transit.[32] Many forces opposed this process. In order to appreciate the achievements of the *estanco de quina* and the Spanish

[31] On gentlemanly culture and early modern science in the English contexts, see: Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994).
[32] Latour, *Science in Action*.

imperial bureaucracy, we begin with an overview of the various factors contributing to the instability of *quina*.

Europeans first encountered what we now know as the cinchona tree some time in the mid seventeenth century (probably in the 1630s); the exact date is uncertain due to lack of historical documentation. Nor does anyone know for sure who first discovered the bark's medicinal properties. Even people in the seventeenth century were uncertain. This uncertainty gave rise to several competing European myths of discovery. Each of these myths featured a different European protagonist – Jesuit missionary, Spanish colonial administrator, or European physician in the employ of the Viceroy of Peru. Such accounts gave little recognition to the role of indigenous informants and often assigned the credit of the crucial discovery and understanding of the bark's febrifugal properties to Europeans. While the conditions of *quina*'s discovery remain unclear, some want to assign credit to the indigenous peoples of South America. This suggestion is plausible, but additional anthropological, historical, and ethnobotanical research is needed to provide a definitive answer to question of how indigenous peoples used and understood cinchona bark before the arrival of Europeans.

In 1738, Charles Marie de la Condamine – the French naturalist, mathematician, and explorer – hoped to reduce some of the uncertainty about *quina*. He had just returned from his famous eleven-year expedition to South America.[33] In 1735, La Condamine had traveled to Quito along with several other French scientists

[33] Safier, *Measuring the New World*; Mary Terrall, *The Man Who Flattened the Earth: Maupertuis and the Sciences in the Enlightenment* (Chicago: University of Chicago Press, 2002); Antonio Lafuente and Antonio Mazuecos, *Los caballeros del punto fijo: ciencia, política y aventura en la expedición geodésica hispanofrancesa al virreinato del Perú en el siglo XVIII* (Barcelona: Serbal-CSIC, 1987); Antonio Lafuente and Eduardo Estrella, "Scientific Enterprise, Academic Adventure and Drawing-Room Culture in the Geodesic Mission to Quito," in *Cross Cultural Diffusion of Science: Latin America*, edited by Juan José Saldaña (Mexico City: Cuadernos de Quipu, 1987), 13-31.

and two Spanish naval officers, Antonio Ulloa and Jorge Juan. The primary goal of the expedition was to take measurements at the equator near the city of Quito in order to resolve a debate in Europe over the shape of the Earth, but a secondary goal was to acquire samples of valuable and rare flora for transplantation to France and the French Caribbean. By the 1730s, the cinchona tree was well known, and La Condamine did not miss the opportunity to acquire precious samples. He arranged to return to Europe by land traveling westward from Quito down the Amazon River to the Atlantic coast of South America. Shortly after leaving Quito, he stopped in Loja to examine and acquire samples of the famed cinchona tree. By 1737, La Condamine was back in Europe and in 1738 he published a paper, "Sur l'arbre de quinquina," in the journal of the Royal Academy of Sciences in Paris. It was the first time an image and description of the cinchona tree had been printed in Europe.[34]

Many of the stories told about the discovery of *quina* were typical of European conceptions of American nature and served to justify European claims to sovereignty in the New World. In one myth, the bark was discovered by a *corregidor*, a royal official to administer a region of the Spanish empire of special interest to the Crown. In another, Jesuit missionaries, who learned of the bark from indigenous people, first discovered the bark. Finally, some myths attributed the discovery to a doctor in the service of the Viceroy of Peru. These were the three main myths that began circulating in the late seventeenth century. In his 1738 article, La Condamine added two additional elements to the mythology of the discovery of quina. He credited the indigenous peoples of America with discovery of the bark and suggested that Indians

[34] Charles Marie de la Condamine, "Sur l'arbre de quinquina," *Historie de l'Académie Royale des Sciences* (1738): 226-243. A facsimile of an eighteenth-century translation of La Condamine's article by the Panamanian physician Sebastían José López Ruiz is included in: Charles Marie de la Condamine, *Viaje a la America Meridional por el Rio Amazonas. Estudio sobre la Quina.*, ed. Antonio Lafuente and Eduardo Estrella (Quito: Abya-Yala, 1993).

learned of the medicinal properties from their observations of “lions,” which came to drink from a small pond in which a few cinchona trees had fallen. This association of indigenous people with “lions” served to reinforce European notions that American inhabitants were less civilized and, hence, closer to nature. Whereas seventeenth-century authors told a story of knowledge transfer from unknowing Indians to missionaries or colonial officials, La Condamine added another step in the knowledge transfer from nature (the lions) to indigenous people. Often, European authors used such myths of discovery as rhetorical techniques to support the veracity and credibility of their claims about *quina,* since little was known in Europe about the bark or the tree from which it came.

Not even science could provide a reliable means for mitigating the confusion about *quina*. Nomenclature was a persistent problem. This took several forms. Consider that in the decades immediately after *quina*’s introduction to Europe the medicament acquired several different names including “quina,” “kina-kina,” “quarango,” “Peruvian bark,” “febrifugal powder,” “Jesuit’s Bark,” and “Lugo’s Bark” in honor of Cardinal Juan de Lugo one of the earliest distributors of the bark in Italy.[35] Botanists in the eighteenth century in their attempts to dissipate the confusion often compounded it. Linnaeus first named the species “Cinchona” in his 1753 *Species Plantarum*, where he used La Condamine’s descriptions and drawings as the basis for his own description of what he called *Cinchona officinalis*.[36] Later in the

[35] *Quina* came to be called “Jesuit’s Bark” primarily as a result of the prominent role of Jesuit missionaries in the distribution of the bark especially within Europe. In the context of various Reformation movements and confessional divisions, physicians in England came to suspect *quina* as a Catholic plot to poison Protestants, see: Gideon Harvey, *The conclave of physicians: detecting their intrigues frauds and plots against their patients: also a peculiar discourse of the Jesuits bark: the history thereof, with its true use and abuse moreover a narrative of an eminent case in physick* (London: James Patridge, 1683).

[36] Carolus Linnaeus, *Species plantarum*, 2 vols. (Holmiae,1753). As has been noted by other historians of quinine and the Cinchona tree, Linnaeus derived his term from the legend of the

eighteenth century, Spanish botanists sought to revise such categories, especially after they realized that La Condamine's illustrations of the tree combined the characteristics of two distinct varieties of cinchona.[37]

Naturalists, physicians, and pharmacists in Europe faced the additional problem of determining the referent for these names. For example, until botanists realized the error in La Condamine's descriptions, matching an actual variety of cinchona tree to Linnaeus' description (which many presumed accurate based on Linnaeus' authority) would have been difficult if not impossible. A. W. Haggis has noted that in the seventeenth century the term "Peruvian bark" led many to confuse *quina* with the "Peruvian balsam" (*Myroxylon peruiferum*), which was a different species of tree all together.[38] Misidentifications were not the only problem. The tree itself presented an extraordinary amount of variation. As naturalists collected more samples and direct observations of the cinchona tree, they kept adding new species and varieties to the taxonomy of *Cinchona*.[39] To make matters worse, trees of the same species presented a range of variation, and even different parts of a single tree exhibited a broad variety of physical characteristics including appearance, taste,

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Condesa de Chinchón, the wife of a seventeenth-century Viceroy of Peru, who was allegedly the first European to be cured by the bark. Notice that Linnaeus dropped the first "h" in Chinchón in his spelling of the species name: *cinchona*. Linnaeus likely got his spelling from Italian transliterations of Chinchón that also dropped the first "h,"see: Jarcho, *Quinine's Predecessor*.

[37] Olarte, *Remedio para el Imperio*; Luis Alfredo Baratas Díaz, *Conocimiento botánico de las especies de Cinchona entre 1750 y 1850: relevencia de la obra botánica española en América* (Salamanca: Consejería de Educación y Cultura de la Junta de Castilla y León, 1998).

[38] A. W. Haggis, "Fundamental Errors in the Early History of Cinchona," *Bulletin of the History of Medicine* 10 (1941), 422-425. He suggests that merchants first called *quina* "Peruvian bark" in order to provoke such confusions with the well-known Peruvian balsam.

[39] Due to the cinchona tree's propensity for hybridization, there is still disagreement among botanists over the number of species, see: Lennart Andersson and Alexandre Antonelli, "Phylogeny of the tribe Cinchoneae (Rubiaceae), its position in Cinchonoideae, and description of a new genus, Ciliosemina," *Taxon* 54 (2005), 17-28.

smell, and texture.[40] In the early eighteenth century, European naturalists understood very little of this variation.

European naturalists were not the only ones who noticed and named the varieties of cinchona trees.[41] In South America, merchants and bark collectors, known as *cascarilleros*, developed their own names for the different varieties of the tree. By the early eighteenth century, those trading in *cascarilla*, as the bark was known in South America, had identified several different types of cinchona tree distinguishable by the colors of their bark – orange, red, yellow, white and black. In his *Arcano de la Quina* of the early nineteenth century, José Celestino Mutis, a celebrated naturalist in the eighteenth-century Atlantic World and director of Spain's Royal Botanical Expedition in New Granada, transposed these categories (except black) into scientific nomenclature (see Chapter 6). Contemporaries in South America also recognized variation in bark from different parts of the tree as reflected in the terminology of bark collectors: *cortezón* (bark from the trunk), *cortezonillo* (bark from the thickest branches), *canuto* (bark from skinny branches), and *canutillo* (bark from re-grown branches).[42] Thus, in the *quina* trade and even within any one shipment of the bark, there were often a wide variety of barks with a range of medical efficacies.

Cascarilleros and merchants used the variety in the sources of the bark to their advantage especially when dealing with an uninformed or unsuspecting consumer. *Cascarilleros*, usually indigenous people, worked in two-man groups with

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[40] Alba Moya, 48-49.
[41] For similar cases of different scientific and lay taxonomies of the natural world, see: D. Graham Burnett, *Trying Leviathan: The Nineteenth-Century New York Court Case That Put the Whale on Trial and Challenged the Order of Nature* (Princeton: Princeton University Press, 2007); Harriet Ritvo, *The Platypus and the Mermaid and other Figments of the Classifying Imagination* (Cambridge, MA: Harvard University Press, 1997).
[42] Filemón Arribas Arranz, *Catálogo XV: Papeles sobre la introducción y distribución de la quina en España* (Valladolid, 1937), viii.

one collecting the bark that fell to the ground as the other worked his way up or down the tree cutting off bark with a knife.[43] Since the Cinchona tree was not a cultivated crop, harvesting the bark was essentially an extractive process; over time the trees became scarcer and bark collectors had to spend more time in the forest and travel farther to find trees for harvesting. Since merchants often paid in advance in the form of clothing, tools or other goods, bark collectors were obligated to meet specific quotas for each harvesting season (more on this below). As trees with the best bark became scarcer, *cascarilleros* had an increasing motivation to mix barks from different types of cinchona or even from a different tree species. Merchants performed similar acts of adulteration in order to get a higher price for lower-quality bark.

One of the consequences of the increasing involvement of botanists in the study of the cinchona tree and in the Crown's *estanco de quina* was to put greater emphasis on the species or type of tree from which the bark was harvested. Previously, as reflected in the bark collectors' categories, the main emphasis had been on the physical characteristics of the bark, regardless of its source. Luz del Alba Moya Torres, drawing heavily on an eighteenth-century account by José Celestino Mutis, explains that there were three major shifts in European tastes in cinchona bark in the eighteenth century. In the first epoch (c. 1630-1700), specific trends are difficult to discern since commerce in the bark was still developing and bark came from one place – Loja, where Europeans first encountered it. In the early

[43] Sebastian José López Ruiz, "Modo de sacar corteza de los arboles de Quina," c. 1780, AGI, Santa Fe 757, fol. 288; La Condamine, "Sur l'arbre de la quina;" John Gray, William Arrot, and Phil. Miller, "An Account of the Peruvian or Jesuits Bark, by Mr. John Gray, F.R.S. Now at Cartagena in the Spanish West-Indies; Extracted from Some Papers Given Him by Mr. William Arrot, a Scotch Surgeon, Who had gather'd it at the Place Where it Grows in Peru. Communicated by Phil. Miller, F.R.S., & c.," *Philosophical Transactions (1683-1775)* 40 (1737-1738): 81-86;

eighteenth century (c. 1700-1740), *quina roja* (red quina) was the preferred species and, from this tree, consumers preferred "thick" bark from the trunk and fatter branches of the tree. After 1740, European preferred *quina amarilla* (yellow quina), and the bark from younger and thinner branches. Moya Torres suggests that collectors and merchants promulgated this last shift because collecting barks from branches was both easier and cheaper.[44] Although such emphasis on the color of the bark might suggest that producers and consumers emphasized tree species before botanists did, many contemporaries noted that such color variation did not necessarily correlate with species.[45]

Just as European naturalists experienced and promulgated confusion in the different species and varieties of cinchona tree, European physicians and pharmacists also contributed to the confusion about *quina*. Starting with the bark's introduction to Europe in the 1630s and 1640s and lasting until the mid eighteenth century, European physicians and pharmacists vigorously debated the mode of action of the bark. Theoretical and practical fractures in the European medical community resulting from differences in Galenic and iatrochemical conceptions of illness and human physiology fueled this debate.[46] When the use of *quina* therapeutically succeeded, it presented a challenge to the humoral theory of disease and the body espoused by Galen and his followers. According to the Galenic approach, disease was the result of an imbalance of the four bodily humors – yellow bile, black bile, phlegm, and blood. The logic of balance meant that a hot disease, like fever, ought

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[44] Moya Torres, 50-51.
[45] Hipólito Ruiz, *Quinologia*.
[46] Here, I can only give a brief gloss on one of the most fascinating and complex episodes in the history of early modern medicine and science, see also: Paula De Vos, "From Herbs to Alchemy: The Introduction of Chemical Medicine to Mexican Pharmacies in the Seventeenth and Eighteenth Centuries," *Journal of Spanish Cultural Studies* 8 (2007), 135-168; Allen G. Debus and Michael T. Walton, eds., *Reading the Book of Nature: The Other Side of the Scientific Revolution* (Kirksville: Sixteenth Century Journal Publishers, 1998).

to be treated with cold medicines and other therapies, such as phlebotomy, to reduce the body's heat. Since *quina* was considered a hot medicament on account of its bitterness, Galenic physicians and followers of Dioscorides' system for classifying medicaments resisted the use of the bark to treat fever.[47] From their perspective, such treatment recklessly endangered the lives of patients.[48] In practice, *quina* was as likely to fail as to succeed, and these instances provided Galenists with empirical fodder to critique the use of *quina* as a febrifuge. Many factors likely contributed to the success or failure of *quina* including the other medicaments and techniques used in the course of treatment, the underlying cause of the, and variations in the quality and kinds of *quina* available.

To make matters more complex, physicians could not necessarily be certain that they were working with *bona fide* cinchona bark.[49] Even if properly harvested and honestly sold, shipments of quina faced the problem of fraud in transit. Bark from the *Audiencia* of Quito was probably smuggled westward to South America's eastern shore via the Zamora, Marañon, and Amazon Rivers.[50] The official route was not much better. From Loja to Cádiz, there were many points at which a well-placed bribe or connection with a royal official could grant a merchant access to high quality bark stored in royal warehouses or customhouses. Portobelo, where, incidentally, the

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[47] An excellent source for an explanation of the intricacies of this system of classification is Andres Lagunas' sixteenth-century translation and edition of Dioscorides, see: Andrés de Laguna, ed., *Pedacion Dioscórides Anazerbeo (1555)* (Madrid: Instituto de España, 1968). See also: John Riddle, *Dioscorides on Pharmacy and Medicine* (Austin: University of Texas Press, 1985).

[48] The details of this debate are covered elsewhere and I will not cover them in detail here. My main intent is to give a further example of the confusion and uncertainty that existed with regard to the cinchona tree and its bark. The most detailed account of these debates and their underlying principles is in: Saul Jarcho, *Quinine's Predecessor*.

[49] Surprisingly, physicians in the debates over *quina* in the late seventeenth and early eighteenth centuries pay little attention to possibility that a sample of the bark failed because it was degraded or adulterated.

[50] Jarcho, *Quinine's Predecessor*, 201-202.

English South Sea Company maintained a factory, was notorious for such activities; advisors to the Crown repeatedly suggested that bark destined for the Royal Pharmacy be shipped to Cádiz via Cape Horn in order to avoid Portobelo.[51]

Bark also degraded on its own. Physical degradation was a problem that confounded all, King and contraband traders alike. Physicians and pharmacists in Europe required dry bark so that it could be pulverized and dissolved either in wine (often, a Riesling to counteract the natural bitterness of the bark) or water. While small amounts of humidity sapped the bark's medical virtue, prolonged exposure to moisture caused the bark to rot.[52] Keeping the bark dry was a feat. Even if traders managed to keep the bark dry on the journey through the rain-soaked forests of South America on its way to the coast, ship captains faced the daunting task of protecting the bark during a long sea voyage to European ports, which lasted anywhere from a few weeks to several months. In many cases, the bark was not much safer on land, as boxes could sit for months and even years in warehouses of the inland and coastal ports in South America.

Empire's Experts: Botanists, Bureaucrats, and Bark Collectors

Getting medically efficacious cinchona bark from forest to pharmacy in the early modern period was, thus, a daunting task. Degradation, deception, misidentification, and variation were all potential forces threatening the physical and

[51] One of the earliest discussions of the problems at Portobelo with regard to cinchona bark was provided by the pharmacists, José Ortega, see: José Ortega to Julian de Arriaga, Madrid, 17 May 1757, AGI, Indiferente 1552, fols. 471-473.

[52] A similar situation existed with the coca plant. Before the discovery of the process of semi-refining coca leaves, many Europeans ignored the medical effects of coca leaves because so few of them survived the long voyage from America to Europe, see: Steven B. Karch, *A Brief History of Cocaine: From Inca Monarch to Cali Cartels: 500 Years of Cocaine Dealing* (Boca Raton: CRC Press, 2006); Joseph Spillane, *Cocaine: From Medical Marvel to Modern Menace in the United States, 1884-1920* (Baltimore: Johns Hopkins University Press, 2000); Paul Gootenberg, ed., *Cocaine: Global Histories* (New York: Routledge, 1999).

ontological stability of cinchona bark in the eighteenth century. When officials in Spain first proposed the *estanco de quina*, they were well aware of the problem of fraud, especially as a result of contraband trade and corruption by government officials. Shortly after the implementation of annual shipments from Loja in the 1750s, officials in Madrid became aware of other problems. In the early decades, many royal orders focused on technical solutions such as making boxes sufficiently watertight to protect the bark on its long journey over sea and land.[53] Although this dissertation focuses primarily on the limits to European science and empire, some appreciation of the achievement of the efforts to establish a royal monopoly of *quina* is in order. In light of the obstacles, it is remarkable that starting in the late 1760s the Royal Pharmacy in Madrid *was* regularly receiving thousands of pounds of cinchona bark from Loja.[54] This achievement – the result of both imperial structures and local ingenuity – adds crucial perspective.

Officials throughout the Spanish imperial bureaucracy turned to experts – individuals or groups with specialized knowledge of *quina*, the cinchona tree, the *quina* trade, or the natural world in general. As mentioned above, at first they did so indiscriminately. The Crown and its representatives engaged a range of experts, including indigenous bark collectors, *quina* merchants, missionaries, local officials, botanists, pharmacists, and physicians – virtually anyone with knowledge or information relevant for the *estanco de quina*. Another method here for tracing the historical development of the role of science in the Spanish empire is to examine the integration of scientific practitioners into the structures of imperial governance. When

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[53] Early modern botanists faced a similar problem in developing technologies to allow for long-distance transport of botanical specimens without physical degradation, see: Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005).

[54] See chapter 2.

botanists sought to become the preeminent experts on the natural world for the Crown in the late 1770s, they had to contend with various other groups of experts already integrated into the imperial culture of knowledge production.

The rubric of expertise is useful here for two reasons. First, this terminology reinforces the methodological commitment of avoiding an *a priori* assumption of the pre-eminence of science. As far as the Crown and its representatives were concerned, the status of "expert" could be conferred as much to an individual with first hand knowledge of *quina* but no formal credentials as to a pharmacist with formal knowledge of medicaments but no direct experience of the cinchona tree in its American habitat. I use the term "experts" for all groups with knowledge of *quina* – from botanists to bark collectors – as way to emphasize that their knowledge and experience of the natural world was the primary basis for their interactions with the Spanish imperial government.

A second reason employing the rubric of expertise is that its cognates were actors' categories. According to a prominent contemporary dictionary, eighteenth-century Castilian included both the noun "expertise" (*pericia*) and the adjective "expert" (*perito*). Contemporary definitions of these terms associate them with formal training or education in a specific field of knowledge or trade. For example, the *Diccionario de Autoridades* defines *perito* as "knowledgeable, experienced, able and skilled (*acertado*) in some science or art."[55] Similarly, *pericia* is defined as "knowledge, experience, practice, and ability in any science or art."[56] Use of these terms was much more flexible. For example, when the Crown or its Ministry of the Indies ordered officials in Latin America to consult with an *hombre perito*, this phrase

[55] Real Academia Española, *Diccionario de Autoridades*, facsimile edition (Madrid: Editorial Gredos, 1984 [1726-1739]), vol. 3, 225.
[56] *Diccionario de Autoridades*, vol. 3, 223.

referred in most, if not all, cases to a person, usually a man, with experiential knowledge of the cinchona tree and its bark. At least, this is how imperial officials understood these terms as evidenced by their employment of missionaries, merchants, other local officials, and bark collectors to acquire information about the cinchona tree.[57] Furthermore, government documents used *experimentado* (experienced), a term which had a lesser connotation of formal training, interchangeably with *perito*.

To further illuminate historical and sociological patterns in the employment of experts by the Spanish Crown, I make an analytical distinction between "learned experts" and "local experts."[58] To be clear, these are not eighteenth-century terms; in addition, the noun "expert" (*hombre perito*) occurs infrequently in the archival records of the Spanish imperial government. "Learned experts" is a catchall term for botanists, pharmacists, and physicians in Spain and especially Madrid; "local experts" is a general term for the bark collectors, merchants, missionaries, and officials in the *quina*-producing regions of South America. Three main factors distinguish these two groups. Whereas the status and authority of "learned experts" was rooted in their formal training (usually a university degree), knowledge of American nature through indirect experience (books, image, and samples), and general knowledge of the natural world, "local experts" tended to lack formal training in the sciences and

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[57] The 1753 report of Miguel de Santisteban to the Viceroy of New Granda is an example (Chapter 2).

[58] Here, I diverge from the more common terminology of expert versus lay knowledge in the science studies literature, see: H. M. Collins and Robert Evans, "The Third Wave of Science Studies: Studies of Expertise and Experience," *Social Studies of Science* 32 (2002), 235-296; Steven Epstein, *Impure Science: AIDS, Activism, and the Politics of Knowledge* (Berkeley: University of California Press, 1996); Brian Wynne, "May the Sheep Safely Graze? A Reflexive view of the Expert-Lay Knowledge Divide," in: *Risk, Environment & Modernity: Towards a New Ecology*, edited by Scott Lash, Bronislaw Szersynski and Brian Wynne (London: Sage, 1996) 44-83; Brian Wynne, "Misunderstood Misunderstandings: Social Identities and the Public Uptake of Science," *Public Understanding of Science* 1 (1992), 281-304.

instead derived their expert status from direct experience of American nature and their specific knowledge of the cinchona tree and its bark. Drawing such a stark distinction calls attention to the fact that even if a local expert had formal training, the Crown and its officials invested learned experts in Madrid with the most authority on key issues and problems relating to *quina* and the monopoly.[59]

Until the last few decades of the eighteenth century, this distinction between learned and local experts works reasonably well. In the late 1770s however, the boundary between learned and local experts began to blur as Spanish botanists participated in scientific expeditions to South America from which they acquired experiential knowledge to complement their formal training in the study of the natural world. For example, in 1777, Hipólito Ruiz (1754-1815) and José Pavón (1754-1840) initiated their botanical to Peru and Chile with patronage from the Crown. Five years later, the Viceroy of New Granada and the Crown established a Royal Botanical Expedition in New Granada under the direction of physician and naturalist José Celestino Mutis (1732-1808). One of the primary objectives for both of these expeditions was the study of the cinchona tree. Thus, Ruiz, Pavón, Mutis and other itinerant naturalists began to undermine local experts' exclusive claim to direct experience of the cinchona tree and American nature. Often, European naturalists abroad did not displace local experts so much as efface the contribution of local informants to the production of natural knowledge. A similar shift occurred in the structures of expertise involved in the *estanco de quina* and the imperial bureaucracy as botanists actively sought to become the primary experts on all matters relating to the natural world and botanical resources of the empire.

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[59] For example, the Viceroy of Peru often consulted with Cosme Bueno on matters relating to *quina*. Bueno was a university-trained physician and a professor at the University of San Marcos in Lima.

Most historical accounts of science in the Spanish empire, especially in the eighteenth century, are often written as if the "science" stood apart from the predominant political context of imperial governance.[60] This account of the role of science in the Spanish empire points to two problems with this approach. First, as the above discussion of experts illustrates, if we focus solely on botanists, pharmacists, and other scientific practitioners, we will only get part of the story. Archival records of the Spanish imperial state in both Spain and Latin America represent a vast and largely untapped set of sources for the study of science and the production of natural knowledge in the Iberian Atlantic World. Thus, this dissertation employs manuscript sources alongside printed ones without privileging one over the other.[61] As Daniela Bleichmar has recently shown, naturalists in the Spanish Atlantic World valued the printed texts and visual images produced by their expeditions.[62] Such items were key factors in the patronage networks and constituted exchanges that constituted the communities of early modern naturalists.[63] Yet, since the sixteenth century, the Spanish Crown and its imperial bureaucracy had also fostered and developed a culture for the production of natural knowledge that relied very little on the apparatus of printing and, in many cases, sought to strictly limit the circulation

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[60] Neil Safier makes a similar point in his book, *Measuring the New World*.

[61] Paula Findlen makes a similar point about the tendency in history of science to overemphasize certain kinds of sources, especially printed texts. Recently, Miruna Achim has called attention to the importance of archival documents for our historical understanding of the scientific enterprises in the early modern Iberian Atlantic, see: Miruna Achim, "Science in Translation: The Commerce of Facts and Artifacts in the Transatlantic Spanish World," *Journal of Spanish Cultural Studies* 8 (2007), 107-115; Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994), 6.

[62] Bleichmar, "Visualizing Nature."

[63] Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006); Nicholas J. Jardine, Anne Secord, and Emma C. Spary, eds., *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996).

of knowledge of American nature.[64] Eighteenth-century Spanish naturalists, who sought to make their science useful to the state and the empire, operated within this bureaucratic and manuscript culture as well as the broader cosmopolitan culture of printed books and the scholarly exchange of objects and information.

This is the second problem with treating science as if it were somehow disconnected from the world of imperial politics and economic interests. One of the central features of the culture of knowledge production embedded in the Spanish imperial bureaucracy was that the Crown and its officials took advantage of the knowledge and information of many different groups. Oftentimes, accounts of science and empire or colonial science focus on the "scientist" as an agent of empire and on the relations between "scientists" and local informants often in service of the state. Besides the obvious fact that the term "scientist" is anachronistic, in the case of *quina*, we will see that the Spanish empire employed many kinds of local informants and experts in South America – not just botanists – that provided knowledge and information directly to the state. When viewed from the perspective of the *estanco de quina*, we can examine the ways in which pharmacists and, later, botanists sought to undermine this direct relationship between the state and other knowing subjects by asserting themselves as middlemen in the brokering of natural knowledge.

In spite of the increased royal patronage of scientific institutions, the Crown and its officials never entirely relinquished their connections with and reliance on local

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[64] On the empirical culture of Spain's Council of the Indies and House of Trade, see: Antonio Barrera-Osorio, "Empiricism in the Spanish Atlantic World," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 177-202; Antonio Barrera, "Empire and Knowledge: Reporting from the New World," *Colonial Latin American Review* 15 (2006), 39-54; Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006).

experts. It is my contention that in order to have a fuller understanding of science in the Spanish Empire during the Enlightenment we need to take account of the role of botanists, pharmacists and physicians vis-à-vis the local experts in America. In turn, this directs our attention to an underappreciated site for the production of natural knowledge in Enlightenment Spain: the Spanish imperial bureaucracy. And so, our story begins there.

From the Rule of the Local to the Rise of the Botanists[65]

In the late 1750s, José de Gálvez, future Minister of the Indies, was working for the Crown as a rank-and-file lawyer in Madrid. In 1759, while others were mourning the death of Ferdinand VI (r. 1746-1759), Gálvez was busy writing. After putting the final touches on a discourse about Spain's American colonies, Gálvez dedicated the manuscript, entitled "Discurso y reflexiones de un vasallo," to the new King of Spain, Charles III (r. 1759-1788).[66] The work was full of general recommendations and specific suggestions on how the Crown might reform relations within the empire so that Spain could derive greater benefit, especially economic benefit, from its American territories. Beginning with the reign of Philip III (r. 1598-1621), Spanish Kings often found themselves bombarded with such writings, whose authors are known collectively as *arbitristas* – loyal vassals to the Crown, who offered not only their idiosyncratic (and at times outlandish) diagnoses of Spain's ills but also made recommendations as to a cure that would restore the vigor and vitality of the

[65] I would like to thank John Marino for the phrase, "the rule of the local." It is especially useful since both senses of word "rule" are fitting.
[66] José de Gálvez, *Discurso y Reflexiones de un Vasallo*, in: Luis García Navarro, *La Política Americana de José de Gálvez: Según su "Discurso y Reflexiones de un Vasallo*" (Málaga: Editorial Algazara, 1998).

empire.[67] Although his discourse partook of this traditional advice genre, Gálvez cast the empire's problems and solutions in a distinctly eighteenth-century and enlightened tone.

Like many of his contemporaries throughout Europe, Gálvez focused on commerce, which he regarded as "the principal axis on which naturally the happiness of Spain depends."[68] He was especially keen on the discovery and development of new products from Spanish America as well as the improvement of the commercial utility of existing American commodities.[69] Thus, Gálvez's discourse is representative of a commercial vision of American nature that increasingly took hold of Spain's imperial bureaucrats in the eighteenth century.[70] In this view, the American kingdoms were vast storehouses of products to be catalogued by Spain's botanists and exploited by Spain's merchants.[71] As he surveyed the various regions of America, Gálvez directed his gaze toward the problem of "what we lose in Peru," the region

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[67] Indeed, much of the *arbitrista* literature of the early seventeenth century drew heavily on medical language and metaphors, see: J. H. Fernández-Santamaria, "Reason of State and Statecraft in Spain (1595-1640)," *Journal of the History of Ideas* 41 (1980), 353-379; Evaristo Correa Calderon, *Registro de Arbitristas Economistas y Reformadores Españoles (1500-1936)* (Madrid: Fundación Universitaria Española, 1981).

[68] José de Gálvez, *Discurso y Reflexiones de un Vasallo*, in: Luis García Navarro, *La Política Americana de José de Gálvez: Según su "Discurso y Reflexiones de un Vasallo*" (Málaga: Editorial Algazara, 1998), 137.

[69] José de Gálvez, *Discurso y Reflexiones de un Vasallo*, in: Luis García Navarro, *La Política Americana de José de Gálvez: Según su "Discurso y Reflexiones de un Vasallo*" (Málaga: Editorial Algazara, 1998), 137.

[70] Commerce and its ameliorative effects was popular topic in much of the literature of the European Enlightenment, see: Albert O. Hirschman, *The Passions and the Interests: Political Arguments for Capitalism Before its Triumph* (Princeton: Princeton University Press, 1997); J.G.A. Pocock, *Virtue, Commerce, and History. Essays on Political Thought and History, Chiefly in the Eighteenth Century* (Cambridge: Cambridge University Press, 1986).

[71] Daniela Bleichmar, "Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 225-252. Paula De Vos has noted that interest in economic potential of American nature was not a distinctly eighteenth-century or Enlightenment phenomenon, see: Paula De Vos, "The Science of Spices: Empiricism and Economic Botany in the Early Spanish Empire," *Journal of World History* 17 (2006), 399-427.

which, according to Gálvez, possessed the "most populated and rich [lands] in America."[72]

Quina figured prominently in this section among a number of other "Peruvian" botanical products – including tobacco and American cinnamon – that Gálvez thought could yield greater economic benefit to the empire and its subjects.[73] He described *quina* as a "marvelous cortex or bark" and noted that it was "the most common and necessary remedy among all civilized nations."[74] Meanwhile, his description and analysis of the trade in cinchona bark echoed many of the sentiments expressed in the royal order of 1751 that proposed the establishment of the *estanco de quina*. "The *quina* plant," Gálvez explained, "[is] abandoned to the greed and robbery individuals." He also noted, "the greater part of the commerce goes to other nations especially the English and the Dutch."[75] Apparently unaware that the Crown had already initiated a royal monopoly of the *quina* from Loja, Gálvez recommended the same solution: "Your Majesty should take possession of all the areas that produce *quina* trees."[76] While he was an optimist about the beneficial effects of commerce, Gálvez clearly did not support free trade in all instances. In the case of *quina*, he saw a state monopoly as the best solution.

As *Empire's Experts* will show, taking possession of "all the areas that produce *quina* trees" was neither a simple nor a straightforward enterprise. It was one that vexed botanists and bark collectors as much as bureaucrats. Ultimately, the fragility and impotence of both science and empire became evident as efforts to

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[72] Gálvez*, Discurso y Reflexiones*, 148-150.
[73] Gálvez, like many Europeans, thought of *quina* was a Peruvian product since much of the bark was shipped through Lima. Few in Europe realized that Loja was located in the Viceroyalty of New Granada not Peru.
[74] Gálvez*, Discurso y Reflexiones*, 148-150.
[75] Gálvez*, Discurso y Reflexiones*, 148-150.
[76] Gálvez*, Discurso y Reflexiones*, 148-150.

administer and, later, conserve the cinchona tree failed. A variety of factors threatened and, at times, thwarted the production of natural knowledge as well as the implementation of imperial control. Indeed, during his tenure as Minister of the Indies from 1776 to 1787, José de Gálvez got first-hand experience with the range of difficulties associated with taking possession of the cinchona tree and its bark. There was not only disagreement over the best policy for administering *quina* but also much debate over the classification of the varieties of cinchona trees and relative medical efficacies of their bark. The problems of governance and knowledge were, thus, intimately intertwined.

This interconnection was largely the result of the fact that the structures and techniques for the production of natural knowledge in the Spanish Atlantic were embedded in the imperial bureaucracy. The phrase "imperial culture of knowledge production" refers to the imperial government and the constellation of experts and informants connected to it. Part One of *Empire's Experts* offers a profile of the key characteristics of this culture. Like the imperial bureaucracy itself, the imperial culture of knowledge production was hierarchical as officials at the upper echelons of the imperial government, such as the Chamberlain of the Royal Household and the Minister of the Indies, solicited information and recommendations from subordinates and others on the ground in Spanish America. Officials in South America replicated this technique as they tapped into the knowledge of a wide variety of informal and formal experts including local officials, merchants, missionaries, and indigenous bark collectors. While the Viceroys, Minister of Indies and royal officials in Madrid made the key decisions with regard to formal policy, these officials valued and relied upon the direct experience that their subordinates in government and society had with the cinchona tree and its bark. The imperial culture of knowledge production was

empirical as well as hierarchical. Since the Crown and imperial officials consulted with such a wide variety of informants, this was also a highly political culture since the primary technique of collecting reports and samples from a wide variety of sources also allowed for the representation of a variety of political and economic interest groups within the empire. Of course, this culture was as exclusive as it was inclusive and there were many groups that had no voice or effective representation in the debates and discussions about the administration of *quina* and many other American commodities.

In the early decades of the *estanco de quina* from the 1750s to the 1770s, local officials in the *Audiencia* of Quito were able to exploit this imperial culture of knowledge production to their own ends as much as officials in Spain. In Chapter 1, we will see how Manuel de la Guardia, a treasury official in Cuenca, employed the technique of submitting samples of cinchona bark to superiors as a means to undermine the authority of Manuel Daza y Fominaya, the Crown-appointed *corregidor* of Loja, who came from Spain. Ultimately, as the Viceroy of New Granada and the Minister of the Indies received increasing evidence of Daza y Fominaya's incompetence, La Guardia was able to oust Daza y Fominaya from the directorship of the royal monopoly of *quina* in Loja. Chapter 2 presents another instance of the rule of the local within the imperial culture of knowledge production as Pedro de Valdivieso, "Magistrate of the Forests" and Daza y Fominaya's successor as director of the royal monopoly's operation in Loja, successfully navigated the imperial bureaucracy and culture of knowledge production to resist the Royal Pharmacy's attempts to impose its knowledge and expertise on bark collectors in Loja. In this instance, a local official in Loja was able to make the case that American knowledge

of place took precedence over European knowledge of taste in the determination and assessment of the quality of the King's bark.

This episode, in particular, highlights the impotence of European science within the broader imperial culture of knowledge production in the Spanish Atlantic. Indeed, the pharmacy's inability to extend its knowledge can be explained with reference to this culture of knowledge production. The structures of imperial governance stretched over a large expanse of territory and, as a result, encountered and interacted with a wide variety of local socio-cultural contexts. Recent scholarship has shown how Spanish officials in America often had to adapt policies from Madrid to local conditions.[77] This resulted in a patchwork of policy implementation ranging from complete compliance to outright rejection. The same was true for science. The royal pharmacists, since they made use of the imperial bureaucracy as a conduit for the collection and circulation of knowledge, had to endure the pitfalls as well as the possibilities of the imperial culture of knowledge production in which everything, even the natural world, was up for negotiation. Indeed, as we will see in Chapter 3, by the late 1770s there was an emerging critical discourse among officials in South America, as represented in the report prepared by Manuel García de Cáceres on the *quina* trade in 1779, that rejected the utility and efficacy of European science to the understanding of the cinchona tree and its bark and, ultimately, to the Crown's *estanco de quina*.

In Madrid, botanists in the late 1770s would capitalize on the shortcomings of the pharmacists and insert themselves as the empire's new scientific experts. The experience and rise of the botanists within the imperial culture of knowledge

[77] David J. Weber, *Bárbaros: Spaniards and their Savages in the Age of Enlightenment* (New Haven: Yale University Press, 2005); Christine Daniels and Amy Turner Bushnell, eds., *Negotiated Empires: Centers and Peripheries in the Americas, 1500-1820* (New York: Routledge, 2002).

production is the focus of Part Two. Chapter 4 explores this pivotal moment for Spanish imperial science and the *estanco de quina*. When he became Minister of the Indies, Gálvez began taking steps to centralize the imperial government and increase the influence of *peninsulares* (officials from Spain) to the detriment of the role of Creole elites in the governance of the empire. It was an opportune moment for botanists, since they promised to centralize the production of natural knowledge about Spanish America and to reduce the influence of local experts in this process. At the same time, Casimiro Gómez Ortega, director of the Royal Botanical Garden, inserted himself into the imperial culture of knowledge production primarily through consultations with Crown officials and the Minister of the Indies on matters relating to *quina*. In addition, imperial bureaucrats were becoming cognizant of a new and pressing problem – after more than a century of intensive bark extraction, cinchona trees were becoming scarce.

Government officials framed the solution to this problem explicitly in the language of conservation, and, they looked to the empire's new experts to solve it. Yet, as botanists integrated themselves into the imperial culture of knowledge production, they too had their difficulties. Chapter 5 examines the appointment of Vicente Olmedo as a "botanist-chemist" to oversee the collection and preparation of cinchona bark in *quina*. This appointment reflects a shift in the imperial culture of knowledge production from local to learned expertise as Olmedo a trained scientific practitioner from the metropole, replaced Pedro de Valdivieso, a local expert in Loja. Yet, it was only a partial victory for botanists, since Olmedo's role as an expert and agent of empire was largely defined and circumscribed by the particular vision of the Spanish Empire held by the Marques de Valdecarzana, the King's Chamberlain and architect of the reform of the *estanco de quina* in Loja.

Chapter 6 considers the effects of the integration of botanists into the imperial culture of knowledge production by examining a debate between José Celestino Mutis, a naturalist and physician in New Granada, and Hipólito Ruiz and José Pavón, botanists in Spain, over the classification of *quina*. This debate most clearly reveals the profundity of the connection between the scientific and imperial enterprises in the Spanish Atlantic; the rift between Mutis and Ruiz proves to be a case study in the co-production of nature *and* empire. Indeed, the main completing claims about the classification of the cinchona tree and its bark became allied with two different visions of the imperial order – one royalist and state-centered and the other mercantile and commerce-centered. This made it impossible to achieve scientific consensus on crucial issues such as the number of species of cinchona trees, the relative medical efficacy of their barks, and the most effective approach to conservation. While they debated, however, the trees continued to disappear. Science failed the state and the empire was revealed as powerless to protect one of its most precious and valuable natural resources.

In practical terms, botanists – just like their predecessors – proved largely ineffective, if not impotent, in addressing the problems associated with the *estanco de quina* and the extraction of cinchona bark. This raises an important question: why did the relationship between science and empire persist even when practical results were not forthcoming? This is a big question that extends beyond the purview of this study. Nonetheless, *Empire's Experts* suggests the ideology and Enlightenment sensibilities of imperial officials, which emphasized science as a means both to understand *and* to solve the empire's problems, blurred the lines between science and statecraft to such an extent that to give up on science would have been akin to giving up on the empire as a whole.

PART I:

THE RULE OF THE LOCAL

Chapter 1

The "Necessary and Pious" Destiny of *Quina*:

The Culture of Knowledge Production in the Spanish Empire (1751-1768)

"The fifth epoch is the decadence in our times."

–José Eusebio Llano Zapata (1757) [1]

The "fifth epoch" to which José Eusebio Llano Zapata referred was the fifth epoch of *quina*, known in South America as *cascarilla*, since the European encounter with the bark in the mid seventeenth century.[2] Llano Zapata was not just being cynical in describing it as an epoch of "decadence." Most observers in the mid eighteenth century, including Spanish imperial officials, would have agreed. *Quina* was increasingly discredited as a medicament due to a general impression that the bark was losing efficacy.[3] While Llano Zapata cited the "bad usage and improper dosage" by European (especially Dutch) doctors as the main cause of the bark's "discredit," Spanish officials focused instead on the detrimental effects of the greed and deception of merchants.

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[1] José Eusebio Llano Zapata, *Memorias histórico, físicas, crítico, apologéticas de la América Meridional* (1757), edited by Ricardo Ramírez Castañeda, Charles Walker, Víctor Peralta Ruiz, Luis Millones Figueroa, and Antonio Garrido Aranda (Lima: Instituto Francés de Estudios Andinos, 2005): 485.

[2] In general, *quina* was the term used in Europe and *cascarilla* was the term used in South America. Many texts, however, used these terms interchangeably. I will do the same. Notably, Llano Zapata refers to quina as "canna perida" which translates as "lost tube." Canna could be a misspelling of *caña*, a Spanish word meaning "rod" or "tube." Aside from its use in modern day Castilian to refer to a small glass of beer, in the eighteenth-century Iberian world, quina was sometimes called a "caña" or "canutillo" (little tube) on account of the fact that the bark, when dried, curled into a tube like cinnamon. The adjective "perida," meaning "lost," was probably a reference to Llano Zapata's prediction of the imminent annihilation of all stands of cinchona trees in South America due to over-harvesting to satiate demand of feverish and malarial Europeans.

[3] Llano Zapata, *Memorias*, 485.

In a 1751 royal order proposing the establishment of an *estanco de quina* (royal monopoly of *quina*), the Spanish cited the corrosive influence of contraband trade, in particular, as one reason why a royal monopoly was needed. Another reason was that the Crown and its ministers could no longer bear seeing foreign merchants enrich themselves by trading in a commodity unique to Spain's American colonies. The *estanco de quina* was, thus, conceived as means to increase Spain's market share in the *quina* trade while at the same time improving the quality of the product. Yet, before imperial officials could formulate and implement policies to realize these goals, they had to have knowledge of the object in question. Consequently, the 1751 royal order was as much a solicitation of information as it was a proposal for royal intervention.

The main purpose of this chapter is to describe the salient features of the techniques and structures of knowledge production deployed and developed by officials in Spain and South America in pursuit of a solution to the decadence of *quina*. My claim is that these techniques and structures constitute an "imperial culture of knowledge production." That officials could deploy this culture highlights the fact that many of the structures and techniques employed in conjunction with the *estanco de quina* predated this particular project. While the first part of this chapter develops a profile of this culture by way of archival records of the first decade of the *estanco de quina* (c. 1751-1760), it is important to emphasize that most of the techniques described were already embedded in the Spanish imperial bureaucracy.[4] The salient features of this culture were that it was hierarchical, empirical, and

[4] Paula De Vos has recently made a similar point in emphasizing the importance of considering eighteenth-century natural history in the context of existing structures, institutions, and practices for producing nature knowledge, see: Paula De Vos, "Research, Development, and Empire: State Support of Science in the Later Spanish Empire," *Colonial Latin American Review* 15 (2006), 55-79.

political, as exemplified by the main practices of collecting reports and samples from throughout the empire. Officials in Spain, moreover, solicited and received information and objects from a variety of informants in South America. While this culture maintained a hierarchical sensibility, imperial officials were often indiscriminate in extracting knowledge from many different kinds of informants as long as those informants had expertise with *quina* in the form of first-hand experience.

The imperial culture of knowledge production placed a high value on experience and empiricism. As a result, officials relied heavily on local expertise – that of local officials, merchants, missionaries, and bark collectors in the *quina*-producing regions of South America – in the early decades of the *estanco de quina*. This characteristic is highly significant for understanding science and empire in the eighteenth-century Spanish Atlantic World. First, historical scholarship has characterized the period of the Bourbon Reforms under Charles III (r. 1759-1788) as one of centralization and increasing state power, but the Crown's reliance on local expertise highlights the de-centralization of the imperial state, especially with regard to the production of knowledge about American nature and practical interventions in the colonies.[5] Second, learned experts in Spain – botanists, pharmacists, and

[5] Kenneth Andrien, through an exploration of the economic history of the region, also shows how the colonial state in the Kingdom or *Audiencia* remained quite weak and ineffectual until the early 1770s with the arrival of a new President, José García de León y Pizarro, who was a protégé of the eighteenth-century Spanish statement and President of the Council of the Indies, José de Gálvez, see: Kenneth Andrien, *The Kingdom of Quito, 1690-1830: The State and Regional Development* (Cambridge: Cambridge University Press, 1995). On the Bourbon reforms in general, see: Gabriel B. Paquette, *Enlightenment, Governance, and Reform in Spain and its Empire, 1759-1808* (New York: Palgrave Macmillan, 2008); John Fisher, *Bourbon Peru, 1750-1824* (Liverpool: Liverpool University Press, 2003); Allan J. Kuethe, "The Early Reforms of Charles III in the Viceroyalty of New Granada, 1759-1776," in *Reform and Insurrection in Bourbon New Granada and Peru* (Baton Rouge: Louisiana State University Press, 1990), 19-40; John Lynch, *Bourbon Spain, 1700-1808* (Oxford: Basil Blackwell, 1989); D. A. Brading, "Bourbon Spain and its American Empire," in *The Cambridge History of Latin America*, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984); D. A. Brading, "Review: Bourbon Spain and Its American Empire," *The Historical Journal* 24 (1981),

physicians – as they got involved with the *estanco de quina* and the imperial enterprise had to contend with the de-centralized apparatus of expertise integrated with imperial governance. The primacy of the authority of botanists and other scientific practitioners was not a given in the imperial culture of knowledge production. After all, imperialists in the eighteenth century did not privilege scientific expertise nor did they take the necessity of science to imperial projects for granted as their counterparts in later centuries would. Instead, pharmacists, botanists, and physicians worked hard to establish and maintain their status as the pre-eminent experts on the natural world as we will see in later chapters.

In the early decades of the *estanco de quina*, the emphasis on experience and empiricism in the imperial bureaucracy had more immediate effects. The second half of this chapter explores one episode in the early years of the *estanco* in which officials in the *Audiencia* of Quito manipulated the techniques and structures of this imperial culture of knowledge production to their own ends. A treasury official in 1767 was able to oust the royally appointed *corregidor* of Loja, a key *quina*-producing region, by undermining the *corregidor*'s claims of knowledge and expertise regarding cinchona bark. This episode also highlights the intrinsically political nature of the imperial culture of knowledge production. Since knowledge of the bark was so closely linked to policy decisions and bureaucratic action, natural knowledge and expertise served as political tools wielded by local officials in Quito as well as the Crown's ministers in Madrid. This also points to an irony of the Bourbon reforms. In the reformers' attempts to rationalize and de-politicize imperial governance to make the state more impervious to local interests and corruption, they inadvertently

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961-969; Geoffrey J. Walker, *Spanish Politics and Imperial Trade, 1700-1789* (London: Macmillan, 1979).

emphasized the political dimensions of natural knowledge, as local interest groups and officials sought to main their authority through knowledge and expertise.

We begin in 1751 in Madrid, with the first of several royal orders that proposed the creation of the *estanco de quina*. With these orders, imperial officials solicited information and policy recommendations from their counterparts in South America. Responses to these orders came primarily from officials in Lima, Quito, and Santa Fe de Bogotá. These reports as well as samples of bark sent by officials in South America are exemplary of the main aspects of the imperial culture of knowledge production. In addition to reports and samples, shipments of *quina* traveled to Madrid under the auspices of the *estanco de quina*. Back in Spain, imperial officials became further cognizant of one of the main problems of the shipments: the corruption and adulteration of the bark. The larger discussion within the imperial bureaucracy of how to improve the quality of the monopoly's shipments provides the backdrop to the second half of this chapter as we move back to South America, this time to Loja. Thus, while the primary objective of this chapter is to explore the culture of knowledge production embedded in Spanish imperial governance, I also explore the various environmental, technical, and social problems that imperial officials hoped to solve through the production of knowledge about the cinchona tree and its bark.

The Spanish Imperial Bureaucracy as a Culture of Knowledge Production

On August 27, 1751, the Crown issued the royal order that first proposed establishing an *estanco de quina* to the Viceroy of New Granada, the Viceroy of Peru, and the President of the *Audiencia* of Quito.[6] This document reveals the Crown's

[6] "Real Cedula," Madrid, 27 August 1751, Archivo General de Indias (AGI), Indiferente General 1552, fols. 343r-348r.

conception of both the *estanco de quina* and the problems with *quina* that required royal intervention. The order and the responses to it from officials in South America also illuminate the structures and techniques for producing natural knowledge embedded in the imperial bureaucracy. In the case of *quina*, the Spanish imperial state and its agents employed two main techniques: 1) the collection of reports from a variety of officials in South America; 2) the collection of a variety of samples of *quina*, with the explicit aim of producing information and knowledge about the cinchona tree, its bark, and the *quina* trade. Moreover, these techniques were often empirical. We begin with the conception of *quina* reflected in the royal order and then move to the techniques for knowledge production.

The problem of adulteration figured prominently in the 1751 royal order. It was an important part of the Crown's conception of *quina* and the *estanco*. Indeed, the order characterized adulteration as a common feature of commerce in the Spanish empire. Speaking of the trade in American natural resources in general, the order observed:

> While divine providence has generously enriched the dominions of His Majesty with abundant minerals and exquisite goods that grow exclusively [in Spain's American kingdoms] they experience the lamentable effects of the industry of foreigners. It has been abundantly clear that the most precious and necessary [products] for living are unknown in the interior Provinces of Spain or they arrive to [these provinces] adulterated and of the worst quality [such that] they are not deemed to be worthy of the attention and commerce of foreigners.[7]

Such observations were common among eighteenth-century Spanish officials, and the Crown framed the problem of adulterated products as a result of the interventions of foreign merchants (*estrangeros*). The underlying assumption was that such products existed in limited supply. Since foreign merchants through their "industry"

[7] Ibid., fol. 343r. All translations are my own unless otherwise indicated.

were able to acquire the best quality goods, only inferior quality and adulterated goods were left for Spanish merchants and consumers. In the most extreme cases, colonial commodities that were "most precious and necessary for living" remained unknown in the "interior Provinces of Spain" because foreign merchants (legally or illegally) had acquired the entire supply of a particular commodity.

The assumption of limited supply had important consequences for royal policies. Until the 1780s, most officials in Spain and South America based their recommendations and actions on the assumption that the amount of *quina* produced was fixed. If production were to change, they thought, it was only going to decrease. In part, this mindset was the result of the persistent association of *quina* with the American mineral products; imperial officials understood *quina* and its trade according to the logic of extraction.[8] Yet, unlike minerals, cinchona trees and their bark could grow back. For reasons that remain unclear, officials gave almost no thought to cultivating the cinchona tree until the 1780s (around the time when botanists became more fully integrated into the *estanco de quina* and the larger structures of imperial governance).[9] Prior to the 1780s, it was almost unthinkable to purposefully increase supply.[10] Consequently, the Crown focused its efforts on regulating distribution and the intervention of foreign merchants.

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[8] At this point, my evidence for this association is mainly anecdotal. For example, consider that the Viceroy of New Granada sent Miguel de Santisteban, an official from the Royal Mint, to Quito in 1752 to study the *quina*. Also, I should note that the associations between *quina* and mined products continued into the 1780s as in a document from 1788, in which merchants proposed paying a fifth of their harvested *quina* to the Crown as kind of tax similar to the *quinto* (royal fifth) that miners paid by giving a fifth of their silver to the Crown, see: Archivo Nacional Histórico de Ecuador, Quito (ANH/Q), Fondo Especial, c. 106,v. 253, no. 6338.

[9] Some officials did consider the prospect of cinchona plantations prior to the 1780s. They rejected such proposals by pointing to the failure of Charles Marie de La Condamine's attempts in 1737-1738 to transplant cinchona saplings from Loja to French territories in the Caribbean.

[10] There were other cultivated crops, but there was little mention of applying the techniques of cultivation to the cinchona tree.

The 1751 royal order also employed this general notion of the "industry" of foreign merchants as a means to frame the specific problems associated with *quina*, especially adulteration and scarcity. Within the larger group of products "most precious and necessary for living," the order described "*cascarilla* or *Quina* bark" as "one of the most appreciable [products]" from the American viceroyalties.[11] Much of the *cascarilla* that leaves the "Indies" goes mainly to "foreign countries," the order noted, such that merchants in Cádiz do not find *quina* of sufficient "quality" nor "quantity" to trade and distribute to the rest of Spain:[12] "Under this conception," it continued, "there seems to be no other option than for His Majesty to buy on his account all the *Quina* that grows in these dominions [the *Audiencia* of Quito] and to put in these Warehouses [an amount] sufficient to supply the Provinces and export that which is leftover, following the example of other sovereigns."[13] The specific term *estanco* was not used but the implication is clear: the Crown intended to monopolize and regulate the trade in *quina* in order to direct the commerce in *quina* away from "foreign countries" and toward Spain.

Implementation of the *estanco de quina* was not so simple. Both the Crown and the Ministry of the Indies recognized that any policy was likely to have differential effects on the various groups involved in the *quina* trade including bark collectors, merchants and local landowners and elites.[14] In the 1751 royal order, the Crown demonstrated its awareness of the possible variable effects of the *estanco* in its

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[11] "Real Cedula," Madrid, 27 August 1751, AGI, Indiferente 1552, fol. 343r-v
[12] Ibid., fol. 344r
[13] Ibid., fol. 344r-v.
[14] Negotiation was a structural feature of the Spanish colonial government before and during the Bourbon reforms of the late eighteenth century. Officials in the colonies were given quite a bit of latitude to handle matters as they saw fit as evidenced by the fact that officials, upon receipt of a order from the Crown, could reply: "I obey but do no execute," see: Colin MacLachlan, *Spain's Empire in the New World: the Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988).

discussion of two main "difficulties," derived, in part, from the underlying assumption that *quina* was an extracted product of limited supply.

The first difficulty was the economic harm that might come to "[*cascarilla*] harvesters" (*los vasallos cosecheros*).[15] The order quickly dispensed with this difficulty by pointing out that cinchona bark "does not come from cultivated trees" and that, even if the trees were cultivated or farmed, cinchona bark was not affected by "weather conditions" (*accidentes de tiempo*).[16] Consequently, the order stated: "there should not be any qualms about setting a fixed price" (*no havra reparo de señalar pecio fixo*).[17] Furthermore, the fixed price benefit harvesters by offering them a stable and known quantity of income for the following year and the punctual payment of income. Thus, bark collectors "will apply themselves to this crop with much enthusiasm and efficacy."[18] The Crown argued that the *estanco* would take the risk and uncertainty out of the trade and thereby encourage an increase in extraction.

The second difficulty was "the danger [*recelo*] that foreigners would transplant the *Quina* Tree to territory that they possess."[19] The Crown recognized that the French, Portuguese and Dutch all possessed colonial territories at the same or close to the same "latitude" where the cinchona tree was found in Spanish America, and Spanish officials were well aware that the French savant and explorer Charles Marie de la Condamine had already attempted to transplant some cinchona trees to

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[15] "Real Cedula," Madrid, 27 August 1751, AGI, Indiferente 1552, fol. 344v.
[16] In other words, cinchona trees were unlikely to suffer damage from a storm or other natural disaster in the same way that another crop might.
[17] Ibid., fol. 345r. The royal order, here, expresses the idea that the cinchona tree was not subject to the perils of growing wheat and other agricultural crops that could be severely affected by variable weather conditions.
[18] Ibid., fol. 345r.
[19] Ibid., fol. 344v-345r.

Cayenne, a French territory in South America.[20] The order cited three reasons why transplantation of the tree should not be a concern. First, it would take foreigners a long time to grow "an entire Forest" to support trade in the bark. Second, foreign nations did not have enough land on which to cultivate a forest of sufficient size. Third, drawing an analogy with grapes, officials assumed that even a difference of one "league" of terrestrial distance would adversely affect the good qualities (*bondad*) of the cinchona bark grown in foreign lands. So, assumptions of the quantities of trees needed and the effects of the climates of different latitudes supported the assumption that expanding the *quina* supply through cultivation was impractical. The logic of extraction prevailed.

Such preconceptions of *quina* and its production and trade held by the Crown and its advisors played an important role in the design and development of the *estanco*. Spanish officials did not work from their preconceptions alone. They also sought empirical information from officials and informants in South America in order to craft policies suited to the particulars of the trade. Nonetheless, the assumptions of Spanish officials conditioned the kinds of information they requested as much as the policies that they promulgated. For example, to acquire this information, the Crown mobilized structures and techniques for the collection of information and production of knowledge already embedded in Spanish imperial governance. Indeed, since the sixteenth century, the Spanish imperial state had supported a culture of

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[20] Neil Safier, *Measuring the New World: Enlightenment Science and South America* (Chicago: University of Chicago Press, 2008); Mary Terrall, *The Man Who Flattened the Earth: Maupertuis and the Sciences in the Enlightenment* (Chicago: University of Chicago Press, 2002); Antonio Lafuente and Antonio Mazuecos, *Los caballeros del punto fijo: ciencia, política y aventura en la expedición geodésica hispanofrancesa al virreinato del Perú en el siglo XVIII* (Barcelona: Serbal-CSIC, 1987); Antonio Lafuente and Eduardo Estrella, "Scientific Enterprise, Academic Adventure and Drawing-Room Culture in the Geodesic Mission to Quito," in *Cross Cultural Diffusion of Science: Latin America*, edited by Juan José Saldaña (Mexico City: Cuadernos de Quipu, 1987), 13-31.

empirical knowledge production especially after the initiation of larger project of *buen gobierno* (good government) under Philip II (r. 1556-1598).[21]

The King's main objective for the *estanco de quina* was "to care for the public health of his vassals, to benefit the harvesters of *Quina*, and to increase the treasury at the same time."[22] The collection of information on *quina* from officials in America was to facilitate the Crown's effort to find a policy to serve these three objectives. In particular, the Crown asked its Viceroys and the President of Quito to provide information regarding "all that could influence this matter adding your own report [*dictamen*]."[23] Officials in America were to proceed with the "greatest stealth" in collecting information for their reports so as to avoid arousing suspicion of informants, who might as a result give false information.[24] Specific information requested included: where the trees grow, what prices are paid for different kinds of bark, what were the predominant trade routes and costs of transportation, how much superior quality bark was harvested at each location, and how much bark was consumed in the colonies annually. Those respondents that supported the proposed *estanco* were directed to provide suggestions about how to impede "foreigners" from acquiring the bark and where the Crown should establish "Factors" that would handle the

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[21] On Spanish colonial institutions, such as the *Consejo de Indias* and the *Casa de Contratación*, as sites of knowledge production, see: Antonio Barrera-Osorio, "Empiricism in the Spanish Atlantic World," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 177-202; Antonio Barrera, "Empire and Knowledge: Reporting from the New World," *Colonial Latin American Review* 15 (2006), 39-54; Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006). On the reforms of Philip II and the notion of *buen gobierno*, see: Geoffrey Parker, *The Grand Strategy of Philip II* (New Haven: Yale University Press, 1998); David Goodman, *Power and Penury: Government, Technology, and Science in Philip II's Spain* (Cambridge: Cambridge University Press, 1988); J. H. Fernández-Santamaria, "Reason of State and Statecraft in Spain (1595-1640)," *Journal of the History of Ideas* 41 (1980), 353-379.

[22] "Real Cedula," Madrid, 27 August 1751, AGI, Indiferente 1552, fol. 346r-v.

[23] Ibid., fol. 346v.

[24] In the original, the phrase is: "...procediendo en todo con el maior sigilo..,"see: Ibid., fol. 346v.

purchasing of the bark. Respondents were also asked to describe "whatever political difficulty or other difficulties" might exist with regard to the establishment of the *estanco de quina*.[25]

This technique of sending the same set of questions to many different officials in the colonies was common in Spanish imperial governance. In many cases, the Crown sent a list of questions or questionnaire along with a royal order. Such questionnaires were one tradition of empirical knowledge production that dated back to at least the sixteenth century and probably had roots in late medieval practices for the collection of information from the provinces on the Iberian Peninsula.[26] Many other European empires in the early modern Atlantic world employed such questionnaires as a genre of imperial information collection and knowledge production.[27] An exemplar of this technique was the *relaciones geografícas* (geographical reports) that colonial officials produced in the late sixteenth century in response to a 1577 questionnaire from the Council of the Indies in Seville.[28] In this case, the main objective was to produce an encyclopedic account of Spanish America as well as comprehensive maps of Spanish territories. In other instances,

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[25] Ibid., fol. 347v-348r.

[26] On the history of the questionnaires from the sixteenth to the eighteenth centuries with some samples, see: Francisco Solano, ed., *Cuestionarios para la Formación de las Relaciones Geográficas de Indias siglos XVI/XIX* (Madrid: Consejo Superior de Investigaciones Científicas, 1988).

[27] Matthew Underwood, a Ph.D. candidate at Harvard University, is currently working on a dissertation that examines the use of such technique by the British imperial government and the Royal Society of London in the seventeenth century.

[28] Barbara Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas* (Chicago: University of Chicago Press, 1996); Xóchitl Guadalupe Medina González, "The Relaciones Geográficas of the Sixteenth Century: Historical Background, Administrative Framework, and the Role of Indigenous Informants," MA Thesis, University of Texas, Austin, 1995; Raquel Alvarez Peláez, *La conquista de la naturaleza americana* (Madrid: Consejo Superior de Investigaciones Científicas, 1993); René Acuña, ed., *Relaciones geográficas del siglo XVI* (México: Universidad Nacional Autónoma de México, Instituto de Investigaciones Antropológicas, 1985); Howard F. Cline, "The Relaciones Geográficas of the Spanish Indies," *The Hispanic American Historical Review* 44 (1964), 341-374. During the reign of Philip II, similar *relaciones* were solicited to collect information on the various regions of the Kingdoms of Castile and Aragon.

such as the Crown's 1751 request for information on *quina*, the objective was to collect a variety opinions and information on a specific topic so that officials in Spain could make an informed decision and understand the differential effects that the *estanco de quina* might have on different groups in the Viceroyalties of Peru and New Granada.

Techniques of Knowledge Production: Reports

Responses to the Crown's call for information and opinions on the *estanco* emerged from all levels of the imperial bureaucracy. In general, respondents endorsed the idea of the monopoly but offered different recommendations as to its structure and operation. The Crown received three main reports from subjects and officials, who held diverse positions in the imperial government in America: one from the *vecinos* (citizens and residents) of Loja, another from Miguel de Santisteban, an official in the employ of the Viceroy of New Granada, and another from José Manso de Velasco, Viceroy of Lima. Of these three, Santisteban's report had the most significant effect on the perceptions and understanding of *quina* and its trade by imperial officials, especially in Spain. Santisteban's report is also representative of the empirical culture fostered by the imperial government. In order to govern, the Crown and its officials first had to know. Santisteban provided both knowledge and recommendations for governance in his 1753 report, and it shows just how dependent the Crown was on local knowledge and expertise in the conception of imperial policies as well as their implementation.

Miguel de Santisteban was a career bureaucrat. In 1751, he was working at the Royal Mint in Santa Fe de Bogotá, the capital of the viceroyalty of New

Granada.[29] After receiving the royal order, the Viceroy selected Santisteban to travel to the *Audiencia* of Quito in order to "establish in Loja the successive shipment[s] of *Quina* bark that His Majesty has ordered be made every year from Cartagena to Spain."[30] The Viceroy also ordered Santisteban to collect the information necessary to respond to the Crown's queries. On June 4, 1753, after two years of travel and information gathering in the *Audiencia* of Quito, Santisteban submitted his report to the Viceroy who sent it to the Minister of the Indies in Spain. It would become one of the foundational documents for discussion and development of the *estanco de quina* in the next few decades.[31]

Just as the Crown relied on variety of officials and individuals to provide the information that would form the basis of imperial policy, Santisteban too relied on a variety of sources for writing his report on *quina* and its trade. Thus, local officials in America as much as imperial officials in Spain endorsed and extended the empirical culture of Spanish imperial governance.[32] Two of Santisteban's main sources of information were his own direct experience with the cinchona tree and the testimony he collected from various informants who worked with *quina*. Indeed, it was Santisteban's dissatisfaction with the second-hand information available in Quito, the

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[29] Biographical details on Santisteban are scarce, see David Robinson's introduction to: Miguel de Santisteban, *Mil leguas por América: De Lima a Caracas 1740-1741, Diario de don Miguel de Santisteban*, ed. David J. Robinson (Bogotá: Banco de la República, 1992).
[30] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa," Santa Fe, 4 June 1753, Biblioteca del Palacio Real de Madrid (BPRM), II/2823, fol. 83r.
[31] In 1776, when the Crown was considering yet another round of reforms to the *estanco de quina*, the Minister of the Indies sent copies of Santisteban's 1753 report back to officials in New Granada and Quito and asked for opinions on the feasibility of its proposals.
[32] Although Santisteban and others in the colonies developed their knowledge of *quina* primarily from their direct experience with the plant, I want avoid the trap of saying that those involved in the production of commodities, like *quina*, have empirical knowledge while those involved in the consumption of commodities had only evaluative or qualitative knowledge. As noted by Arjun Appadurai, often, different types of knowledge co-exist both where commodities are produced and where they are consumed. See Appadurai's introduction in: Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 1986).

capital city of the *Audiencia*, that drove him to visit *quina*-producing regions directly. "[Having] arrived in the City of Quito and having collected the corresponding reports on this matter," he explained, "I was not content [simply] with the news that the *Quina* Tree grew in the Mountains of the Provinces of Chimbo, Alausi, and Cuenca. [So], I traveled to [those locations] where, aided by intelligent persons, I examined this tree myself comparing its leaves, flowers, and fruit."[33] Here was a local bureaucrat imbued with the spirit of empiricism.[34]

Santisteban actively engaged in the discovery and study of cinchona trees. He was careful to emphasize his role and first-hand experience through the use of the personal pronoun, "I." For example, after listing all known locations of cinchona trees from Piura to Cuenca, he provided a list of stands of cinchona trees that he had discovered during his travels. When recounting his experience in the province of Chimbo on his way to Guayaquil, he wrote, "I discovered many *Quina* trees that in their color and styptic taste seem to me to be good although the bark is not as compact." "I have found this Tree," he continued, "in the Mountainous regions of the Road, that goes from Quito to Santa Fe in all the places whose climate [*temperamente*] is similar to that of Loja and whose elevation [*suelo*], by the observations of Monsieur La Condamine, are elevated to 800 *tuesas* or 2,000 *vazas castellanas*."[35] Oddly, in spite of his direct experience with the tree, at the end of his report, he noted that he did not "dwell on the description of the *Quina* Tree and the

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[33] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 83r.

[34] The sources of this spirit of empiricism are unclear. One possibility is the legalistic culture of the imperial bureaucracy as much as any kind of proto-scientific sensibility.

[35] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 85r. Santisteban actually refers to the trees as "arboles de China" or "China Trees." Although the term "china" did refer at this time to a different plant, *raíz de china*, it was also commonly a synonym for the word "*quina*" for Spanish speakers especially those in the American colonies.

diversity of its species" because "Mr. De la Condamine" has already described "the distinctions of color of the bark [and] the virtue, size and texture of the leaves" in his article in the journal of the Academy of Sciences in Paris.[36]

Santisteban reinforced his authority as a first-hand observer through a detailed description of Loja, the region where the Crown proposed establishing the *estanco de quina*. He noted that the city "has houses that are little more than ruins" on account of "an earthquake that occurred in recent years" and "the poverty" that had plagued the region ever since the gold mines at Zaruma, Loyola, and Zamora started to falter.[37] He characterized Loja as depopulated with less than forty "Spanish residents" and with several new families in the region that were unlikely to reach "the second generation."[38] As for the *quina* trade in Loja, Santisteban wrote: "it is purely passive" and "rarely extends to Panama or Piura."[39] According to Santisteban, only five or six residents of Loja purchased bark from "country folk" in order to resell it in Piura.[40] This lack of interest in the *quina* trade was apparently widespread: "there are few merchants in the Province of Quito and upper Peru [*alto Perú*] that are interested in this business."[41] As to the history of trade in the bark, Santisteban, using information from Charles Marie de La Condamine's 1738 report to the Academy of Sciences and from the entry "*quinaquina*" in the "Universal Dictionary of Trevoux," explained that *quina* fetched a good price and maintained a good reputation in Europe:

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[36] Ibid., fol. 88r.
[37] Ibid., fol. 83v.
[38] Ibid., fol. 83 v. Undoubtedly, part of the decline that Santisteban witnessed, could also be attributed to the economic depression that hit the entire Kingdom of Quito in the eighteen century, see: Andrien, *The Kingdom of Quito*.
[39] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 83v.
[40] Ibid., fol. 83v.
[41] Ibid., fol. 84r

> until the *Quina* trees became rare on account of the great amount of harvesting; and some residents of Loja, motivated by greed, mixed other barks in their shipments, since they did not have [*quina*] in the quantities requested by Spain. Consequently, [this mixing of barks] which was done at the *Ferias* in *Portovelo*, caused the discredit and now only a half of a peso per pound is paid whereas before [the bark was sold] at four to six pesos [per pound in *Portovelo*] and twelve pesos [per pound] in Seville. This has contributed to the ruin of Loja also.[42]

From Santisteban's perspective, the decline and poverty of Loja was tied to the decline in the reputation and value of its main product, testimony that reiterated the problem of adulteration noted by Spanish officials.

Another important aspect of the imperial culture of knowledge production is that informants, especially officials in the American colonies, were often asked to make policy recommendations based on their expert knowledge. Santisteban made six arguments in support of "the *estanco de la Quina*," which he characterized as "useful to public health, to Royal interest, and to the municipality [*vecindario*] of the City of Loja and is Province."[43] First, Santisteban argued that the Crown could exert more control over *quina* through the mechanism of an *estanco*. He even suggested how the royal monopoly should be organized with the appointment of "two officials" whose function would be to assist:

> in the examination of [*quina*] which is brought for sale, they will be able to have knowledge of it, to remove any foreign barks which [vendors] have mixed with [the *quina*] out of greed in order to increase the weight, and also to reject that [bark] which does not possess the prescribed qualities. This precaution will produce pure [bark] will be

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[42] Ibid., fol. 84v. The "Diccionario universal de Trevoux" is a reference to a dictionary published by the Jesuits in the town of Trevoux, France. The Jesuits also published a journal in this same town. The first edition of the dictionary was in the early eighteenth century (1704) and later editions followed. Although it is impossible to know which edition Santisteban had in hand, he may have encountered later editions. See: *Dictionnaire universel françois et latin, contenant la signification et la definition tant des mots de l'une & de l'autre langue, avec leurs différens usages*. Nouvelle édition corrigée et considerablemente augmentée. Paris: Chez la Vueve Delaune, rue S. Jacques, 1743.

[43] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 85v.

> had and those marvelous effects, which were seen in the early years [of the *quina* trade], will be obtained.[44]

Here, his proposal for the structure of the *estanco* was a clear response to fraud. Moreover, he suggested that the Crown appoint expert officials to assay the bark in order to insure its purity and quality. Note also that his reference to the purity of the bark exemplifies how thinking about *quina* was associated with and shaped by the notion of extraction, especially in the case of minerals. In the end, Santisteban felt that a government monopoly would revive the reputation that *quina* had when it was first discovered as "remedy for fevers."[45] Expert knowledge was the solution to the problem of adulteration.

A second way in which the *estanco* might restore the value of *quina* was that "selling [the bark] in Spain from only one hand will reestablish the value, that it had in Europe for most of the last century, in which [the bark] pure and fresh was shipped without risk of the greed of merchants adulterating it with other barks which converted [*quina*] to a poison or which altered, decreased, or destroyed the efficacy of its virtue."[46] Here, he referred not only to *quina*'s glorious past but also explicitly the greed of merchants as the cause of adulteration. Whereas the Crown had framed the problems of adulteration and poor quality as the result of foreign merchants buying all the best bark and sending it to their respective countries, Santisteban suggested that merchants actively adulterated the bark. Other benefits of the *estanco* included economic recovery in Loja and increased quantities of *quina*.[47]

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[44] Ibid., fol. 85v.
[45] Ibid., fol. 85v.
[46] Ibid., fol. 85v.
[47] Santisteban proposed that if the Crown were to pay residents of Loja one *real* per pound of bark then Loja would no longer be impoverished. The Crown's offer of one *real* per pound was, in Santisteban's estimation, a price "which they rarely received in silver in their trade in that bark." Second, he implied that creating the estanco would help restore the available quantities of quina. He supported the creation of an estanco "because this branch of the

Santisteban's report provided two legal justifications for the Crown's proposed *estanco de quina*. First, he noted that "[since] *Quina* is a tree with which Divine providence has increased the riches of this new world, it does not conform to the rules of politics [*politica*] that foreigners, especially the English, have made this product one of the [main] sources of their commerce."[48] In other words, since *quina* was a product from Spanish lands, the Spanish King and people should be the ones who benefit (and even profit) from trade in the bark. Though the roots of Santisteban's thought are difficult to trace, this "rule of politics" was probably derived from the mercantilist economic theories of the early eighteenth century. Santisteban also noted that since the cinchona tree grows in "forested and uncultivated mountains belonging to the state [*montañas realengos*]," the King is "the owner of them." Moreover, Santisteban explained, "the use of forests, Waters, and land is [held in] common by virtue [*disposición*] of the Laws of these Indies."[49] Santisteban's legal justification rested, thus, on two principles: the Spanish Crown should benefit from the commodities in its lands and the Crown was owner and guardian of such resources for the common good. In contrast to later suggestions that the state foster private investment in the cinchona tree, Santisteban justified the monopoly with the idea that *quina* was a common resource.

Beyond these legalistic justifications, Santisteban provided the Crown with a list of six recommended "resolutions" (*providencias*) to protect *quina* and foster the trade in the bark. In the first, he recommended the prohibition of trade in "any *Quina*

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general commerce of Our Nation receives little consideration" since "the 500 *petacas* of six *arrobas* or 700 *quintales*, which I regularly requested, are not obtained," see: Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 85v.

[48] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 85v.

[49] Ibid., fol. 85v.

tree" from "outside the territory that comprises the *Corregimiento* de Loja" until "the virtues of [*quina*], which has been sent from the Jurisdictions of Cuenca, Alausi, and Chimbo, have been examined in the Court."[50] The second *providencia* was that "Individuals of any station or dignity" were not to trade in quantities of *quina* outside of the territory of Loja in excess of four to six pounds under penalty of a fine and compensation of their *quina*.[51] Third, Santisteban recommended that a Royal Official at the "*Cajas R[eale]s* in Piura" mark those "*petacas* of *Quina*" that are to be sent to Panama with the "stamp of the Royal Crown" and that this official send dispatches to the "Factor of Aloxa."[52] Upon receipt in Panama, officials there were to store the *cascarilla* in the "Royal Warehouses" until it was ready to be shipped to Spain "on the account of His Majesty."[53] He also recommended that a Royal Official in Payta (see Map I.1) pay the "shipping freight charges" (*los fletes del Mar*) from Payta to Panama and Portovelo.

Finally, he recommended that the "Cities, Villages and Places of the Kingdom of Peru, Chile, Quito, Tierra Firma, and New Granada" present "*quina*" to their Governors in quantities needed "for their use and consumption of their Pharmacies."[54] Thus, Santisteban sought to limit the trade in *quina* from Loja to a small amount in order to direct most of that product to the King and his Royal Pharmacy. Moreover, Santisteban suggested that *quina* from other parts of South America was sufficient to supply any local need for the medicament. Noticeably, he said nothing about trade with foreign merchants, and provided no suggestion on how to handle the illicit trade

[50] Ibid., fol. 87r-v.
[51] Ibid., fol. 87v.
[52] Ibid., fol. 87v.
[53] Ibid., fol. 87v.
[54] Ibid., fol. 87v.

of foreign merchants, which figured prominently in the 1751 royal order establishing the monopoly.

Santisteban's 1753 report exemplifies several key aspects of the culture of knowledge production embedded in the imperial bureaucracy. First, it was hierarchical. Officials in Spain sent requests for information to the Viceroys, the heads of the imperial government in South America, who, in turn, sent these queries to their subordinates. Santisteban's own recommendation, that new kinds of *quina* could only be certified for commercial usage by testing at the Court in Madrid, reinforced the hierarchical aspect of this culture. Second, this culture was empirical. A high premium was placed on first-hand knowledge of the object or objects in question, and Santisteban was careful to note his direct experience of the cinchona tree in Loja and elsewhere. Third, this culture was political. Requests for information from Spanish officials were often accompanied by requests for policy recommendations. The Crown did not ask for "just the facts;" it wanted information and opinions on their implications for imperial policies as well. Finally, this culture was political in the sense that imperial officials collected information indiscriminately from anyone and everyone with knowledge of the object or phenomenon in question. These multiple sources of information invariably represented a variety of perspectives as well as political and economic interests. Let us now consider a second report to further illustrate how this imperial culture of knowledge production worked.

José Manso de Velasco, Viceroy of Peru submitted his report in November of 1753. Like his counterpart in New Granada, Viceroy José Alfonso de Pizarro, Manso de Velasco solicited information from his subordinates. Ultimately, he obtained "reliable information from intelligent people experienced [*practicas*] in the commerce

of *Quina*," underlining the authority and credibility of his report.[55] Unlike Santisteban, who relied primarily on his own direct experience, the Viceroy of Peru relied primarily on the testimony of local experts.

Manso de Velasco's report largely complemented that of Santisteban. Whereas Santisteban had pointed to merchant greed as the sole cause of adulteration, Manso de Velasco suggested that the situation was more complex. He pointed to several factors (natural and human) that could influence the quality of the bark. Place was important. Like many of his contemporaries, Manso de Velasco described the *quina* harvested from trees on the "Mountain of Caxanuma in the Province of Loja" as the "best quality, according to experience.[56] He attributed the high quality of the bark from these regions to local climate: "a simultaneous abundance of rain, warm air, and terrain in which to enjoy the mild rays of the sun which give [the bark] the proper maturity such that experience shows that on the same tree the bark on the side [of the tree], which receives this benefit [of the sun's rays] in greater proportion, is better."[57] Note that Manso de Velsaco repeatedly emphasizes that his claims were rooted in experience – an example of the value placed on empiricism in this imperial culture of knowledge production.

Manso de Velasco further noted that techniques of harvesting and preparing the bark had an effect on its quality. One crucial factor was humidity, which, according to Manso de Velasco, "weakens [the bark] and makes its virtue evaporate."[58] He was not alone in this view. Medical practitioners in Europe agreed that keeping the bark dry was essential to preserving its efficacy or "virtue."

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[55] José Manso de Velasco a Marques de la Ensenada, Lima, 4 November 1753, AGI, Indiferente 1552, fol. 331r.
[56] Ibid., fol. 331r.
[57] Ibid., fol. 332r-v.
[58] Ibid., fol. 332v.

Accordingly, bark collectors had developed methods for drying the bark immediately after stripping it from trees. In general, bark was dried in parallel rows on "platforms of reeds, which are called *Barbacoas*" and covered with "straw."[59] Manso de Velasco also described the "shape, color, and taste" of superior *quina*. For example, the best bark was not "thicker than a finger" since it was harvested from "small branches" (*ramazones*). When dry, the bark should have "the same shape as cinnamon," a lighter color on its interior surface and a darker color on its exterior, and a rough texture. Meanwhile, "the principle indicator [*signo*] of its quality [*bondad*]," he explained, "consists in the intense activity and vigorous force of its bitterness."[60] Thus, he provided the Crown with crucial information on how to evaluate the quality of the bark once it arrived.

In his view, expert knowledge was essential to producing the best bark. Manso de Velasco's example came from the "Port of Paita" on the northern coast of Peru. Since it was the port closest to the *quina*-producing regions in the southern part of the *Audiencia* of Quito, Payta was an important entrepôt where various merchants and bark collectors from inland regions brought their bark for evaluation and export. Here, merchants and others separated the bark according to its quality (good or bad) and the part of the tree from which it came (branches or trunk). They also cleaned the bark in order to eliminate "dust and useless leaves and other barks which fraudulently are mixed in."[61] Such descriptions give a sense of the array of characteristics that merchants and others used when evaluating and pricing a particular quantity of bark. In some cases, the very act of sorting the bark affected its value. According to Manso de Velasco, prices in Payta were based primarily on

[59] Ibid., fol. 332v.
[60] Ibid., fol. 333r-v.
[61] Ibid., fol. 333v.

purity. He noted that one *real* per pound was paid for bark "which only a third was useable" and two *reales* per pound for bark "which did not have too much illegitimate material" while bark "which [has even] less [illegitimate material]" got three *reales* per pound.[62] Purity, thus, was defined as the relative proportion of good or useable bark to useless or bad material. As to the *cascarilla* to be sent to the Royal Pharmacy, Manso de Velasco speculated that it would fetch "six *reales* per pound because it had been selected very carefully by individuals with much expertise [*sugetos mui peritos*] which, in truth, I suppose [makes] one of these *Petacas* [equivalent to] three in common commerce."[63]

While the information in his reports largely complemented that of Santisteban, Manso de Velasco's policy recommendations diverged considerably. In particular, he considered "the introduction of a type of *estanco* most contemptible."[64] He agreed with Santisteban and the Crown that "it has always been considered unjust and cruel that distant lands enjoy that which your own lands produce and that the abundance of foreigners is at the expense of your sterility," but rejected the *estanco* on free-trade principles. A royal monopoly "eliminates the ability of those, who make living by it, to trade freely [*comercio libre*]" and "makes [the product] pass through various hands from harvesters, who collect the bark, to buyers, who package the bark, to merchants and individuals, who ship it at their own risk," he wrote.[65] It was these aspects that led to the "prohibition by law" of the "*estanco* of cochineal" in the "Kingdom of México."[66]

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[62] Ibid., fol. 334r.
[63] Ibid., fol. 334v.
[64] Ibid., fol. 337r.
[65] Ibid., fol. 337r. The original reads: "no son mas privilegiados, ni menos precisos los generos, que miran al abasto de los sanos, que los que sirven al remedio de los enfermos."
[66] Ibid., fol. 337r-v.

Manso de Velasco then backpedaled a bit, which suggests that these observations were meant simply as a list of the kinds of arguments that could be made against the *estanco de quina*. He quickly explained that cochineal "does not have as necessary and pious a destiny" as *quina*, presumably because cochineal was just a dye and lacked *quina*'s life-saving properties. Alongside his observation of the "inconvenience" to free trade that an *estanco* might produce, Manso de Velasco emphasized a crucial benefit: products "subject to the Royal Hand are imported at better proportions [i.e. of better quality] and with lower risks of loss."[67] In addition, the overall quality of *quina* would be improved by "delivering a reasonable price [*precio puntual*] for the *cascarilla*," by "naming able subjects, who could promote the harvesting and benefit [of *cascarilla*] in the places which produce it," and with the appointment of an "official in Paita [sic], who would receive and admit only [*cascarilla*] of the best quality."[68] Economic incentive and expertise could, thus, work together to improve the quality of *quina*.

These remarks illuminate contemporary conceptions of the relationship between expertise, economics and empire in the early years of *estanco de quina*. "Individuals with expertise" provided the means to counter the forces of variation and adulteration that seemed inherent to the *quina* trade. Moreover, between the 1751 royal order and Manso de Velasco's report, we see that officials on both sides of the Atlantic framed the *estanco de quina* in similar terms – as a project in which experts were needed. In these early decades, the Crown relied primarily on the expertise of local officials and informants. Indeed, the reports of Santisteban and Manso de Velasco are examples of how the Crown tapped into local expertise and knowledge

[67] Ibid., fol. 337v.
[68] Ibid., fol. 337v.

via the imperial bureaucracy. Such reports together provided officials in Spain with vital knowledge on the cinchona tree and the trade in its bark. Yet, the collection of reports from experts and informants was not the only technique for knowing American nature. The Crown also promoted techniques for the collection and examination of materials – in this case, bark samples.

Techniques of Knowledge Production: Samples

All the shipments of *quina* from Loja for the *estanco* eventually ended up at the Royal Pharmacy in Madrid. The royal pharmacists checked the quality of the bark before it was used on the Royal Family or distributed by the Crown. It was the last opportunity to identify and eliminate adulterated *quina* or impostor bark that may have been intentionally or inadvertently added to the shipment. To perform this task, the pharmacists first needed knowledge of all the different kinds of *quina* and which kinds were of superior quality relative to others. Consequently, in August 1751, the Crown sent a second royal order to the Viceroy of New Granada, the Viceroy of Peru, and the President of Quito: "observations and experiments" were to be performed in Madrid to identify *quina* of the highest quality.[69] Recipients of the royal order were instructed to send samples from newly discovered stands of cinchona trees as well as known stands. Thus, the imperial bureaucracy became an important conduit for the collection and conveyance of bark samples to Madrid so that existing *quina* resources could be compared and surveyed at the Royal Pharmacy. Moreover, it was in the execution of the "observations and experiments" of these samples that learned

[69] "Real Cedula," Madrid, 30 August 1751, AGI, Indiferente 1552, fol. 358r. The bark would be tested at the Royal Pharmacy, see: Chapter 2.

experts in Madrid – pharmacists, botanists, and physicians – first got involved with the *estanco de quina*.

Both Miguel de Santisteban and Viceroy Alfonso de Pizarro fulfilled the request for samples. In his report from June 4, 1753, Santisteban noted that he had ordered that "four *petacas* of six *arrobas* each" be sent to Guayaquil from "every one of these places [in the Provinces of Chimbo, Alausi, and Cuenca] that produce bark from the thinnest branches."[70] Four days later, in a letter to the Marques de Ensenada, José Alfonso de Pizarro, the Viceroy of New Granada, confirmed that he would shortly be sending "four *tercios* or *petacas* of six *arrobas* of *Quina* which grows in the Mountains of the Chimbo in the *Corregimiento* of Cuenca."[71] Pizarro noted the he would send these *petacas* of *quina* so that their "virtues" (*virtudes*) could be examined by "the most skillful Botanists of the court." In particular, Pizarro hoped that the botanists' examination would "dispel the preoccupation with the preference for [*quina*] from the Mountains of Caxanuma near Loja."[72]

At the same time that they were fulfilling the Crown's request for samples, Santisteban and Pizarro were also serving local interests in Cuenca. *Quina* from Loja – a province neighboring Cuenca – had been considered the best by everyone involved in the trade from bark collectors to pharmacists. A favorable review of Cuenca's bark by the Royal Pharmacy, however, could possibly undermine Loja's claim to be the sole region producing superior *quina*. Thus, there was potential for economic benefit to the province of Cuenca and its merchant community. Here, the

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[70] Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa..." Santa Fe, 4 June 1753, BPRM, II/2823, fol. 83r.
[71] José Alonso Pizarro, Marques de Villar to Marques de Ensenada, Santa Fe, 8 June 1753, AGI, Indiferente 1552, fol. 302r.
[72] Ibid., fol. 302v. Later in the letter, Pizarro notes that he awaits "more *tercios* [of quina] from different places" which would include samples from the trunk and roots (303r).

Viceroy of New Granada implicitly recognized the authority of the Royal Pharmacy as the preeminent body for assessing and evaluating different kinds of *quina*.

Viceroy Manso de Velasco sent another set of samples a few months later. While the Viceroy of New Granada seemed primarily focused on bringing economic activity to Cuenca, the Viceroy of Peru sent his samples for different reasons.[73] Manso de Velasco's samples came from the Mojos region of the *Audiencia* of La Plata, which bordered Portuguese territory in South America. A serious concern was that the Portuguese might gain access to this *quina*, develop their own trade in the bark, and break the Spanish monopoly. On December 29, 1753, Manso de Velasco wrote the Marques de Ensenada, in Spain, to inform him that he was sending "an [eleven-pound] sample of [*quina*] that is harvested in the midst of the kingdom in the region called Yungas [sic] in the bishopric of La Paz."[74] Manso de Velasco informed Ensenada that Dr. Cosme Bueno, a Professor at the university in Lima, had "used it with good success and the same effects as [*quina*] from Loxa." He had also written to the "*corregidores* of Sica Sica [sic] and La Paz so that they would make a formal investigation of the places which produce this plant."[75] In particular, Manso de Velasco asked these local officials to investigate whether they "could restrict [trade] with Lands of the Crown of Portugal." Thus, he framed his letter a response to interest the Crown expressed in its 1751 royal order of the possibility of *quina* being "extracted to foreign lands."[76]

A few months later this sample arrived at the Royal Pharmacy in Madrid. The bark was tested by José Martínez Toledano, the Head Pharmacist at the Royal

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[73] Such instances point to how different interests to influence what kind of knowledge was produced and if any knowledge was produced at all.
[74] José António Manso de Velasco to the Marques de la Ensenada, Lima, 23 December 1753, AGI, Indiferente 1552, 366r.
[75] Ibid., 366r-v.
[76] Ibid., 366v.

Pharmacy, Dr. Joseph Ximenez, a physician to the Royal Family, and Dr. Campillo, a "physician of the Chamber." In November 1754, Martínez Toledano informed Julian de Arriaga, Minister of the Indies, that "it works [*corresponder*] well against many intermittent Fevers."[77] He also reported, "it was in very poor condition when I received it."[78] Pharmacists and physicians in Madrid, however, had not been the only ones testing this bark.

In early December, unaware of the pharmacy's tests, Manso de Velasco sent the reports he had promised from colonial officials in the Jungas region. He reiterated that Cosme Bueno, Professor of Medicine at the University of San Marcos in Lima, "assures [me] that a few are equal to [*quina*] from Loja."[79] His letter also included extracts of reports from the President of the *Audiencia* of La Plata, the *corregidor* of La Paz, and the *corregidor* of Zica Zica. All three respondents noted that they received their samples from Jesuit missionaries working in "the Missions of Mojos" on the border with Portuguese colonial territories. Both the President of La Plata as well as the Viceroy of Peru assuaged the Crown's fears of foreign trade by pointing out that shipping the bark overland to the eastern coast was not feasible. Specifically, the President of La Plata reported that *quina* "taken from this Territory would lose its virtue [*virtud*] especially [if taken] by sea, such that it would be worthless upon arrival in Europe."[80] Moreover, the President reported that "an expert, who knows about these things experimented" with this *quina* and found, in opposition to Cosme Bueno in Lima and Joseph Martínez Toledano in Madrid, "that it is not like

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[77] Joseph Martínez Toledano, [Letter to Julian de Arriaga], Buen Retiro, 24 November 1754, AGI, Indiferente 1552, 368r.
[78] Ibid., 368r.
[79] José Manso de Velasco [to Marques de Ensenada], Lima, 3 December 1754, AGI, Indiferente 1552, fol. 417v.
[80] José Manso de Velasco, "Extracto de los informes hechos por el Presidente de la R[ea]l Audiencia de la Plata, y los Corregidores de la Paz y Zica Zica," Lima, [3 December 1754], AGI, Indiferente 1552, fol. 419r.

[the *quina*] from Loja."[81] In spite of the *corregidor* of Zica Zica's admission that "I cannot insure with certainty if [this *quina*] is inaccessible to the Portuguese lands," the Crown was convinced by Manso de Velasco's and the President of la Plata's argument that any *quina* traded by the Portuguese would be too degraded upon its arrival in Europe to be of any commercial value. In July 1755, the Viceroy of Peru acknowledged receipt of an order from the Minister of the Indies instructing the Viceroy to let the *quina* from Jungas enter into "commerce" so that the "regions in which this product is collected" could take advantage of the medicinal qualities of the bark and, possibly even, make some profit (*lucro*).[82]

The movement of the Viceroy of Peru's sample of *quina* from the forests of La Plata to the pharmacy in Madrid illuminates the culture of knowledge production in the early years of the *estanco de quina*. Several different groups of people with relevant knowledge and expertise were involved. Note that Viceroy Manso de Velasco relied on Jesuit missionaries and local officials in Mojos, La Plata and Zica Zica for knowledge about the cinchona bark and the potential of a trade developing. The Viceroy also relied on experts in Lima, such as Dr. Cosme Bueno at the university, to conduct preliminary tests of the quality and efficacy of this *quina*. Pharmacists and physicians connected to the Crown in Madrid conducted further examinations. The Crown and the Ministry of the Indies consulted with all of these informants as part of a broader survey of the *quina* resources of the empire but also as part of a process for deciding on how to manage this resource and whether its proximity to Portuguese territories presented a real threat. Thus, the circulation of *quina* samples put an extant imperial culture of knowledge production into action as the imperial

[81] Ibid.52, fol. 419r.
[82] José Manso de Velasco to Julian de Arriaga, Lima, 20 July 1755, AGI, Indiferente 1552, fol. 373r.

government coordinated local and learned expertise in pursuit of solutions to political and pragmatic concerns.

Just as examinations of samples of newly discovered cinchona trees drew learned experts into this imperial culture of knowledge production, so did examinations of samples from the shipments for the *estanco*. One case is especially instructive. At some point in 1756 or 1757, officials in Spain discovered that a recent shipment of cinchona bark was adulterated. We can only infer the date based on a report filed in 1757 by José Ortetga, a pharmacist in Madrid, who was asked to examine the bark and identify the cause of the adulteration of the shipment.[83] It was neither the first time Ortega had helped the Crown nor his first encounter with adulteration.

In the introduction to his report, Ortega explained, "I have gone various times to select *Quina* for ambassadors and other distinguished persons, to whom His Majesty has deemed it prudent to give this gift."[84] On these occasions, Ortega noted that he rarely found *quina* of "good quality." Instead, he found what he called "*Quinote*, which is an aggregation of thick barks, powder, and woodchips from the whole *Quina* tree."[85] Far from being surprised, he noted: "the adulteration of *Quina* is an old [practice] in America, and for this reason [*motivo*] this celebrated Medicament lost its credit."[86] As to the source of adulteration, Ortega pointed to the English factory in Portovelo, where he speculated that Thomas Blechiden, a merchant

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[83] José Ortega (d. 1761), according to Arthur Steele, was the founder and perpetual secretary of the *Academia de Medicina* in Madrid and served as "first pharmacists of the army." Ortega also served as director of the botanical garden at Migas Calientes founded by Ferdinand VI on October 21, 1755. In 1771, Ortega's nephew, Casimiro Gómez Ortega (1740-1818) would come to occupy the directorship of the Royal Botanical Garden, see: Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964), 31-2, 36-7

[84] José Ortega to Julian Arriaga, Madrid,17 May 1757, AGI, Indiferente 1552, fol. 471r.

[85] Ibid., fol. 471v.

[86] Ibid., fol. 472r.

probably for the South Sea Company, siphoned the good quality *quina* from the Spanish trade network. Since Ortega had never been to America, we might ask on what basis he made this assessment. In fact, Ortega's report draws heavily from the work of Charles Marie de la Condamine, the French naturalist who served on the joint French-Spanish expedition to Quito a few years earlier (1735-1744), observed the cinchona tree in the 1730s, and published a report in the journal of the French Academy of Sciences in 1738.[87]

Ortega's report represents a key moment in the development of the Crown's employment of learned experts in Madrid to address the problems of the *estanco de quina* especially the problem of adulteration. Also, if we assume that the impetus for this report derived from a recent adulterated shipment, this case must have been one of the first where the Crown recognized the adulteration of *quina* as a problem of the state. Although familiar with La Condamine's report and other texts on American nature, Ortega had never traveled to Spain's colonies or observed the cinchona tree *in situ*. Rather, through his consultations for the Royal Pharmacy and connections to the scientific community in Madrid, Ortega established himself as an authority on the natural world whose status as a learned expert derived not from direct experience with American nature, but from his training as a pharmacist and botanist, his knowledge of texts about American plants, and his proximity (social and physical) to the Spanish Crown.

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[87] Neil Safier, *Measuring the New World*; Antonio Lafuente and Antonio Mazuecos, *Los caballeros del punto fijo: ciencia, política y aventura en la expedición geodésica hispanofrancesa al virreinato del Perú en el siglo XVIII* (Barcelona: Serbal-CSIC, 1987); Antonio Lafuente and Eduardo Estrella, "Scientific Enterprise, Academic Adventure and Drawing-Room Culture in the Geodesic Mission to Quito," in *Cross Cultural Diffusion of Science: Latin America*, edited by Juan José Saldaña (Mexico City: Cuadernos de Quipu, 1987), 13-31.

Ortega did not let his audience with the Crown pass without promoting the utility of botany. In this way, he started to lay the foundations for a relationship between botany and empire that would only come to fruition two decades later.[88] As part of his report, he recounted the story of Joseph de Jussieu, a botanist who traveled with La Condamine.[89] According to Ortega, Jussieu, whom he described as "one of the Members [*Académicas*] of the Royal Academy of Sciences in Paris, a great doctor and Botanist," traveled to Loja at the invitation of the Viceroy not only to study the plant but also to instruct local merchants and *cascarilleros* on how to distinguish "true Bark from false."[90] In this way, Ortega rooted the credibility of Loja's *cascarilleros* and their bark in this educational encounter with a European botanist.

This tale focused the Crown's attention on adulteration as a problem of *fraud*. In retelling Jussieu's tale, Ortega was simultaneously giving an example of the utility of botany while ruling out the possibility of ignorance as a cause of the corruption. From Ortega's perspective, Jussieu's act of bestowing European knowledge on local merchants and bark collectors had dissipated their ignorance. The tale provided in effect a model of successful relations between science and the state. However, Ortega's plea for further involvement of botanists fell on deaf ears. Imperial officials in Spain were still heavily invested in a mode of natural knowledge production that relied upon the local knowledge and expertise of missionaries, merchants, bark collectors, and officials in South America. Nonetheless, Ortega's report is a good example of how early practitioners began to make the case for the utility of botany to the Spanish Empire. The Crown and its officials would not yield to this

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[88] See Chapter 4
[89] On Jussieu's botanical misadventures in South Americe, see: Neil Safier, "Fruitless Botany: Joseph de Jussieu's South American Odyssey," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 203-224.
[90] José Ortega to Julian Arriaga, 17 May 1757, AGI, Indiferente 1552, fol. 472r-v.

propagandizing until the late 1770s. For now, botanists and other learned experts shared space of expertise in the imperial culture of knowledge production with many other groups claiming expertise on the cinchona tree in particular and American nature in general.

Local Knowledge and Imperial Politics: the Case of Manuel de la Guardia

To further understand the culture of knowledge production embedded in Spanish imperial governance, let us consider a case of this culture in action, on which illustrates how the techniques and structures of knowledge production could be manipulated as much by officials in South America as by officials in Spain. This instance also illustrates the politics of knowledge involved in the *estanco de quina*. The Crown only wanted the best bark for its *estanco de quina*. At the same time, a contract to supply the *estanco* would mean a significant amount of economic security and activity to any region. In order to secure and maintain such a contract, merchants and local officials in a *quina*-producing region had to convince the Crown and the Royal Pharmacy that their bark was of superior quality. Thus, knowledge of the quality of *quina* had direct political and economic implications. In this case, we will see how a local official in Cuenca, Manuel de la Guardia, used manipulated this culture of knowledge production to undermine the authority of the Crown-appointed *corregidor* of Loja, Manuel Daza y Fominaya, in a bid to secure greater local authority over the *estanco* operation in Loja.

Table 1.1: Events and documents in the dispute between Manuel de la Guardia and Manuel Daza y Fominaya circa 1767

Year	Date	Event	Location
1751	August 27	Royal order issued proposing the *estanco de quina* and soliciting information from officials in South America.	Madrid
1753	June 4	Miguel de Santisteban submits his "Relación informativa práctica de la quina de la ciudad de Loxa" to the Viceroy of New Granada, Pedro Mesía de la Cerda.	Santa Fe de Bogotá
1753	November 4	José Manso de Velasco, Viceroy of Peru, submits his report on the *quina* trade to the Marques de Ensenada.	Lima
1766	August?	Manuel Daza y Fominaya arrives in Loja from Spain to serve as *corregidor*.	Loja
1767	(Summer)	Manuel de la Guardia, a treasury official from Cuenca, travels to Loja to investigate Daza y Fominaya's work with the *estanco de quina*.	Loja
1767	August	Manuel Amat y Juniet, Viceroy of Peru, informs Viceroy of New Granada of complaints from officials in Piura about the quality of Daza y Fominaya's shipments of cinchona bark.	Lima
1767	September	Manuel de la Guardia finishes his investigation in Loja and initiates his attack on Daza y Fominaya by sending a set of bark samples collected by the residents of Loja to the Minister of the Indies.	Cuenca
1767	September	Miguel de Muzquiz informs the Minister of the Indies of the urgent need for reform in the *estanco de quina* in light of the poor quality of the bark received in the annual shipments from Loja.	Madrid
1768	June	Viceroy Mesía de la Cerda receives news from the Minister of the Indies of the favorable review of La Guardia's bark samples (sent in September 1767). Minister of the Indies also endorses La Guardia's suggestion that members of the Town Council in Loja be put in charge of the *estanco de quina* and asks Viceroy Mesía de la Cerda to consider the proposal.	Santa Fe de Bogotá
1768	October	José Diguja, President of Quito, creates the post of "Magistrate of the Forests" (*juez privado de los montes*) as part of a general program for reforming the *estanco de quina*. Pedro de Valdivieso, a prominent resident of Loja, is appointed to the post.	Quito

A Context of Corrupted Shipments

La Guardia's dispute with Daza y Fominaya began in September 1767. At the time, Manuel de la Guardia was an official at the Treasury Office in Cuenca; Manuel Daza y Fominaya was the *corregidor* of Loja whose tasks included collecting, preparing, and sending the annual shipments of bark for the *estanco de quina*. In 1767, amidst complaints of the quality of the bark in Daza y Fominaya's shipments, La Guardia traveled to Loja to investigate. As a treasury official, he wanted to make sure that the Crown's money was being used properly. In a letter, La Guardia reported that Daza y Fominaya's *quina* was "useless and without value [*aprecio*]."[91] La Guardia's superiors in South America and in Spain undoubtedly would have been displeased to hear that Daza y Fominaya was wasting government funds. A more serious concern was that Daza y Fominaya was not providing the royal monopoly with the best bark.

La Guardia's critiques of Daza y Fominaya were taken seriously by officials in Spain and New Granada was in part because the *estanco* had experienced a series of adulterated and poor quality shipments of bark in the previous decade, contributing to a shortage of *quina* for the Royal Pharmacy. In fact, both the quantity and quality of the bark shipments had been problems since the early 1750s. Miguel de Santisteban had initiated the annual shipments from Loja in 1753 when he traveled to

[91] Manuel de la Guardia [to Julian de Arriaga?], Loja, 27 September 1767, AGI, Indiferente 1552, fol. 830r-v. Although Arriaga is not explicitly named on this copy of the letter, later correspondence from Julian de Arriaga to Pedro Mesía de la Cerda, Viceroy of New Granada, indicates that Arriaga received this letter or a letter very similar to this one from La Guardia. La Guardia also sent a copy of his findings directly to Pedro Mesía de la Cerda, Viceroy of New Granada, see: Manuel de la Guardia], [Copy of a part of a letter to the Viceroy of New Granada], [Loja], 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 25r-28v. Although neither the author nor the recipient of this text are indicated, the note from the scribe indicates that it was copied from a document in the "*secretaría de Camara*" of the Viceroy of New Granada. Similarity to the content to a letter that La Guardia sent to Spain around the same time suggests that La Guardia is the author.

the region to collect information for his report to the Viceroy of New Granada.[92] Before returning to Santa Fe de Bogotá, Santisteban prepared at least one shipment of 972 pounds of "colored or yellow *cascarilla* from the hills of Cajanuma and Uritusinga" packaged into six "*petacas*" (leather sacks).[93] Shipments for the *estanco de quina* then stalled a bit due to disruptions in trade and shipping due to Spain's involvement in the Seven Years War with Britain (1756-1763).[94]

Bark that made it across the Atlantic was in general poor quality. In August 1758, Diego Robles and Pedro Gonzalez, two inspectors at the port of Cádiz, reviewed eleven *petacas* of *quina* and found that three *petacas* contained bark that was "stale" and "without value," two others contained "thick bark which could only serve as a dyestuff," and the remaining six contained bark of "medium quality" worth no more than "three or four silver *reales*."[95] In April 1759, Francisco Perez Izquierda and José Pavón, at the Royal Pharmacy, tested eight "sacks" of *quina* (of unidentified origin other than coming from a royal warehouse in Madrid) and found that "all of it is

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[92] In a 1767 report, Ignacio de Checa, a former *corregidor* of Loja (r. 1761-1766) dated the first shipment of *quina* for the *estanco* to "1750 or 1751." He may have been thinking of the date of the royal order instead of the date of the first shipment, see: Ignacio de Checa to José Diguja, Quito, 10 August 1768, AHN/Q, Fondo Especial v. 24, No. 2858, fols. 59r-v.

[93] Ibid., fols. 59r-v. Checa explained that this first shipment consisted of "six *petacas*." Each *petaca* (leather sack) held six *arrobas* (twenty five pounds) plus twelve pounds of bark for a total of 162 pounds per *petaca*. The total shipment then was 972 pounds of *quina*. In reality, Santisteban's shipment was slightly less than this quantity. On June 8, 1753, the Viceroy of New Granada wrote to Marques de la Ensenada, in Spain, informing Ensenada that "four *petacas* of six *arrobas* of Quina" (600 pounds total) would shortly depart for Cádiz from Cartagena, see: José Pizarro, Marques de Villar to the Marques de la Ensenada, Santa Fe 8 June 1753, AGI, Indiferente 1552, fols. 302r-304r. The shipment left the port of Cartagena de Indias on a Dutch ship on September 7, 1753, see: Ignacio Sala, et. al. to Marques de la Ensenada, Cartagena, 7 September 1753, AGI, Indiferente 1552, fol. 379r.

[94] Franz A. J. Szabo, *The Seven Years War in Europe: 1756-1763* (Harlow: Pearson Education Limited, 2008); Daniel Marston, *The Seven Year's War* (New York: Routledge, 2001).

[95] Diego Robles and Pedro Gonzalez to Esteban José de Abaria, Cádiz, 22 August 1758, AGI, Indiferente 1552, fol. 501r. This bark was that of a private trader that the Crown was considering for requisition.

stale and totally useless."[96] The bark was summarily burned and the ashes used as a "salt" in the Royal Pharmacy. Also, in 1759, the President of Quito reported that Royal Officials in Panama were delaying a shipment of 1,000 pounds of *cascarilla* sent from Loja in April of 1758. As of February 1760, the Crown reported to Royal Officials in Portovelo (the main port on the east coast of Panama) that they still had not received the shipment of April 1758.[97]

When regular trade within the Spanish empire resumed in the early 1760s, the problem of poor quality shipments persisted. In March of 1766, the Marqués of Esquilache reported to Julian de Arriaga, Minister of the Indies, that in a recent shipment of twenty *petacas* of *cascarilla* (3240 pounds) only 4.5 *arrobas* (112.5 pounds) could be used by the Royal Pharmacy. At this point, officials in Spain pursued a technical solution to the problem. On March 15, Arriaga sent two orders to Pedro Mesía de la Cerda, Viceroy of New Granada. These instructed the Viceroy to take the necessary steps to improve the quality of the shipments of *cascarilla* and noted "the King wants to regulate chance [*suerte*] so as not to be exposed to the reparable contingencies of negligence."[98] The other order was more emphatic in its tone: "I advise Your Excellency [the Viceroy of New Granada] by order of the King to expand your resolutions so as to replace these shipments, at opportune times, from

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[96] Balthasar Ilgueta de Vigil [?] to the Conde de Valdeparaiso, Madrid, 20 April 1759, AGI, Indiferente 1552, fol. 528r-v.

[97] Marques de Selva Alegre, President of Quito to Julian de Arriaga, Quito, 6 March1759, AGI, Indiferente 1552, fols. 539r-540v; [Royal Order to the Royal Officials of Portovelo], Madrid, 19 February 1760, AGI Indiferente, 1552, fol. 552r. Raphael Vicente Garcia and Gerardo Joseph de la Sobreira, the Royal Officials at Portovelo, reported in December of 1760 that they sent a shipment of fifty-six *petacas* to Cartegena (de Indias) and any further delay was due to officials there, see: Garcia and Sobreira to Julian de Arriaga, Portovelo, 22 December 1760, AGI, Indiferente 1552, fol. 553r.

[98] Julian de Arriaga [to Pedro Mesía de la Cerda], Madrid, 15 March 1766, AGI, Indiferente 1552, fol. 766v.

Guayaquil."[99] From Guayaquil, the shipments were to be sent to Callao (or El Callado), Peru and then on to Cádiz via Cape Horn. This was recommended so as to avoid the detrimental effects of "the vapors of the land in Panama" – one of the justifications given by the Marqués de Esquilache for restricting the shipping routes available for the monopoly's bark.[100]

A month later, in June of 1766, the Marqués de Esquilache sent a note directly to the Viceroy of New Granada expressing his concern about bark shipped to Spain via Panama (Table 1.1). He first noted that "the King and his Chamber Physicians are in the Palace every day making the color run from my face over the lack of good *Quina* that the Royal Pharmacy is experiencing."[101] He further reported that recently the Royal Pharmacy had been forced to purchase *quina* from Marseilles (undoubtedly an embarrassment for the Crown). In his medical dissertation (c. 1765), Francisco de Paula Gallego described the "epidemic fevers" of the early 1760s, which invariably put pressure on the Crown's meager *quina* supplies.[102] The Marqués de Esquilache advised the Viceroy "by all imaginable means and with the usual precautions" to collect "the most exquisite *Quina* that can be found in that Kingdom and send it annually to this [Kingdom] with the level of quality [*proporción]* that there has been [previously] in the Royal Pharmacy."[103] Along with his note, Esquilache included a "recipe" (*receta*) from Diego Porcell, "Physician to His Majesty." It was a protocol on

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[99] Ibid., fol. 767r.
[100] Marqués de Esquilache to Julian de Arriaga, El Pardo, 4 March 1766, AGI, Indiferente 1552, fols. 762r-763v
[101] Marqués de Esquilache to Pedro Mesía de la Cerda, Madrid, 3 June 1766, AGI, Indiferente 1552, fol. 772r-v.
[102] Francisco de Paula Gallego, "Disertación medica del abuso de la Quina en las fiebras mesentericas," c. 1765, Archivo del Real Academia Nacional de Medicina (ARANM), legajo 6, documento 320.
[103] Marqués de Esquilache to Pedro Mesía de la Cerda, Madrid, 3 June 1766, AGI, Indiferente 1552, fol. 772v.

how "to select *Quina* bark and to conserve it so that it is not destroyed."[104] Porcell's recommendations included collecting the bark from a tree of "medium age" at the "opportune time" of the year (Porcell suggested "Autumn").[105] "The bark should be dried," he continued, "in the shade where it is exposed to the air." Finally, he recommended packing the dried bark in "sacks" (*corachas*) that would then be put into "barrels to protect [the bark] from humidity" which would be stowed in a dry place on the ship.[106]

Porcell's recipe shows that Spanish officials continued to cast the problem of adulterated shipments as a problem of knowledge as well as technique. Restricting the shipping routes was the technical solution; sending instructions to bark collectors in Loja was the knowledge solution. Porcell's recipe was intended to instruct bark collectors in the proper techniques for preparing the bark and, to a lesser extent, collecting it. Thus, imperial officials sought to extend the expertise and knowledge of a Spanish physician to Loja via the imperial bureaucracy. In August 1766, the Viceroy of New Granada forwarded Porcell's recipe to the new *corregidor* of Loja, Manuel Daza y Fominaya. A direct (but tenuous) link between a learned expert in Madrid and bark collectors in Loja was established. Such action would not be taken again until 1773.

While officials in Spain instructed their counterparts in South America to implement Porcell's recommendations, the Crown also asked the Viceroy of New Granada and his subordinates to implement their own reforms for improving the

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[104] Diego Porcell, "Receta," Aranjuez, 3 June 1766, AGI, Indiferente 1552, fol. 775r. If Porcell's prescription was not sent as an enclosure with Esquilache's note of June 3, it followed closely on the heals of Esquilache's note.

[105] Here, Porcell reveals his ignorance of local conditions in Loja. Bark collectors in Loja already knew (or were instructed by merchants) to collect bark during the summer months (April to August) to take advantage of the dry season, especially since the bark needed to be kept dry to preserve its medical virtue.

[106] Diego Porcell, "Receta," Aranjuez, 3 June 1766, AGI, Indiferente 1552, fol. 775r.

quality of the *quina* shipments. After all, Porcell's recipe was only a paragraph long. It focused primarily on the proper method of packaging the bark to protect it from humidity during its transatlantic voyage.[107] His only recommendation for harvesting (to choose bark from trees of "medium age") was not very specific, and said nothing about other important factors such as which type (or species) of cinchona tree to harvest the bark from or from which part of the tree to harvest the bark (branches vs. trunk; skinny vs. fat branches). Such details were left to the discretion of local experts in the *Audiencia* of Quito. Nonetheless, the Viceroy of New Granada highlighted the importance of improving the techniques of collection and preparation as evident in the three main causes of the poor quality of the bark shipments from Loja: "the delays in transportation," "not selecting [*quina*] from the most exquisite and mature Trees," and "carelessness in packaging it [*empetacarla*]."[108]

The slowness of communications meant that Porcell's instructions had a delayed effect. In August or September 1767, another shipment of poor quality bark from Loja arrived at the Royal Pharmacy. Two "assistants" (*ayudantes*) at the pharmacy were asked to examine "every *petaca*."[109] The results were not good. In general, the assistants found that the bark "was extremely poor quality mixed with rotten parts [*basura podrida y escamojos*] of the Plant and of other foreign Trees which are not *Quina*." Out of the 685 *arrobas* (17,125 pounds) of bark, only 30

[107] In part, Porcell's silence on the specific procedures of harvesting the bark could be a result of the fact that Porcell had never had direct experience of the cinchona tree and the harvesting of its bark.
[108] Pedro Mesía de la Cerda to the *corregidor* of Loja, Santa Fe, 27 August 1766, AGI, Indiferente 1552, fols. 794r-795v. A copy of this letter also exists in the National Archives in Ecuador (ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 67r-68v.
[109] Miguel de Muzquiz to Julian de Arriaga, San Ildefonso, 27 September 1767, AGI, Indiferente 1552, fols. 809r-v.

arrobas (750 pounds) were of sufficient quality for royal purposes.[110] Muzquiz expressed his displeasure in the strictest terms: "this omission and carelessness among the subaltern Ministers of His Majesty, who administer and send [bark] from the Indies, is as reprehensible and worthy of punishment as if they had transferred [the bark] from one *petaca* to another in order to steal it as in the case of those who transport the bark."[111] Muzquiz's rhetoric reflects the seriousness with which Spanish officials treated the problem of corrupted shipments. A month later, Julian de Arriaga, Minister of the Indies, relayed the bad news to the Viceroy of New Granada.[112]

Quina Contested: The Downfall of *Corregidor* Daza y Fominaya

Something was awry in the *estanco de quina,* and by 1767, officials in Spain had come to focus their attention on the operations in Loja. In August 1766, Manuel Daza y Fominaya arrived in Loja to take up the post of *corregidor*.[113] All eyes were

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[110] In other words, out of a shipment of 17,125 pounds of quina, only 750 pounds were useable. Thus, only 4.4% of the shipment was worth saving. This was not much of an improvement over the shipment examined in 1766 in which only 3.5% (112.5 out of 3240 pounds) of the cascarilla was useable.

[111] Miguel de Muzquiz to Julian de Arriaga, San Ildefonso, 27 September 1767, AGI, Indiferente 1552, fol. 810r. The full force of Muzquiz's ire is a bit difficult to render into English. The original reads: "Esta omisión y descuido en los Ministros subalternos de S[u] M[ajestad] que intervienen y la remiten desde Yndias, es tan reprehensible como punible la malicia que puede haver en los conductores en el caso de haverse transferido de una a otra Petaca para su canvio" (810r). In addition, Muzquiz's comment is indicative of the fact that the Crown and its officials were slowly becoming more aware of the possible problems in the production of quina as well as in the transportation of the bark.

[112] [Julian de Arriaga] to the Viceroy of New Granada, 28 October 1767, AGI, Indiferente 1552, fols. 825r-826v.

[113] There had only been two other *corregidores* of Loja since the creation of the *estanco de quina* in 1751. Like Daza y Fominaya and many other *corregidores* in colonial Latin America, they both had been appointees from Spain. The first *corregidor* was Pedro Manuel de Palacios. Records indicate that Palacios traveled to the Indies from Spain in June of 1753 which means that he probably took up the post of *corregidor* of Loja in the fall of that year. Palacios held the post for almost a decade until 1761 when Ignacio de Checa, his replacement, arrived. Checa held the post for only five years until 1766. "Expediente de información y licencia de pasajero a Indias de Pedro Manuel de Palacios, corregidor de Loja y Zamora en la provincia de Quito," 23 June 1753, AGI, Contratación 5495, N. 2, R. 14. Archival documents relating to the shipments of cascarilla made during the reign of Palacios have yet to be found. Some details of Palacios' involvement in the shipments of quina are

on him. After all, one of the main responsibilities of the *corregidor* was to oversee the preparation of the bark shipments for the *estanco*. For Daza y Fominaya, it must have been a daunting task. Like many other *corregidores* in colonial Latin America, he was an appointee from Spain who had never set foot in South America, let alone Loja, prior to his appointment. Suddenly, he was in charge of collecting bark from a tree that he had never seen in a community to which he was an outsider in an unfamiliar land. It was a common experience for Crown-appointed *corregidores* from Spain.[114]

Daza y Fominaya was well aware of the importance of his post and the precariousness of his authority in Loja. In June 1766, just a few months before Daza y Fominaya's arrival, the Viceroy of New Granada had sent a letter to the previous *corregidor* of Loja regarding the poor quality of previous bark shipments and demanding that future shipments be improved. Then, in August, the Viceroy sent Porcell's "recipe" to Daza y Fominaya with an order that *quina* be collected and prepared according to these instructions. At the same time that he was receiving pressure from his superiors, Daza y Fominaya encountered resistance from the residents of Loja. Things did not go smoothly for the new *corregidor*.

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mentioned in a report to José Diguja, President of Quito, made by Ignacio de Checa, Palacios' antecessor as *corregidor* of Loja, in August of 1768, see: Ignacio de Checa to José Diguja, Quito, 10 August 1768, AHN/Q, Fondo Especial v. 24, No. 2858, fols. 59r-62v. Checa left Spain in November of 1758 but, apparently, did not take up the post of *corregidor* of Loja until 1761 as he noted in his 1768 report to José Diguja, see: "Expediente de información y licencia de pasajero a Indias de Ignacio de Checa, corregidor de Loja y Zamora," 10 November 1758, AGI, Contratación 5501, N. 2, R. 22.

[114] A *corregidor* was a royally-appointed official that provided a direct link between a local region and the central Spanish government. The office had its roots in the political structures of medieval Castile and was used widely by Ferdinand and Isabella. J.H. Elliott compares a *corregidor* to a Justice of the Peace except that Spanish *corregidores* were more independent of the locality and more tied to the central government than a Justice of the Peace, see: J. H. Elliott, *Imperial Spain, 1469-1716* (New York: Penguin, 2002 [1963]), 91-94; Mark A. Burkholder and Lyman L. Johnson, *Colonial Latin America* (Oxford: Oxford University Press, 2004), 87-8 and 274-5.

A decree from March 1767 reflects the tensions that Daza y Fominaya experienced with the local community. He noted a "lack of respect" for an earlier decree regarding the "prohibition of the extraction of *cascarilla*, and [of] the cultivation [*fomento*] of the Trees that produce it."[115] In addition, "some Individuals" of the "Town Council [of Loja]" had promulgated an "attack" on the new *corregidor* by seeking "to overturn his resolutions."[116] Such actions were probably part of the usual negotiations in colonial society upon the arrival of a new official from Spain. As his language suggests, Daza y Fominaya interpreted the situation as a threat to his authority as *corregidor*. He responded with stricter regulation of the extraction of *quina* and even deployed the "troops of His Majesty" to enforce these decrees.[117] For example, in March 1767, Daza y Fominaya issued a decree (*auto*) that effectively squelched all private trade in *quina* especially that from the hills of Uritusinga and Cajanuma that were considered to produce the very best bark.

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[115] Manuel Daza y Fominaya, "Auto," 28 February 1767, Loja, ANH/Q, Fondo Especial, vol. 63, no. 2700, fol. 79r. Given the date of this decree, Daza y Fominaya may have had in mind a recent dispute he had with Gregorio Espinoza de los Monteros, a cascarilla merchant in Piura, and Bernardo Santoyo de Aguirre, a resident in Loja and Monteros' representative there. Apparently, Daza y Fominaya had previously issued a decree prohibiting the extraction of cascarilla and embargoed the cascarilla in Santoyo's possession in the order to use it for a shipment of cascarilla to the Royal Pharmacy. Espinoza and Santoyo disputed the embargo with three main arguments: 1) they had been given "certification" by members of the town council in Loja; 2) since the cascarilla was not from the hills of Uritusinga or Cajanuma, it was not good enough for the Royal Pharmacy; 3) the cascarilla had been harvested before Daza y Fominaya had assumed the post of *corregidor* of Loja and issued the decree. Testimony from others involved in the dispute suggested that Daza y Fominaya had issued the embargo as revenge against Gregorio Espinosa de los Monteros because Espinosa refused to sell a "silver chair" to Daza y Fominaya at the absurdly low price of forty pesos, see: "Autos de Don Gregorio Espinoza de los Monteros con el Corregi[do]r de Loja sobre Cascarilla," 22 January 1767, ANH/Q, Cascarilla, Caja 1, Expediente 3.

[116] Manuel Daza y Fominaya, "Auto," 28 February 1767, Loja, ANH/Q, Fondo Especial, vol. 63, no. 2700, fol. 79r.

[117] Manuel Daza y Fominaya, "Auto," Loja, 23 April 1767, ANH/Q, Fondo Especial, vol. 63, no. 2713, fols. 211v-212v. Daza y Fominaya had written to the Viceroy of New Granada in March of 1767 requesting that the Viceroy order the President of Quito to send the troops to Loja, see: Manuel Daza y Fominaya to the Viceroy of New Granada, Loja, 15 March 1767, ANH/Q, Fondo Especial vol. 63, no. 2700, fols. 73r-78v.

"All permanent residents [*vecinos estantes*] and inhabitants [*abitantes*] of whatever class, estate, or condition, which exist," Daza y Fominaya stated in his decree, "cannot send peons to extract the *cascarilla* [of this province]."[118] Only those with "permission" (*licencia*) could harvest the bark. In addition, licensed individuals were required "to bring [it] to the town council where they will be paid from the Account of His Majesty [*Cuenta de Su Magestad*]." Daza y Fominaya promised a "just price" on the condition that the bark was "the best from Uritusinga and Cajanuma without any mixing [in] of White, *Cuchurilla* and *Crespilla* barks" which were considered "worthless" and "bad quality." "Nobody," Daza y Fominaya continues, "should dare to destroy [*perder*] the Trees, with or without malice, or to disturb the paths [along which the bark] is carried in these territories, because [individuals] do not have a right to said Trees."[119] Furthermore, any residents or inhabitants, who were in possession of previously harvested bark, were ordered to inform the *corregidor* of their holdings. Finally, violators of the decree were threatened with "being declared Unfaithful Vassals of His Catholic Majesty," "exile from these Provinces," and "four years in the prison, at the Castle in Chagres."[120] Through such regulations Daza y Fominaya attempted to assert his authority as *corregidor* while at the same time emphasizing the need to acquire the very best bark for the *estanco*. The effect on the residents of Loja was more drastic. For many in the region, trading in the bark was their only source of income.

Such coercive tactics ultimately resulted in a shipment of forty-eight *petacas* (7,776 pounds) of *quina*. Daza y Fominaya took every opportunity to remind the Viceroy of the difficulties he faced in producing the shipment. He was not shy about

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[118] Manuel Daza y Fominaya, "Auto," 28 February 1767, Loja, ANH/Q, Fondo Especial, vol. 63, no. 2700, fols. 79r-79v.
[119] Ibid., fol. 79v.
[120] Ibid., fol. 79v.

engaging in hyperbole to describe his achievement. In October 1767, he informed the Viceroy that he had "done more in the service of God, the King, and the Republic in one year than all the *corregidores* of America since the conquest."[121] For the Viceroy and officials in Spain, what mattered most however was the quality of the bark in the shipment. It was on this issue that Daza y Fominaya was vulnerable.

Local officials in the *Audiencia* of Quito recognized this vulnerability and used it against him. The official most responsible for Daza y Fominaya's downfall was Manuel de la Guardia, a treasury official in Cuenca. Since La Guardia could not challenge the new *corregidor*'s political authority, he sought to undermine Daza y Fominaya's authority by other means. In September 1767, La Guardia launched a campaign to discredit Daza y Fominaya's knowledge of *quina* by emphasizing the *corregidor*'s inability to produce shipments of superior quality. Given the importance of *quina* as a colonial commodity and the recent problems with the quality of shipments, it was a shrewd and effective strategy. La Guardia's timing was one reason why his campaign against the *corregidor* succeeded.

Other officials in Quito and Peru had recently made a number of complaints about *quina* from Loja sent by the *corregidor*. For example, in August 1767, Manuel Amat y Juniet, Viceroy of Peru, informed the Viceroy of New Granada of complaints from royal officials in Piura. Piura was an important market town in northern Peru where many *quina* producers and traders from the surrounding inland provinces brought their bark for sale. It was also in Piura that *quina* shipments in Loja received the first of many inspections by royal officials as they traveled from the forest to the Royal Pharmacy in Madrid. In 1767, these officials informed the Viceroy of Peru that

[121] Manuel Daza y Fominaya to the Viceroy of New Granada, Loja, 6 October 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 41v.

the bark was in such "poor condition" that most of it was "useless."[122] In response, officials in Piura had asked an official (*fiscal*) at Payta, the port nearest to Piura, to have this bark examined by "experts" (*peritos*) in order to "separate that which is of satisfactory [*saneada*] quality from the rest."[123] Meanwhile, in Madrid, the royal pharmacists discovered that only a fraction (4.4%) of the *quina* in a recent shipment was useable for royal purposes.[124] Although Daza y Fominaya was not *corregidor* when this bark would have been collected, he was the one – as current holder of the post – held responsible for the failure.

Some time in the summer of 1767, Manuel de La Guardia, the treasury official from Cuenca, went to Loja to investigate "the quality of the *cascarilla* that Manuel Daza y Fominaya is sending to the Royal Pharmacy." La Guardia presumably initiated this investigation in response to existing complaints about the *corregidor* possibly even those from the officials in Piura. In a report addressed directly to the Minister of the Indies, Julian de Arriaga, La Guardia wrote: "I found [the bark] to be useless and without value [*aprecio*]."[125] La Guardia relayed his findings to Viceroy Mesía de la Cerda as well. Reports from other officials corroborated La Guardia's assessment. For example, Mathias de Valdivieso y Cespedes, a royal official at Payta, sent to the Viceroy the results of an inspection of Daza y Fominaya's *quina* by two "experts." In their report (*dictamen*), the two experts, Fernando Lazuregui y Landa and Juan López de la Peña, noted that although they found "good *cascarilla*," "it was covered in dust, [mixed] with a lot of useless bark [*basura*] and broken pieces

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[122] Manuel de Amat y Juniet to Pedro Mesía de la Cerda, Lima, 16 August 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 35r.
[123] Ibid., fol. 33r-34r.
[124] See n. 110.
[125] Manuel de la Guardia [to Julian de Arriaga?], Loja, 27 September 1767, AGI, Indiferente 1552, fol. 830r-v. Although Arriaga is not explicitly named on this copy of the letter, later correspondence from Julian de Arriaga to Pedro Mesía de la Cerda, Viceroy of New Granada, indicates that Arriaga received this letter or a letter very similar to this one from La Guardia.

[*costrón*], such that it was necessary to shake [the boxes] and to clean [the bark] until *canutillo* [large curled pieces of bark] remained as separate from the bad [bark] and the broken pieces [*costrónes*]."[126] Ultimately, such reports in conjunction with existing complaints about the quality of the bark in the monopoly's shipments reflected badly on Daza y Fominaya's ability to secure the best bark for the King. Moreover, according to the structure of the imperial culture of knowledge production, all of these reports converged at the office of the Viceroy of New Granada in 1767 and 1768.

Manuel de la Guardia further used this culture of knowledge production for his own ends by sending a *quina* sample to the Minister of the Indies. The sample accompanied La Guardia's letter revealing that Daza y Fominaya's bark was "useless and without value." The bark traveled in a "small box" and La Guardia described it as "a sample of the legitimate *cascarilla*, [which has been] proven [*experimentada*] by the practices of this place [Loja]." He also made reference to "the Love and Loyalty that I have witnessed in the Town Council and residents [*vecinos*] of [Loja]" to increase the credibility of those that produced the sample.[127] Thus, La Guardia hoped to favorably contrast the "love and loyalty" of the residents of Loja and the superior quality of their bark with the inability of Daza y Fominaya and the inferior quality of his bark. It was the imperial culture of knowledge production that made this possible. The structures for collecting samples of bark already existed and in this case, they allowed for a local treasury official in Cuenca to be in direct contact with

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[126] Mathias de Baldivieso y Cespedes and Manuel de la Guardia to the Viceroy of New Granada, Payta, 27 October 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 31r-32r. As for the two "experts," existing documents do not indicate how someone achieved this status. Lazuregui y Landa was a scribe in Payta. The documents do not indicate López de la Peña's profession. A copy of their report was later submitted by Manuel Daza y Fominaya as part of his effort to demonstrate the quality of his work on the cascarilla shipments for the Royal Pharmacy, see: Fernando Lazuregui y Landa, "Certificación," Piura, 23 November 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 71r-v.

[127] Manuel de la Guardia to Julian de Arriaga, Loja, 27 September 1767, AGI, Indiferente 1552, fol. 830r-v.

the Minister of the Indies through the mediation of the Viceroy of New Granada. Moreover, if the Minister of the Indies had any doubts about the reports from officials in Quito and Peru, La Guardia's sample could serve as physical evidence that local officials and residents in Loja were capable of produce bark of better quality than that produced by the *corregidor*. It was another shrewd tactic in which La Guardia recognized the importance of empirical knowledge in the political culture of Spanish imperial governance. [128]

La Guardia's empirical gamble paid off. A note scrawled at the bottom of the copy of La Guardia's letter in the *Archivo General de Indias*, states that the sample "has been found to be of very good quality."[129] These results would not reach the Viceroy of New Granada until the fall of 1768. Meantime, there were other matters to attend to. The Viceroy was already aware of local dissatisfaction with Daza y Fominaya and his bark. Although Daza y Fominaya consistently defended the quality of his shipments, he repeatedly complained to the Viceroy of difficulties with the residents of Loja and the treasury officials in Cuenca.[130] Wearied by the constant

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[128] As noted by Antonio Barrera, Spanish imperial government had fostered and institutionalized empirical practices since the sixteenth century, see: Barrera-Osorio, *Experiencing Nature*, Chapter 2.

[129] Manuel de la Guardia to Julian de Arriaga, Loja, 27 September 1767, AGI, Indiferente 1552, fol. 830v. The note was most likely written by Arriaga himself or one of his scribes at the Ministry.

[130] As with the previous *corregidores* of Loja had done, Daza y Fominaya was required to pay these costs himself and then submit a report of the costs to the treasury office in Cuenca so that he could be reimbursed. At some point, he had asked the officials in Cuenca for 1,000 pesos to cover the costs of collecting, packaging, and shipping the cascarilla. For various reasons, including some dispute over Daza y Fominaya's tax-collecting practices and an exchange of personal insults in letters between Daza y Fominaya and two of the officials in Cuenca, Gabriel Delgado and Manuel de la Guardia, officials in Cuenca refused to pay the 1,000 pesos. Thus, Daza y Fominaya further felt that his authority as *corregidor* was undermined. While the documentary record is incomplete, there is no indication that the payment was ever made.

Two vitriolic letters remain from correspondence by Daza y Fominaya and La Guardia regarding an unspecified matter which, nonetheless, was serious enough for each to threaten the other, see: Manuel de la Guardia to Manuel Daza y Fominaya, Cuenca, 21 February 1767, ANH/Q, Fondo Especial, vol. 63, no. 2700, fols. 82r-v; Manuel Daza y Fominaya to Manuel de

string of complaints from Spain, local officials, and Daza y Fominaya, the Viceroy and his advisors were anxious for resolution. In the fall of 1768, a letter arrived from the Minister of the Indies arrived that offered a way out.

In this letter, Minister Arriaga informed the Viceroy that only thirty *arrobas* of the last shipment of 685 *arrobas* of *cascarilla* were useful to the Royal Pharmacy. He advised the Viceroy to "once again reflect on the attention that this matter deserves" and to "give the warnings that you have given previously" in order to incite the *corregidor* and bark collectors in Loja to improve the quality of the shipments.[131] Arriaga's letter was emphatic but vague. He clearly wanted a change to the status quo but offered no specific advice on how to do so. In addition, Arriaga appeared ignorant of local critiques of Daza y Fominaya's ability to produce superior quality *quina*.

In light of this emerging cluster of problems on both sides of the Atlantic, the question of what action to take remained. Fortunately, the process that revealed these problems with the *corregidor* of Loja and the *cascarilla* shipments also produced a possible solution. Not surprisingly, in many cases, it was the same people who registered complaints about the *cascarilla* shipments that offered

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la Guardia, Loja, 15 March 1767, Fondo Especial, vol. 63, no. 2700, fols. 83r-84r. The letters in which Daza y Fominaya brags of his work for the Crown and lack of recognition and compensation include: Manuel Daza y Fominaya to Pedro Mesía de la Cerda, Loja, 15 March 1767, ANH/Q, Fondo Especial, vol. 63, no. 2700, fols. 73r-78v; Manuel Daza y Fominaya to Pedro Mesía de la Cerda, Loja, 6 October 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 39r-50r. He also reiterated his claim to the 1,000 pesos in testimony (*informe*) to the President of Quito, José Diguja. Diguja solicited Daza y Fominaya's testimony as part of an effort, in 1768, to reorganization the *estanco* and improve the quality of the shipments of cascarilla, see: Manuel Daza y Fominaya, "Informe," [Loja], 17 August 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, 63r-66v. In addition to the correspondence between La Guardia and Daza y Fominaya, other documents relating to the Royal Officials of Cuenca denial Daza y Fominaya's request for 1,000 pesos include: Gabriel Delgado and Manuel de la Guardia [to unidentified recipient], Cuenca, 13 May 1767, Fondo Especial, vol. 63, no. 2713, fols. 209r-210r; Dr. Cisne, [Report to the Junta de la Real Hacienda], Quito, 19 August 1767, Fondo Especial, vol. 63, no. 2713, fol. 213r-v.

[131] Julian de Arriaga to Pedro Mesía de la Cerda, 28 October 1767, AGI, Indiferente 1552, fol. 826r.

solutions to the problems. Suggestions for solutions came from the geographical termini of the *estanco* in Madrid and the *Audiencia* of Quito. This time they converged in Spain at the office of Julian de Arriaga, Minister of the Indies in Cádiz.

One set of suggestions came from Miguel de Muzquiz, Secretary of Finance. Muzquiz included them in his letter of September 23, 1767 that also informed Arriaga of the small amount of useable *quina* in the shipment that arrived at the Royal Pharmacy in August. Speaking for the King, Muzquiz ordered Arriaga to send the most exact [*estrechas*] orders to the Viceroys and Captains General advising [them] that, before it is packed into *petacas*, the quality of the *quina* ought to be carefully examined by experienced [*practicas*] and intelligent persons." *Petacas* were to be stamped "with a Mark" to indicate that they had been reviewed by "experienced and intelligent persons" and to be accompanied by "a letter [*carta de aviso*] from the Viceroy, Capitan General or any other Person who is sending the shipment." This letter was to provide information on the "quality of the product" and the "location where it grows." Muzquiz also instructed Arriaga to send any other "warnings or resolutions" which Arriaga deemed necessary to "prevent any manner of omission or fraud."[132]

Arriaga received a complementary set of suggestions on how to solve these problems when Manuel de la Guardia's letter and *quina* sample arrived a few months later.[133] La Guardia confirmed Muzquiz's observation that the monopoly's shipments were no good. He also explained to the Minister of the Indies that the *corregidor* of Loja was to blame. As for a solution, La Guardia asked for Arriaga's "consideration that the town council [in Loja] be put in charge of the annual shipment of this

[132] Miguel de Muzquiz to Julian de Arriaga, San Ildefonso, 23 September 1767, AGI, Indiferente 1552, fols. 809r-812v.
[133] La Guardia sent his letter to Arriaga in September 1767. Travel time for letters from South America to Spain varied from a few weeks to a few months depending on

product."[134] "It is known," continued La Guardia, "[that] the *corregidores* pay little attention [to this matter] as does the present [*corregidor*, Manuel Daza y Fominaya]."[135] As to the sample of bark collected by the "town council and residents" of Loja that he sent, La Guardia felt that Arriaga's "verification" of the sample would reveal the "difference" in quality between La Guardia's sample and the *cascarilla* "sent by this *corregidor*.[136] While the two *cascarilla*s were not directly compared, tests did reveal that the sample La Guardia was of good quality. In La Guardia's letter, Arriaga found a specific recommendation on who should be the "experienced and intelligent persons" to examine the bark in Loja as proposed by Muzquiz in his letter – the town council (*cabildo*) and residents (*vecinos*) of Loja. Officials on both sides of the Atlantic – Muzquiz and La Guardia – embraced local expertise as a solution to the problem of quality. La Guardia went one step further and openly rejected the expertise and ability of the *corregidor*, who was not a local expert but a Crown appointee from Spain.[137]

In June 1768, Pedro Mesía de la Cerda, Viceroy of New Granada, received a letter from the Minister of the Indies with news of the favorable review of La Guardia's bark sample. The Viceroy also learned that La Guardia had suggested to Arriaga that "future collection [of *quina*] should be the charge of the secular Town Council and residents of Loja."[138] The Crown endorsed the proposal. "The King has ordered me," Arriaga wrote, "to advise Your Excellency that you should consider if this approach

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[134] Manuel de la Guardia to Julian de Arriaga, Cuenca, 27 September 1767, AGI, Indiferente 1552, fol. 830r-v.
[135] Manuel de la Guardia to Julian de Arriaga, Cuenca, 27 September 1767, AGI, Indiferente 1552, fol. 830r-v.
[136] Ibid., fol. 830r-v
[137] This was true of all the *corregidores* of Loja in the 1750s and 1760s. Thus, local tensions between Creole colonial officials and colonial officials from Spain played a role in the realization of the structure and operations of the *estanco de quina*.
[138] Julian de Arriaga to the Viceroy of New Granada, Aranjuez, 13 June 1767, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 99r-v.

would be preferable."[139] This suggestion was consistent with plans that Mesía de la Cerda had already set in motion. In March 1768, the Viceroy explained to the President of Quito, José Diguja, that recent reports from "Royal Official in Cuenca, Manuel de la Guardia" and "Royal Officials of Piura" had convinced him that the *corregidores* "are not able to arrange everything" in spite of repeated statements to the opposite effect from Manuel Daza y Fominaya.[140] Furthermore, La Guardia had already suggested to Viceroy Mesía de la Cerda that the Town Council and residents of Loja be put in charge of the collection and preparation of the monopoly's bark shipments. The Viceroy, in turn, asked the President of Quito to "collect the necessary reports [*informes*] regarding this matter and [to make] the resolutions most convenient for the immediate observation of what His Majesty wants."[141] In light of recent news that the most recent shipment to the Royal Pharmacy was mostly useless for royal purposes, the Viceroy of New Granada was especially anxious to make improvements to the shipments. He explained to the President of Quito: "I have been repeatedly entrusted by the Court with the sending of the best [*más selecta*] *cascarilla* from the Province of Loja to the Royal Pharmacy in order to replace the shipments that previously were rejected."[142]

Ultimately, José Diguja, the President of Quito, realized La Guardia's proposal in a modified form. As ordered by the Viceroy, Diguja investigated that matter in the summer of 1768. Ironically, he solicited reports from Manual Daza y Fominaya, the acting *corregidor* of Loja, and Ignacio Checa, Daza y Fominaya's predecessor. The very same officials that the Viceroy, La Guardia and others (not to mention the record

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[139] Ibid., fol. 99r
[140] Pedro Mesía de la Cerda to the President of Quito, Santa Fe, 5 March 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 51r-52r.
[141] Ibid., fols. 51v.
[142] Ibid., fols. 51v.

of the poor quality of *cascarilla* shipments) had suggested lacked the competency to oversee this project. In a decree issue on July 21, 1768, Diguja noted that one of the problems with previous policy on the *estanco de quina* was that it lacked specific recommendations concerning the "quality and quantity of *cascarilla* that should be sent annually, the method for preparing [the bark] with the greatest security, the prices at which to purchase [that bark] and the funds with which to pay [the costs]."[143] It was this information that Diguja wanted from Daza y Fominaya and Checa.[144]

Daza y Fominaya and Checa answered all of José Diguja's inquiries. Of interest here is their conceptions of what produced the deterioration and poor quality of the *quina* and what recommendations they had for improving the quality of the *cascarilla* shipments. As to the former, Checa pointed to the fact that, by the time the bark arrived at the Royal Pharmacy or was used by the pharmacists, it was old (*por la antigua dispo[sición*]). He also noted that the *petacas* were subject to exposure to "humidity" and much rough handling when being "loaded and unloaded" in the ports of "Paita, Panama, Causes and Portovelo" and while traveling over land.[145] Not surprisingly, since Checa focused on the material aspects of the deterioration of *cascarilla*, he offered a material solution to the problem. He advised Diguja that more secure shipments could be achieved by shipping the bark in "boxes wrapped in

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[143] José Diguja, "Auto," Quito, 21 July 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 57r-58v.

[144] Diguja asked for Checa and Daza y Fominaya to provide information on the following subjects: "orders received from the Viceroy of New Granada and those received by any predecessors, how [these orders] were put into practice, what accounts for the deterioration and poor quality of this product when it is examined in Spain, how could the bark be prepared to make it more stable [*segura*] during shipment; what quantity and weight has previously been order to be sent in the annual shipments; what funds have been used to pay the costs; at which prices [the bark] has been bought and at which prices it should be bought; and include whatever else should be known for this Service for His Majesty," see: José Diguja, "Auto," Quito, 21 July 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fols. 58r.

[145] Ignacio de Checa, "Informe," Quito, 10 August 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 60v.

leather [*cuero*]" and with greater attention to "protecting [the bark] from humidity" while in transit.[146] Checa also recommended that the "Mark of the King should be stamped on the seams of the leather and on the corners of the box," a measure which Checa may have naively hoped would prevent others from opening the boxes to remove the good bark for the Royal Pharmacy and replacing it with bark of lesser quality.[147] Finally, regarding the shipping route, Checa recommended that the shipments be made via the port of Guayaquil which "has more security and formality than the port of Paita" and "is subject to the same government as Loja."[148] Moreover, Checa felt that the path from Loja to the port of Tumbes, from which the bark was shipped to Guayaquil, was "shorter" and with "less risk."[149]

Whereas Checa focused mainly on the material conditions of the *cascarilla* shipments, Daza y Fominaya treated the "deterioration and bad condition" of the bark as a social problem and a problem of expertise. In particular, Daza y Fominaya, whose first shipment of *cascarilla* had yet to arrive Madrid, placed the blame squarely on his predecessors. He explained that his predecessors "constantly mixed good and bad [bark]," in addition to buying their bark from "Haciendas" without "looking at it or examining it."[150] Unlike Checa, Daza y Fominaya did not make any concrete suggestions for improving the *cascarilla* shipments. He claimed that his methods were most effective and made sure to remind Diguja of that as well as of the fact that he still had received no monetary compensation for his efforts. In addition, Daza y Fominaya was careful to demonstrate his knowledge of *cascarilla* to Diguja and even

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[146] Ignacio de Checa, "Informe," Quito, 10 August 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 61r.
[147] Ibid., fol. 62r.
[148] Ibid., fol. 62r.
[149] Ibid., fol. 62r.
[150] Manuel Daza y Fominaya, "Informe," 17 August 1768, ANH/Q, Fondo Especial, vol. 24, no. 2858, fol. 64v.

offered some critiques of the "recipe" sent by Diego Porcell, the King's physician, in 1766.[151] Effectively, it was Daza y Fominaya's last chance to defend his record and abilities in producing *cascarilla* shipments for the Royal Pharmacy.

We do not know whether Daza y Fominaya was able to redeem his individual reputation as a producer of *cascarilla*. He did, however, retain his post as *corregidor* of Loja – undoubtedly to the dismay of Manuel de la Guardia and the residents of Loja. While La Guardia and others were unsuccessful in fully unseating Daza y Fominaya, they were successful in sowing the seeds of doubt regarding the ability of the *corregidores* of Loja to produce shipments of good-quality *cascarilla* for the Royal Pharmacy. In October 1768, José Diguja, President of Quito, created a new officer to oversee the collection and preparation of the annual shipments of *quina*, the o "\Magistrate of the Forests" (*Juez Privativo de Montes*), and appointed a local resident of Loja and member of a prominent merchant family, Pedro Xavier de Valdivieso y Torres, to the post. It is, perhaps, no coincidence that in other letters to other colonial officials informing them of Valdivieso's appointment that Diguja describes him explicitly as "resident (*vecino*) of Loja."[152] With the appointment of Valdivieso, both Muzquiz and La Guardia saw their suggested program fulfilled. The Crown and Muzquiz saw the realization of their suggestion that an "experienced and intelligent" person be appointed to examine the bark at the point of collection. Meantime, La Guardia's request that the "town council and residents of Loja" be put in charge of annual shipment was, partially fulfilled, in that the commission was now out of the hands of *corregidor*, an outsider, and into the hands of a *vecino* of Loja, Pedro de Valdivieso y Torres.

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[151] Ibid., fol. 65r.

[152] On October 5, 1768, José Diguja sent out a series of orders and letters to various colonial officials throughout the *Audiencia* of Quito. The original drafts of these letters are at: ANH/Q, Fondo Especial, vol. 68, no. 2897, fols. 146r-155v.

Conclusion

The Spanish imperial bureaucracy was not only a structure of imperial governance but also a culture of knowledge production. This culture had several distinctive characteristics. It was hierarchical in the sense that imperial officials relied upon subordinates and informants who had direct experience and first-hand knowledge with the society and nature in South America. When the King asked his Viceroy for information on *quina*, the Viceroy solicited information in turn from local officials in *quina*-producing regions. This culture of knowledge production was also empirical in that members of the culture valued the knowledge and expertise of those people with first-hand experience of the phenomena in question. Finally, this culture was political in that problems of knowledge were often directly connected to questions of imperial policy. Moreover, since imperial officials consulted a wide variety of informants, the reports sent to the Viceroys and Minister of the Indies often reflected a range of political and economic interest groups in South America. In the case of the *estanco de quina*, solicitations for information about the cinchona tree and the bark were almost always accompanied by solicitations for recommendations and opinions on how to best manage this natural resource.

It is important to emphasize that none of these features of this culture of knowledge production were new in the mid eighteenth century. When officials in Spain sent out the order to establish the *estanco de quina* in 1751, these officials and their counterparts in South America could draw upon structures and techniques of knowledge production that were centuries old. As Antonio Barrera has argued, the Spanish imperial enterprise had valued empiricism (broadly defined) and institutionalized the production of knowledge since the early decades of the sixteenth century with the creation of the *Consejo de Indias* (Council of Indies) and the *Casa de*

Contratación (House of Trade). Certainly King Charles III and his reformist ministers brought a new, even enlightened, sensibility to imperial governance. This sensibility – derived from their time governing the Kingdom of Naples and interacting with a milieu of some of Europe's first political economists – stressed first-hand observations in the surveying of resources available to further economic recovery or progress. Yet, when Charles III and his ministers took charge of the Spanish Empire in 1759, they would have found an existing imperial bureaucracy that shared some of their sensibilities. The task was simply to employ this existing culture of imperial knowledge production to new ends. The early decades of the *estanco de quina* illustrate how such sensibilities meshed with the existing culture of knowledge production in practice.

Two main techniques were employed in this imperial culture of knowledge production – the collection of reports and the collection of samples, and in both cases imperial officials in Spain sought variety. They wanted reports and information from several officials in the imperial bureaucracy in South America representing a range of interests and locations. In the early years of the *estanco de quina*, the Crown achieved this goal as represented in reports and distinctive recommendations solicited by Miguel de Santisteban, an agent of the Viceroy of New Granada, and José Manso de Velasco, Viceroy of Peru. The Minister of the Indies and the royal pharmacists also sought variety in the samples of *quina* collected and submitted by officials in South America. Through comparative analysis, the royal pharmacy hoped to identify all the varieties of *quina* in the empire and classify it according to its medical virtue. Such activities were vital to the *estanco de quina* through which the Crown hoped to obtain and monopolize the best bark in the empire. In terms of the goal of surveying all existing resources and soliciting a variety of opinions, the Crown

and its imperial bureaucracy fostered a culture of knowledge production that engaged a range of experts and informants in the *estanco* project.

Use of a wide range of experts and informants had important consequences. The second part of this chapter has shown that, while the imperial culture of knowledge production was in some sense hierarchical, it was not centralized. Manuel de la Guardia's campaign against Manuel Daza y Fominaya, *corregidor* of Loja, shows how local officials in South America could use the imperial culture of knowledge production to their own ends. While the Crown used various techniques to survey the *quina* resources in the empire, La Guardia used these same techniques – especially the sending of samples – to undermine the authority of Daza y Fominaya. Since knowledge of *quina* was political by virtue of the fact that the techniques of knowledge production were so closely associated with the techniques of governance in the imperial bureaucracy, La Guardia was able to employ knowledge of *quina* as a political tool. At the same time that he valorized the knowledge and expertise of the Town Council and residents of Loja, he waged a campaign against the knowledge and expertise of Loja's *corregidor*. Of course, La Guardia was aided by existing concerns and problems with the adulteration of the bark; but, it was his concerted efforts to manipulate the culture of knowledge production that further convinced imperial officials – the Minister of the Indies and the Viceroy of New Granada – that local expertise was the solution to the problems with the quality of the monopoly's shipments. This turn to local expertise was not only integral to the imperial culture of knowledge production but also shaped the way in which science was integrated into the *estanco de quina* and the Spanish Empire at large.

Chapter 2

Imperial Science Inaction:

Cooperation and Contention in the *Estanco de Quina* (c. 1773)

In January 1773, the Royal Pharmacy in Madrid received a shipment of ninety-four boxes containing over 15,000 pounds of *quina* from Loja. Before anything could be done with the bark, the pharmacists first had to determine whether it was good enough for royal purposes. This task was crucial to enforcing the Crown's standards of quality for the bark. Indeed, since the creation of the *estanco de quina*, the Royal Pharmacy had played a vital role in the project. The pharmacy not only inspected the annual shipments but also analyzed samples of *quina* from previously unknown sources to determine their medical and commercial viability. In the 1750s and 1760s, the Royal Pharmacy increasingly sought to play a larger role in the *estanco* and to establish in effect a monopoly on the authority to produce knowledge about *quina*.

In 1773, after deeming the most recent shipment from Loja as entirely useless, the pharmacists attempted to impose their knowledge and expertise directly on officials and bark collectors in Loja by sending a set of instructions for collecting the bark and a bark sample. This effort failed. While *quina*, as an object, circulated easily, knowledge about it did not. In this chapter, I argue that the reason for this failure is that the pharmacy's knowledge was specific to European court culture and had little efficacy in Loja where bark collectors and local officials operated primarily within the commercial culture of the Atlantic World. This episode, thus, reveals another crucial aspect of the imperial culture of knowledge production in the early

decades of the *estanco*: the specificity of knowledge to the heterogeneous sociocultural contexts that comprised the Spanish empire. With the corrupted shipment of 1773, we begin the analysis of those factors that contributed to the fragility and failures of science in the Spanish imperial enterprise.

This chapter also addresses the possibilities and problems associated with the "transfer and mediation of expertise" in the early modern world.[1] Even within the common culture of the imperial knowledge complex that stretched from Madrid to Loja, learned experts – in this case pharmacists – still had difficulty in transferring and imposing their expertise to other parts of the Spanish Empire. The variable values and tastes embedded in different sociocultural contexts of the broader Atlantic World were the key.

The Royal Pharmacy in the Imperial Culture of Knowledge Production

The Royal Pharmacy might seem an unlikely institution of imperial science especially since its original and primary function was to make medicaments for the royal family.[2] While the medieval Iberian Kings often had pharmacists associated with their courts, it was Philip II who institutionalized their position in 1594 with the establishment of the Royal Pharmacy.[3] Organizationally, the Royal Pharmacy was part of the Royal Chamber (*Real Cámara*) a subdivision of the Royal Household (*Real Casa*). The official responsible for managing the Royal Chamber and by

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[1] I have borrowed this phrase from: Alison Sandman and Eric H. Ash, "Trading Expertise: Sebastian Cabot between Spain and England," *Renaissance Quarterly* 57 (2004), 813-846.
[2] M. de Pilar García de Yébenes Torres, *La Real Botica durante el reinado de Felipe V (1700-1746)*, PhD Dissertation (Universidad Complutense de Madrid, 1994); Carmen Sánchez Tellez, *Estudio histórico de la botica del Palacio como institución Real*, PhD Dissertation (Universidad de Granada, 1979); M. E. Alegre Pérez, *Veinticinco años en la Real Botica (1783-1808)*, PhD Dissertation (Universidad Complutense de Madrid, 1976).
[3] The establishment of the Royal Pharmacy was likely a part of Philip II's broader project of supporting the sciences, see: David C. Goodman, *Power and Penury: Government, Technology, and Science in Philip II's Spain* (Cambridge: Cambridge University Press, 1988).

extension the Royal Pharmacy was the *Sumiller de Corps* or Chamberlain. "*Sumiller de Corps"* was primarily an honorific title and the duties of managing the Royal Chamber took a backseat to the Chamberlain's primary function as advisor to the King. Nonetheless, the Chamberlain, as the royal advisor most responsible for the pharmacy, became a key figure in the discussion and direction of the *estanco de quina* as well as a mediator between the Crown and the variety of experts engaged in the monopoly project.

On medical matters, the Royal Pharmacy answered to the most senior *médico de cámara* or Chamber Physician. In theory, royal pharmacists were only allowed to produce and dispense medicaments prepared according to the recipes and prescriptions of the senior Chamber Physician. In practice, the senior Chamber Physician merely provided a signature to recipes and prescriptions prepared by the other physicians and surgeons of the Royal Chamber. While the pharmacists had some autonomy in the purchasing and stocking of the raw materials of which medicaments were made, the senior Chamber Physician was required to oversee the purchase of especially rare, delicate, or valuable compounds such as bezoar stones, aloe (*leño de aloe*) and *almizcle* (musk).[4]

According to its original charters, the Royal Pharmacy had two main functions that were to be performed at two separate locations. While one part of the pharmacy was to be located "within the palace for the use and enjoyment of the King and his family," the other part of the pharmacy was to be located in the servants' quarters of the Royal Household. While the first location was exclusively for royal usage, the second location was for common usage (*del común*) and served the servants of the

[4] Maria del Pilar García de Yébenes Torres, *La Real Botica durante el reinado de Felipe V (1700-1746)*, PhD Dissertation (Madrid: Universidad Complutense de Madrid, 1994), 31.

Royal Household as well as a certain number of "the poor and persons in need."[5] Only the palace location of the Royal Pharmacy was ever established. Nonetheless, the pharmacy retained its dual mission of providing for both Crown and commoners. Indeed, the uses to which the Royal Pharmacy put its *quina* in the later eighteenth century also reflected this dual mission. However, the extent to which the Royal Pharmacy was required to serve the broader community was poorly defined in the original charters. As a result, royal pharmacists, often sought clarification from the Chamberlain and the Crown regarding which servants they should attend to and how much they should contribute to outside organization, such as convents and hospitals.[6]

The Royal Pharmacy acquired additional functions in seventeenth and early eighteenth centuries. For example, Philip IV (r. 1621-1665) put the Royal Pharmacy in charge of the inspection of all pharmacies, herbalist shops, and druggist shops of Spain. In the early eighteenth century, the Crown ordered the royal pharmacists to perform examinations of specific medicinal substances. Many private pharmacists in Spain produced their own "medicinal waters" for use in the preparation of medicaments. The Crown now expected the Royal Pharmacy to monitor the techniques used by private pharmacists and the quality of the medicinal waters produced.[7] Similarly, in the 1740s, the Royal Pharmacy was enlisted to perform inspection and analysis of brandy (*aguardiente*) and other liquors of which the Crown had a monopoly.[8] María del Pilar García de Yébenes explains that the royal pharmacists were asked to ascertain the "exact identity" of the substances in these

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[5] Ibid., 34. García de Yébenes draws this distinction from a document from December 6, 1594 entitled "Instrucción para que la Botica nueva de S.M. pueda comenzar a servir y dar recaudo."
[6] Maria Esther Alegre Pérez, "La asistencia social en la Real Botica durante el último cuarto del siglo XVIII" *Boletín de la Sociedad Española de Historia de Farmacia* 139 (1984): 199-211.
[7] The Royal Pharmacy had its own distillery and produced "medicinal waters" in house. García de Yébenes Torres, *La Real Botica durante el reinado de Felipe V*, 182, 185-214.
[8] Ibid., 181.

royal monopolies.[9] Thus, the Crown's decision to involve the Royal Pharmacy in its *estanco de quina* may have emerged out of the pharmacy's existing relationship with the Crown's other monopolies.

In the eighteenth century, the Royal Pharmacy also acquired the task of studying the medicinal properties of American plants, animals, and minerals.[10] This shift occurred as part of the Crown's renewed attention to American nature as a resource to be exploited exclusively by Spain.[11] As to the role of science in this new program, José Campillo y Cosío, one of Spain's foremost Enlightenment thinkers, proposed that:

> Intendants [in America] ought to send samples to Spain of anything contained in these vast countries, be it herb, bush, root, tree, fruit, resin, mineral, rock, etc… that is known to have some special virtue for health, taste or other uses through established tradition and confirmation by experience, so that the most able Chemists can analyze them and identify any object that would prove to be as useful to the Monarchy, as spices are to the Republic of Holland…[and] that would produce for the Royal Treasury more than the mines of both [New Spain and Peru].[12]

Campillo's plan made science an integral part of assessing the utility and commercial potential of American nature. Moreover, the science was to be done in Spain rather than America. As a result, just as in the commercial exploitation of American nature,

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[9] Ibid., 181.
[10] M. E. Alegre Pérez, "La Real Botica y las especies americanas (siglo XVIII)," *Boletín de la Sociedad Española de Historica de la Farmacia* 140 (1984), 225-244.
[11] Daniela Bleichmar, "Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire," in *Science and Empire in the Atlantic World*, eds. James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 225-252**;** Stanley J. Stein and Barbara H. Stein, *Silver, Trade, and War: Spain and America in the Making of Early Modern Europe* (Baltimore: Johns Hopkins University Press, 2000).
[12] José del Campillo y Cosío, *Nuevo Sistema de Gobierno Económico para América*, ed. Manuel Ballesteros Gaibrois (Oviedo: Grupo Editorial Asturiano, 1993 [1789]), 177-178. Although Campillo y Cosío's work was not published until 1789, it circulated in manuscript among elites and government officials in the early 1740s. In addition, Bernardo Ward included a substantial part of Campillo y Cosío's work in his *Proyecto económico: en que se proponen varias providencias dirigidas a promover los intereses de España* (Madrid: Joachin Ibarra, 1779).

American officials would provide European scientists with the raw materials from which to produce new natural knowledge.

Recently, historians of science have incorporated such perspectives and activities into their conception of science as part of Europe's colonial and imperial enterprises. For example, Londa Schiebinger defines colonial science as "science done in Europe that drew on colonial resources in addition to science done in areas that were part of Europe's trading or territorial empires."[13] In a recent essay on Nicolas Monardes, a sixteenth-century physician in Seville who collected and publicized information on New World medicaments, Daniela Bleichmar observes, "colonial science was often enacted at home, not abroad."[14] Such conceptions emphasize the symbiotic relationship between the scientific and colonial enterprises in the early modern world. Many studies have shown how key sites of modern and early modern science (botanical gardens, museums, learned societies) and their associated practices (observation, collection, classification, experimentation) contributed to and benefited from colonial and commercial enterprises.[15] In many ways, this conception of colonial science "at home" resembles Bruno Latour's notion of "centres of calculation."[16] In keeping with his view of science as composed of

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[13] Londa Schiebinger, "Forum Introduction: The European Colonial Science Complex," *Isis* 96 (2005), 52-55.

[14] Daniela Bleichmar, "Books, Bodies, and Fields: Sixteenth-Century Transatlantic Encounters with New World Materia Medica," in *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, eds. Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), 83-99.

[15] Delbourgo and Dew, eds., *Science and Empire*; Schiebinger and Swan, eds., *Colonial Botany;* Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven: Yale University Press, 2000); D. P. Miller and P. H. Reill, eds., *Visions of Empire: Voyages, Botany, and Representations of Nature* (Cambridge: Cambridge University Press, 1996); Lucile Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Garden* (New York: Academic Press, 1979).

[16] Bruno Latour, "Chapter 6: Centres of Calculation," in: *Science in Action: How to follow scientists and engineers through society* (Milton Keynes: Open University Press, 1987), 215-257. For an example of application of Latourian theory and method to an eighteenth-century

networks of agonistic human and non-human actors, Latour describes "centres of calculation" as sites that produce knowledge, and dominate other sites at a distance, by accumulating and comparing experiences of people, places, events and things that have been rendered immutable, mobile and combinable.[17]

By the mid eighteenth century, the Royal Pharmacy in Madrid became such an institution of imperial science. The Crown wanted the pharmacy to monitor known drugs produced in Spain and to provide analysis of novel drugs. New World nature proved to be a veritable pharmaceutical El Dorado in the early modern period offering all kinds of new medicaments to European physicians, patients, and entrepreneurs.[18] As a result, many of the novel drugs analyzed and classified at the pharmacy came from Spain's American colonies. Beyond providing a means for processing the influx of new compounds, the Royal Pharmacy also served as the Crown's primary means for combating the deceit and duplicity of the various quacks and mountebanks who took advantage of medicament's novelty to cast it as the next wonder drug. Since at

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institution of natural science, see: Emma C. Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000).

[17]Notably, Latour draws on John Law's work on Portuguese commercial expansion in the fifteenth and sixteenth century. In addition, Latour employs the eighteenth-century scientific expedition of La Perouse as a key example. Both cases – La Perouse's expedition and Portuguese commercial expansion – are key examples of early modern science in colonial contexts. See: John Law, "On the methods of long-distance control: vessels, navigation and the Portuguese route to India," in: *Power, Action and Belief: A New Sociology of Knowledge?* edited by John Law (London: Routledge & Kegan Paul, 1986), 234-263; John Law, "On the Social Explanation of Technical Change: The Case of the Portuguese Maritime Expansion," *Technology and Culture* 28 (1987), 227-252.

[18]Antonio Barrera, *Experiencing Nature: the Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006); Paula De Vos, "Research, Development, and Empire: State Support of Science in the Later Spanish Empire," *Colonial Latin American Review* 15 (2006): 55-79; Bleichmar, "Books, Bodies, and Fields"; Paula De Vos, "An Herbal El Dorado: the Quest for Botanical Wealth in the Spanish Empire," *Endeavour* 27, no. 3 (2003): 117-121; Antonio Barrera, "Local Herbs, Global Medicines: Commerce, Knowledge and Commodities in Spanish America," in: *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe*, eds. Pamela H. Smith and Paula Findlen (New York: Routledge, 2002), 163-181; José María López Piñero and María Luz López Terrada, *La influencia española en la introducción en Europe de las plantas americanas (1493-1623)* (Valencia: Instituto de Estudios Documentales e Historicos sobre la Ciencia, 1998).

least the fifteenth century, the Spanish Crown had had a keen interest in knowing and regulating the trade in medicaments and new American drugs were easily folded into this project.[19] Thus, the Crown had both the motivation and the means to make its Royal Pharmacy a key site for producing knowledge about American nature.

The pharmacy's involvement with *quina* and the royal monopoly is indicative of such developments. As early as 1736, the Crown ordered royal officials in Cádiz, Spain's main Atlantic port in the eighteenth century, to commandeer *quina* recently arrived from America and send it to the pharmacy in Madrid.[20] In the 1740s, royal pharmacists bypassed these officials and sent their requests for medicaments, in which *quina* figured prominently, directly to officials in Spanish America.[21] When the Crown first suggested the monopoly in 1751, it asked the pharmacy to assess all known and new varieties of *quina* in order to determine which the Crown should monopolize. As discussed in the previous chapter, the Crown also asked officials in America to collect and submit samples of the different varieties of cinchona bark in their regions.[22] In June 1753, the Viceroy of New Granada sent samples of bark from the Province of Cuenca, which was just north of Loja (Map I.1). Since *quina* was one

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[19] Paula De Vos, "The Art of Pharmacy in Seventeenth- and Eighteenth-century Mexico," PhD Dissertation (University of California, Berkeley, 2001).

[20] In a series of letters, Francisco Varas y Valdes, an official in Cádiz, reports on his efforts to secure various quantities of good quality *quina* for the "Pharmacy of Your Majesties," see: Francisco Varas y Valdes to José Patiño, Cádiz, 24 April, 14 May, and 23 May 1736, AGI, Indiferente 1552, nn.

[21] "Memoria de Generos para la Botica del Rey N[uest]ro S[eñ]or que se crian en el Reyno de México," San Ildefonso, 30 September 1745, AGI, Indiferente 1552, fols. 50r-51v; "Memoria de Generos Medicinales del Reyno del Peru y provincias immediatas," San Ildefonso, 30 September 1745, AGI, Indiferente 1552, fols. 60r-61v; "Memoria de Generos para la Botica del Rey N[uest]ro S[eñ]or que se crian en el Reyno del Perú y provincias immediatas," Buen Retiro, 24 November 1746, AGI, Indiferente 1552, fols. 22r-23r; "Memoria de Generos para la Botica de el Rey N[uest]ro S[eñ]or que se crian en México," Buen Retiro, 24 November 1746, AGI, Indiferente 1552, fols. 24r-25r; Royal Order to José Manso, Viceroy of Peru, "para que envie Quina, Calaguala y los demas Generos que le estan prevenida anteriormente", Madrid, 14 October 1747, fols. 46r-47v; Royal Order to Juan Francisco Guemes y Horcasitas, Viceroy of México, Madrid, 14 October 1747, AGI, Indiferente 1552, fols. 89r-90r.

[22] Royal Decree, Madrid, 27 August 1751, AGI, Indiferente 1552, fols. 343r-347v.

of the main exports of the region, the Viceroy hoped that bark from Cuenca could be used to supply the monopoly and that an examination its "virtues" by "the most skillful Botanists of the court" in Madrid would "dispel the preference for [*quina*] from the Mountains of Caxanuma near Loja."[23] Other samples arrived from the Viceroyalty of Peru in December 1753.[24]

Such developments show how the Royal Pharmacy functioned as a site of imperial science. At the same time that the pharmacy relied on colonial officials to collect and send bark samples, the Crown relied on the royal pharmacists to assess the medical utility of different kinds of cinchona bark. As an "obligatory passage point" where all *quina* for the Crown was collected and examined, the pharmacy had much influence over the credibility and circulation of different kinds of *quina* in the Spanish Atlantic. Moreover, the results of their examinations had political and economic consequences.[25]

Officials in South America were well aware of the weight that a favorable decision by the Royal Pharmacy carried. As a result, some sought to use the pharmacy's authority to their own ends. The Viceroy of New Granada, for example, suggested that a positive assessment of bark from Cuenca would promote trade in that province. As for the pharmacists, such mobilization of officials in Spain's American territories was crucial. Unlike other Spanish institutions of imperial science such as the Royal Botanical Garden, the Royal Pharmacy did not send its own agents

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[23] José Alonso Pizarro, Marques de Villar, to Marques de Ensenada, Santa Fe, 8 Junio 1753, AGI, Indiferente 1552, fol. 302v. Pizarro noted that he was waiting for "more [quina] from different places" (303r).

[24] José António Manso de Velasco to the Marques de la Ensenada, Lima, 23 December 1753, AGI, Indiferente 1552, fols. 364r-367r.

[25] Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay," in: *Power, Action and Belief: A New Sociology of Knowledge?*, edited by John Law (London: Routledge and Kegan Paul, 1986), 196–233.

to collect and observe American nature *in situ*.[26] Instead, the pharmacists waited for *quina* and other medicaments from America to come to them via the imperial bureaucracy.

Cooperation: The Royal Pharmacy and Pedro de Valdivieso in the late 1760s

This relationship between the Royal Pharmacy and officials in South America was in many instances cooperative and cordial. Consider the case of Pedro de Valdivieso y Torres. In 1768 as part of the administrative shake up of the *estanco de quina* after the disastrous shipments of *corregidor* Manuel Daza y Fominaya, José Diguja, the President of Quito, had created the new office of Magistrate of the Forests (*Juez Privátivo de los Montes*) in Loja.[27] The Magistrate's sole purpose was to oversee the collection, preparation and packaging of cinchona bark for the monopoly's annual shipments. Diguja appointed Pedro de Valdivieso to the post in response to pressures and complaints from local officials about *corregidor* Daza y Fominaya (Chapter 1). According to these officials, Daza y Fominaya was unfit to oversee the preparation of the annual shipments because he was an appointee from Spain and lacked sufficient knowledge and experience with *quina*. Valdivieso, in contrast, had grown up in Loja and was a member of a prominent merchant family with experience in the *quina* trade. In his first few years as Magistrate of the Forests, Valdivieso worked closely with the Royal Pharmacy and relied upon the expertise of the pharmacists.

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[26] In the late eighteenth century, the Crown supported several botanical expeditions under the direction of the Royal Botanical Garden, see: Bleichmar, "Visual Culture;" Alejandro R. Díez Torre et al., eds., *La ciencia española en ultramar. Actas de las I Jornadas sobre <<España y las expediciones científicas en América y Filipinas>>* (Madrid: Doce Calles, 1991); Iris Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions* (Seattle: University of Washington Press, 1981).

[27] José Diguja to Pedro de Valdivieso, Quito, 5 October 1768, ANH/Q, Fondo Especial, box 24, vol. 68, no. 2897, fols. 151r-154r.

Valdivieso's work with the Royal Pharmacy can be described as cooperative (rather than coercive) mainly because Valdivieso's own expertise was not dependent upon the Royal Pharmacy. As a result, Valdivieso was an ideal candidate to serve as an expert advisor to the President of Quito in the same way that pharmacists (and later botanists) in Madrid served as expert advisors to the Crown. In order to understand Valdivieso's role as an expert and his relationship with the Royal Pharmacy, we first need to consider the nature of his relationship with the President of Quito, José Diguja. In his first few years as Magistrate of the Forests, Valdivieso solidified and extended his expertise on *quina* in a number of ways.

In November 1768, a month after his appointment to the post, Valdivieso initiated a survey of the existing *quina* resources in Loja. He was especially interested in the quantity and quality of cinchona trees in the forests on two hills – Cajanuma and Uritusinga. These hills were considered the sources of the best of the best bark, so, collecting bark from these hills was essential to providing the Royal Pharmacy with superior *quina*. Consider a decree issued in Loja in December 1768 in which Valdivieso extended his title: "Private Magistrate for the Maintenance (*yntendencia*) of *Cascarilla* for the Royal Pharmacy and Conservation of the Hills of Uritusinga and Cajanuma."[28] Valdivieso was the first to recognize that conservation of the best trees was crucial to the production of the best bark. Surveying the cinchona forests in Loja was thus central to the execution of his duties; it was also essential to strengthening his status as an expert. The knowledge gleaned from this survey would give him unique insight into the problems and practicalities of

[28] Pedro de Valdivieso, "Decreto," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 105r-106r. This document, which will be discussed later, was a decree regarding the trade in cascarilla in Loja based on the findings of Valdivieso's eight explorers.

administering the *estanco de quina* in Loja. Valdivieso's survey did, indeed, yield important information: cinchona tree were becoming increasingly scarce.

Just as his superiors looked to him for local knowledge of *quina*, Valdivieso employed his subordinates in the survey – eight "explorers," who were the "most experience (*practícos*) in the Knowledge of the aforementioned hills."[29] In this way, Valdivieso extended hierarchical organization of the imperial knowledge culture. He also replicated the political nature of imperial knowledge complex since he had asked his explorers to collect "100 *quintales*" of bark while conducting their surveys. This bark was to be used for the next shipment of the Royal Pharmacy. As in other parts of the Spanish imperial bureaucracy, knowledge and governance were the simultaneous products of one enterprise.

For the most part, the explorers returned with bad news.[30] For example, Carlos Xaramillo reported that, after traveling by mule and on foot for three days and covering ten "leagues," he did not find "*cascarilla* trees of reasonable maturity."[31]

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[29] Ibid., fols. 105r-106r. This description of the explorers is drawn from this decree which was issued after Valdivieso had been made aware of their findings. The explorers were all "residents" (*vecinos*) of Loja with years of experience with cascarilla and the hills of Uritusinga and Cajanuma. For example, Manuel de Mora, one of the explorers, claimed that of his thirty-nine years, thirty of these were spent working in these two hills. Valdivieso instructed each of his explorers to follow a different pathway in their wanderings and to examine any stands of cascarilla that they encountered. From the initial group of eight "explorers" contacted by Valdivieso, the numbers quickly to swelled fifteen "explorers" as the original eight invited friends and relatives along probably for conversation and company as they wandered the hills around Loja. They all departed Loja on November 28, 1768 and spent three days exploring.

[30] Shortly after their return, six of the explorers gave testimony before Validivieso and Casimiro Castilla, a royal scribe. These testimonies included: Carlos Xaramillo, "Testimonio," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 109v-110r; Pedro de Abarca, "Testimonio," Loja, [3 December 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110r-v; Manuel de Mora, "Testimonio," Loja, [3 December, 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110v-111r; Pedro Calderon, "Testimonio," Loja, 5 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 111r-v; Fernando Calderon, "Testimonio," Loja, [5 December, 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 111v-112r; Alberto de Leon, "Testimonio," Loja, 6 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, 112r-113r.

[31] Carlos Xaramillo, "Testimonio," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 109v-110r.

Pedro de Abarca observed that he could not find "even the smallest tree of good-quality *cascarilla*."[32] Others told a similar story. As Manuel de Mora explained, the stands of cinchona trees had been "cut down" or "clear cut" (*talado*) such that there was a "scarcity of *cascarilla* forests."[33] Similarly, Fernando Calderon reported that he found "piles of cut and de-barked branches" while Alberto del Leon reported finding branches "skinned and cut" which he took as "signs that there have been many people" in these (supposedly royal) hills extracting *cascarilla*.[34] In addition, Xaramillo told Valdivieso, "shacks had been built" in these hills undoubtedly to serve as temporary housing for illicit bark collectors. Testimonies suggested that human intervention had caused the utter ruin of the *cascarilla* forests of Uritusinga and Cajanuma. While Abarca conjectured that bark bought and sold by "Indians and whites" from Loja could have only come from these hills, since there were no other hills in the vicinity with *cascarilla*, Xaramillo placed the blame more broadly on "free trade" (*libre comercio*).[35] The other explorers confirmed this vision in their testimonies as they point out that there were no other hills with *cascarilla* in the vicinity (*recinto*) of Loja such that the bark traded recently in Loja could have *only* come from the royal hills of Uritusinga and Cajanuma.

All hope was not lost. Respondents reported finding, amongst the destruction, several "very young" cinchona trees. While the trees were too young to have their bark harvested for immediate shipment, the explorers suggested that these young

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[32] Pedro de Abarca, "Testimonio," Loja, [3 December 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110r-v.
[33] Manuel de Mora, "Testimonio", Loja, [3 December, 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110v-111r.
[34] Fernando Calderon, "Testimonio," Loja, [5 December, 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 111v-112r; Alberto de Leon, "Testimonio," Loja, 6 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, 112r-113r.
[35] Carlos Xaramillo, "Testimonio," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 109v-110r; Pedro de Abarca, "Testimonio," Loja, [3 December 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110r-v

trees would be ready for harvesting in three to five years.[36] Thus, Uritusinga and Cajanuma could become productive hills in a matter of years. In the meantime, however, Valdivieso had to solve two problems – where to get the *cascarilla* for the immediate shipments for the Royal Pharmacy and how to protect these hills so as to avoid any further scarcity of cinchona trees in the region. In early December 1768, Valdivieso issued a series of decrees (*autos*), which effectively established a moratorium on the commerce in bark from Loja.[37] He declared: "no one, regardless of estate, quality and condition can extract *cascarilla* from the hills of Cajanuma and Uritusinga including the hillsides of Parucato, Villonaco and Guangora," and, "it [is] absolutely prohibited to extract, sell, or buy [*cascarilla*] in the vicinity of the City [Loja] and up to five leagues [around the city]."[38] As punishment for violations, "whites" were to receive "a fine of twenty five *pesos*," "two months in prison," and "the loss of

[36] Carlos Xaramillo suggested that the trees would be ready in "three or four years" while Pedro de Abarca thought that the trees could be ready in "a couple of years" and Pedro Calderon speculated that Valdivieso would have to wait "four or five years," see: Carlos Xaramillo, "Testimonio," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 109v-110r; Pedro de Abarca, "Testimonio," Loja, [3 December 1768], ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 110r-v; Pedro Calderon, "Testimonio," Loja, 5 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 111r-v.

[37] Valdivieso issued three decrees in total. Here, I will focus on the first one as it is the most detailed. Moreover, the second decree from December 5 merely reinforces what his December 3 decree stated. See: Pedro de Valdivieso, "Auto," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fols. 105r-106r; Pedro de Valdivieso, "Auto," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fol. 109r; Pedro de Valdivieso, "Auto," Loja, 5 December 1768, ANH/Q, vol. 67, no. 2858, fols. 107r-v.

[38] Pedro de Valdivieso, "Auto," Loja, 3 December 1768, ANH/Q, Fondo Especial, vol. 67, no. 2858, fol. 105v. In this decree, Valdivieso reported to the people of Loja that his "explorers" had found Uritusinga and Cajanuma "clear-cut [*talados*] and without fully mature cascarilla of such that it will be difficult to produce in this year and the following [years] 100 *quintales* [of cascarilla] let alone half that amount." In order to "prevent the lack of this product" and to insure that the existing cinchona tree achieve "the maturity and other qualities specified in the Instructions" from José Diguja, Valdivieso ordered that "Merchants, residents, and inhabitants in this City [Loja] and the Villages of Malacatos and Vilcabamba and [any other] dealers and merchants in cascarilla are not able to buy or sell it within this City [Loja]." Valdivieso also pointed out that, since cascarilla is not found on any other hills in the precinct (*recinto*) of Loja, "the Indians and Spaniards, on account of the proximity, must have extracted and sold the cascarilla from these prohibited hills." In these activities, all parties had "broken the Mandates of their Superior since they had not been stopped by the repeated published orders prohibiting cutting of and commerce in cascarilla from these hills."

all *cascarilla*" which would be given to the Royal Pharmacy; "Indians or Mulattos" would suffer "loss of cascarilla," "100 lashes," and "one month in prison."[39]

Still, Valdivieso faced the problem of how to secure *cascarilla* for the immediate supply of the Royal Pharmacy, so he ordered that anyone in possession of *cascarilla* should make it manifest, "within two days" of the publication of the decree, so that "the quantity and quality could be assessed." Consequently, Valdivieso would take "the best in order to serve a contribution to the upcoming shipment."[40] For their bark, owners would be "paid at the going rate in cash (*plato de contado*)."[41] Valdivieso hoped to buy any existing *cascarilla* from local merchants in order to produce the next shipment for the Royal Pharmacy in Madrid. This decree presented bark merchants with a choice. On the one hand, they could sell their *cascarilla* to the Crown, via Valdivieso, at the "going rate" with the caveat that they would have to make the Crown and its representatives aware of the quantity and quality of their stores. On the other hand, merchants could keep their *cascarilla* possessions a secret and try to clandestinely trade it or transport it out of Loja. In the latter case, if caught, the merchant would have to give all of his *cascarilla* to the Crown without any financial reparation.

Valdivieso's early survey of the cinchona forests of Loja fit with the imperial culture of knowledge production. Through sending out expert explorers into the forest, Valdivieso was able to increase his own knowledge and expertise. In addition, the results of this survey – the revelation of the scarcity of cinchona trees – formed the basis of a new policy of restricting the cinchona trade. Thus, the knowledge was

[39] Ibid., fol. 105v, 106r.
[40] Ibid., fol. 105v.
[41] Ibid.

wholly political as it formed the basis of Valdivieso's authority and policies of governance.

As the scarcity of cinchona trees loomed large, the President of Quito further confirmed Valdivieso's expert status by turning to Valdivieso for advice on one particular solution to the problem. President Diguja had praised Valdivieso's "resolutions" on the cutting, selling, and buying of *cascarilla* by private individuals.[42] Yet, he inquired about the possibility of using a type of *cascarilla* known as *costrón* which came from the "trunk [of the tree] or the upper half of the trunk." According to his letter to Valdivieso, Diguja had gotten the idea of using this type of *cascarilla* from reports of usage of cinchona bark by indigenous peoples. This proposal represented a significant divergence from current trends in the *quina* trade. In the late 1760s, merchants and consumers tended to prefer bark from branches especially thin ones.[43] Diguja reported to Valdivieso:

> I have been assured here that those natives do not treat their illnesses with *cascarilla* from re-grown branches nor [do they use *cascarilla*] from the thinnest [parts] of the Tree. [Instead, they use *cascarilla*] from the trunk or the upper half of the tree which they call *costrónes* and consider most efficacious and with which they have experienced the best effects.[44]

Diguja asked for Valdivieso's advice on the "certainty" of using *costrón*. He also asked that Valdivieso send "two boxes, indicating them in the Invoice [of the next

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[42] José Diguja to Pedro de Valdivieso, Quito, 8 February 1769, ANH/Q, Fondo Especial, vol. 72, no. 2972-3, fols. 194r-v.

[43] Luz del Alba Moya Torres, *La arbol de la vida: Auge y crisis de la cascarilla in la Audiencia de Quito, siglo XVIII* (Quito: Facultad Latinoamericana de Ciencias Sociales Sede Ecuador, 1994), 50-51. Moya Torres identify three main epochs of preferences for different types of cinchona bark. In the first epoch, from the 1630s to c. 1700, there was little knowledge of the different species of trees and different types of bark from the different parts of the tree so the only preference was for cinchona bark from Loja. In the second epoch (c. 1700-1740), Moya Torres explains, *quina roja* (red quina) was considered the best while merchants and consumers had a preference for "fat bark" which probably meant bark from the trunk. After 1740, tastes shifted to *quina amarilla* (yellow quina) and the bark of tender and thin branches.

[44] José Diguja to Pedro de Valdivieso, Quito, 8 February 1769, ANH/Q, Fondo Especial, vol. 72, no. 2972-3, fol. 195r. Diguja, incidentally, does not explicitly name who provided him with this information or how he learned of the usage of cascarilla by indigenous people.

shipment] so that the Royal Pharmacy may examine [the bark] and determine whether its effects are advantageous."[45]

It is worth pausing here to consider the implied relationship between local expertise and the expertise of the royal pharmacists. Diguja explicitly relied on Valdivieso's local expertise to confirm or reject two claims about *costrón*: first, if it was true that indigenous people used this type of *cascarilla*; and, second, if *costrón* had any medical efficacy and commercial value. Valdivieso's position as a local expert was fundamental, in so far as he was the one who got to *initially* decide or determine whether *costrón* met certain standards of efficacy for inclusion in the shipments to the Royal Pharmacy. Valdivieso was a gatekeeper, of sorts, controlling those types of *cascarilla* that arrived at the pharmacy in the first place. If Valdivieso rejected *costrón*, then it would not make it to the next phase of testing at the Royal Pharmacy. Even if Valdivieso approved *costrón*, the Royal Pharmacy would have to confirm these results with additional tests and experiments before it could be included in the monopoly's shipments. Whereas Valdivieso had the power to confirm or deny indigenous knowledge of *costrón* as expressed through Diguja, the royal pharmacists had the power to confirm or deny Valdivieso's endorsement of *costrón* (and by extension indigenous knowledge and usage of this type of *quina*).

Does this mean that the Royal Pharmacy, as a scientific institution in the orbit of the royal court in Madrid, exerted power over this bark from Spain's colonial periphery and the knowledge produced there? Yes and no. On the one hand, the royal pharmacists clearly had the final say as to whether certain types of *cascarilla* (and knowledge of it) passed muster. On the other hand, Valdivieso had the power to determine whether the royal pharmacists even had the possibility to test and examine

[45] Ibid.

this bark. From the latter perspective, one could claim that Valdivieso and royal pharmacists both participated in the examination of *cascarilla* and the validation of knowledge of it.

In March 1769, Valdivieso provided his expert opinion on *costrón*. He drew on a number of sources of information: indigenous practices, direct experience, and European texts on the therapeutic administration of the bark. In general, Valdivieso was skeptical that there was any significant difference in the efficacy of bark taken from the trunk versus that from the branches. He outlined the history of which types of bark were used in commerce, noting that half a century earlier the dominant practice was to harvest bark "only from the body [of the tree], rejecting [bark from] the branches."[46] Moreover, Valdivieso continued, this bark was sent to "Kingdoms of Spain."[47] It was only around the year 1750, according to Valdivieso, that "*canutillo*" (bark from skinny branches) "was introduced by merchants" since "corpulent trees [had] been destroyed by continual extraction."[48] The historical shift in harvesting practices seemed to suggest that the specific part of the tree was of no consequence, at least from Valdivieso's perspective.[49]

Valdivieso also expressed skepticism about the knowledge and practices of indigenous people. He explained to Diguja that while "the natives of this Province [Loja] suffer from epidemics of tertiary and quaternary [fevers] in all parts of the year," the majority of them "ignore the efficacy of this prodigious vegetable." Consequently,

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[46] Pedro de Valdivieso to José Diguja, Loja, 8 March 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-13, fol. 88v.
[47] Ibid.
[48] Ibid.
[49] Although it is impossible to determine whether Valdivieso drew consciously on this tradition or not, his employment of the history of changing European tastes for bark from different parts of the tree bears a resemblance to arguments of other works of the late seventeenth and early eighteenth century which used historical claims to suggest that one needed to approach receive knowledge skeptically, see: John Robertson, *The Case for the Enlightenment: Scotland and Naples 1680-1760* (Cambridge: Cambridge University Press, 2007).

the indigenous people "experience continual deaths having been vulgarly persuaded that the use of *cascarilla* makes tertiary fevers malignant [*les atabardilla las tercianas*] and it will take much work to dissuade them of this error."[50] Valdivieso then explained that, while further "practice" with "the efficacy and security of this remedy" might convince the indigenous people, his confidence in the "efficacy and security" of *cascarilla* was founded not on his own experiences but "emerged on the occasion of having found it in the work of the Illustrious Feijoo [on] whose authority I made use of this remedy [*especifico*] with all confidence."[51]

On the authority of the work of Benito Jerónimo Feijoo, one of the foremost thinkers of the early Enlightenment in Spain, Valdivieso then began experiments with bark taken from tree trunks. He explained to Diguja that *cascarilla* "has been the most administered [medicament in this] Province."[52] Indeed, he described an instance in which he cured three "sick people" in Quito by administering *costrón*. He also noted that in July 1767 in Loja he cured "twenty-two fevers among children and servants" by his "method." This method, which Valdivieso claimed to have used for twenty year, was to help "the ill obtain prompt relief [from fevers]" by administering *cascarilla* that "was neither very think nor very thin."[53] Here, Diguja had the response to his question. What mattered most was the *thickness* of the bark not whether it came from the tree's branches or its trunk.

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[50] Pedro de Valdivieso to José Diguja, Loja, 8 March 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-13, fol. 89r.
[51] Ibid., fols. 89r-v. The "Illustrious Feijoo" is the Spanish Benedictine monk Benito Jerónimo Feijoo (1676-1764) who was one of the important members of the Spanish Enlightenment in the early eighteenth century. Feijoo mentions the use of quina in "Carta 13" of *Tomo Primero* (1742) and "Carta 21" of *Tomo Cinco* of his *Cartas Eruditas y Curiosas* (Madrid): Jerónimo Benito Feijoo, *Cartas erudítas, y curiosas, en que por la mayor parte se continúa designio de el Theatro critico universal, impugnando, o reduciendo a dudosas varias opiniones comunes*, 5 vols. (Madrid: F. del Hierro, 1742-1760).
[52] Pedro de Valdivieso to José Diguja, Loja, 8 March 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-13, fol. 89v.
[53] Ibid., fols. 89v-90r.

Valdivieso also demonstrated general knowledge of European texts on the therapeutic administration of *quina*, using it to further inculcate skepticism about establishing certain rules in the usage of cinchona bark – all the better to undermine the notion that *costrón* was inherently inferior because it came form the trunk. He started with Loja and observed, "the method of applying it has varied in this Province." "Some," Valdivieso explained, "put it into an infusion of quince syrup...; others in virgin honey with some sour orange; others in liquor [*aguardiente*]; others in wine and others in water."[54] "In addition," Valdivieso continued, "variations can be noted among the Physicians of Europe in the method, quantity, and schedule of administering the bark."[55] As evidence, he referenced the work of José Alsinet, a royal physician, who had published the first edition of his *Nuevas Utilidades de Quina* (New Uses of Quina) in Madrid in 1763.[56] After a brief description of Alsinet's method, Valdivieso explained, "I have not practiced [this method] because it has been only a short time that I have had this little work by Alsinet in my possession."[57] Furthermore, while Alsinet spoke at length of the "singular virtues of quina," he said nothing about the "selection of its quality" which would have given "greater certainty" to Valdivieso in his efforts to replicate Alsinet's method.[58] Finally, Valdivieso offered reassurance to the President of Quito, "I am convinced that the kinds [of *cascarilla*] requested by Your Excellency will be approved by the Physicians of His Majesty."[59]

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[54] Ibid., fol. 90r.
[55] Ibid., fol. 90v.
[56] José Alsinet, *Nuevas utilidades de quina* (Madrid: A. Muñoz del Valle, 1763). Alsinet published a second edition a decade later: José Alsinet, *Nuevas utilidades de la quina demonstradas, confirmadas, y añadidas* (Madrid: A. Muñoz del Valle, 1774).
[57] Pedro de Valdivieso to José Diguja, Loja, 8 March 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-13, fol. 90v.
[58] Ibid., fols. 90r-91v.
[59] Ibid., fol. 91r.

Thus far, we have seen how Valdivieso employed many of the techniques of the imperial culture of knowledge production and realized his expert status through the skillful coordination of many sources of evidence and information in a manner not unlike the *savants* and *philosophes* of Enlightenment Europe.[60] Valdivieso also employed the technique of sending of bark samples.[61] To further convince Diguja of the efficacy of *costrón*, Valdivieso sent to Quito a "little box" containing "three classes [of bark] ... all from the same species of tree" in order to illustrate his claim that "differences arise [primarily] from the greater or lesser maturity of the plant."[62] His goal was "to better inform [Your Excellency] about the classes of *cascarilla* and the state of the Forests."[63] The three classes included: 1) *cortezon* (another name for *costrón*) which "is from the trunk of a mature tree;" 2) *cascarilla* "from the thick branches of a mature tree or the trunk of medium maturity;"[64] and 3) *cascarilla* "from very young plants by whose defect of not having thickness to its bark, it is cut and mixed with part of the wood."[65] Note that Valdivieso controlled for species variation by collecting all three classes from the same species.

What were the results of Valdivieso's *cascarilla* experiment in a box? Diguja recounted them in a letter. He noted that the "three classes" had been "examined" [*reconocidas*] although he did not mention how or by whom. The "first class" or *cortezon*, as Valdivieso called it, was of "very good quality." The "second class" – bark from thick branches of mature trees and from the trunk of middle-age tress,

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[60] On the practices of collating and codifying knowledge of South America in eighteenth-century Europe, see: Neil Safier, *Measuring the New World: Enlightenment Science and South America* (Chicago: University of Chicago Press, 2008).
[61] See Chapter 1.
[62] Pedro de Valdivieso, [to José Diguja], Loja, 26 April 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-24, fol. 104v.
[63] Ibid., fol. 105r.
[64] This was the type of bark sent as a sample by Manuel de la Guardia to the Royal Pharmacy in September 1767.
[65] Ibid., fol. 105r.

which was probably the type of bark that Valdivieso had administered to various fever-sufferers in Loja and Quito – was "very special and exquisite." Finally, as to the "third class" taken from young trees, Diguja found it to be "unusable and worthless."[66] Diguja's empirical inspection apparently confirmed Valdivieso's recommendations. In recognition of the superiority of the bark from thick branches of mature trees and the trunks of middle-aged trees, Diguja requested that Valdivieso send 112 *quintales* (100 for the Royal Pharmacy, six for Julian de Arriaga, Minister of the Indies, and six for the Conde de Aranda, the President of the Council of Castile) of the *cascarilla* of the "second class." Yet, Diguja still requested that Valdivieso send two boxes of *costrón* for further testing at the Royal Pharmacy.[67] Finally, Diguja informed Valdivieso he has "sent [the box] to the Court informing [them] of its types [*calidades*] of bark and of that [type] which will follow in the first shipment."[68]

It was through this technique of sending a box of bark samples that Valdivieso worked cooperatively with learned experts in Madrid, especially the royal pharmacists. Consider box sixty-four included with Valdivieso's first shipment to the Royal Pharmacy that departed Loja in October 1769.[69] This box contained a samples of three varieties of *quina* testing at the Royal Pharmacy: *resaque*, *cortezon* (a.k.a. *costrón*) and *crespilla*. For each of these, Valdivieso asked that the pharmacists determine if these barks were of sufficient quality to be used to supplement future shipments. *Resaque* was bark that had re-grown on trees that had been left with

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[66] José Diguja to Pedro de Valdivieso, Quito, 11 May 1769, ANH/Q, Fondo Especial, vol. 72, no. 2972-11, fols. 208r-v.
[67] Ibid., fol. 208v.
[68] Ibid., fol. 209v.
[69] Pedro de Valdivieso, "Factura instructiva de la Cascarilla q[u]e se [h]a acopiado p[ar]a la Real Botica este año de 1769," Loja, 26 October 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-67, fols. 155r-157v.

"some part of [their] bark on account of negligence or inconvenience."[70] Meanwhile, he sent samples of *cortezon* or *costrón* taken from trunks of trees that produced *cascarilla* of the "*amarilla* and *colorada*" varieties. While the *resaque* and *cortezon* were from known varieties of cinchona trees, the *crespilla* (curled) represented a novel variety. Valdivieso suggested that *crespilla* was of comparable quality to other kinds of *quina* by explaining that this bark had "a bitterness equal to the *cascarillas* of superior quality."[71] Moreover, he hoped that testing of *crespilla* at the Royal Pharmacy would help to determine if this bark "loses its activity upon crossing the Line (the equator)."[72] Finally, he included samples of powdered *quina* packaged in tubes of bamboo (*canutos de Guadua*) to protect against humidity and asked the royal pharmacists to determine if this bark had "equal activity" to bark which arrived whole as most bark did.[73]

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[70] Ibid.

[71] This feature was important because Galenic-Hippocratic theory of medicaments – one of the predominant European intellectual grids for understanding the efficacy of *quina* – stated that the bitterness of a medicament was indicative of the heat of the medicament and, hence, its virtue or efficacy. Consequently, equal levels of bitterness might indicate similar strengths as a febrifuge.

[72] Pedro de Valdivieso, "Factura instructiva de la Cascarilla q[u]e se [h]a acopiado p[ar]a la Real Botica este año de 1769," Loja, 26 October 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-67, fols. 155r-157v.

[73] Ibid. One tube contained cascarilla *amarilla* and the other contained cascarilla *colorada*. Valdivieso attested to their purity explaining that the samples were "separated from all useless material" (*limpia de toda brosa*). Yet, unlike the rest of the cascarilla, which was shipped as dried whole bark, these samples had been "ground and pulverized." With these samples, Valdivieso hoped that the pharmacy would make a comparison of the quality of cascarilla *amarilla* with that of cascarilla *colorada*. He also hope that the pharmacists would compare these samples "with that [bark] which arrives intact and investigate if this bark has equal activity to that which is pulverized and accommodated with [these] new safeguards from Humidity (i.e. the tubes of bamboo." If the bark was found to be better quality, he suggested that this could be designated "for the Royal Family and in subsequent [shipments] one or more *quintales* of this cascarilla could be sent."

There are no records of the pharmacy's assessment of Valdivieso's box samples.[74] Nonetheless, this case is indicative of how the Royal Pharmacy functioned as an institution of imperial science through its connections to both the Crown and local officials in South America. First, it shows how these officials – as well as the Crown – assigned primacy to the Royal Pharmacy as a key site for assessing different kinds of *quina*. Diguja in particular urged Valdivieso to send his samples of *costrón* to the Royal Pharmacy for confirmation of his results. Along with the *costrón*, Valdivieso included other samples of interest to the *estanco* project. Second, it highlights how a local expert in Loja collecting the bark and the learned experts at the Royal Pharmacy worked together to produce knowledge about *quina*. While dependent on officials in South America to send samples of *quina* and other New World medicaments, the Royal Pharmacists had gained knowledge and expertise through the collection, examination, and comparison of samples from all parts of Spain's vast empire. In this way, the Royal Pharmacy served as a "centre of calculation."[75] Moreover, within the structure of the Crown's *estanco de quina* and the imperial culture of knowledge production, the pharmacy became an "obligatory passage point" in the network that connected cinchona trees in Loja with the King in Madrid.[76] The relationship between local and learned experts was, at this point, symbiotic. From the Crown's perspective, both forest and pharmacy were key sites of expertise and knowledge about *quina*. In addition, according to the culture of knowledge production embedded in imperial governance, officials in Spain drew on experts at both sites in the implementation and administration of the *estanco de quina*.

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[74] I am grateful to the archivists at the *Archivo del Palacio Real de Madrid*, which houses the records of the Royal Pharmacy, for checking on this matter.
[75] Latour, 215-257.
[76] Callon, 200-203.

Contention: The Controversy over the 1773 *Quina* Shipment

In 1773, the Royal Pharmacy's primacy as an institution of imperial science received an important test.[77] By that time, the pharmacy had become an integral part of the *estanco* as pharmacists assessed samples of novel varieties of *quina* and inspected, stored, and dispersed all the Crown's bark. As the *estanco* developed, it was the inspection of the annual shipments that took up increasingly more time mainly because of the increasing quantities of bark in each shipment (Table 2.1).[78] In

[77] The shipment departed Loja in November 1770 and arrived in Madrid in January 1773, see: Pedro de Valdivieso, "Factura instructiva de la cascarilla que se ha acopiado para la Real Botica en este año de 1770," Loja, 20 November 1770, AGI, Quito 239, fol. 50r-v.

[78] In December of 1770, José Martínez Toledano, Chief Pharmacist at the Royal Pharmacy, provided the Duke of Losada with an assessment of the holdings of *quina* at the *Casa de Geographia* and the *quina* from shipments of that year. Of 234 "boxes and *corachas*" (approximately 23,400 pounds) of *quina* at the *Casa de Geographia*, Martínez Toledano reported that 2,600 pounds of bark were useable. He also noted that a recently arrived shipment of 22 boxes of *quina* (2,200 pounds of bark) yielded 2,000 pounds of usable bark. In total, Martínez Toledano reported that the Royal Pharmacy was in possession of 4,600 pounds of useable *quina* after having assessed over 25,000 pounds of bark. By December 1770, the Royal Pharmacy was routinely working with massive quantities of *quina*. More was on the way. Several of the shipments that had arrived in Cádiz earlier in the year (1770 had yet to arrive at the Royal Pharmacy (Table II.1), see: José Martínez Toledano, "Mem[ori]a de los Generos Medicinales q[u]e han venido oy dia veinte de Ag[os]to de 1770 de la remesa ultima," San Ildefonso, 24 August 1770, AGS, Hacienda, 959-2, Carpeta 110.

We can gain appreciation of the significance of the portions of *quina* handled by the Royal Pharmacy in 1770 by comparison to report prepared by José Martínez Toledano in August of that year. In that report, Martínez Toledano listed all the "medicinal goods that have arrived from the last shipment [from México]." As compared to *quina*, which is usually listed in units of boxes (of 100 pounds) or *arrobas* (25 pounds), most of the medicinal goods are listed in quantities of eight ("*yervas dulzes*") to thirty-three pounds ("*Anime copal*"). On this list, the medicament that arrived in the largest amount was the 300 pounds of sarsaparilla.[78] However, this quantity of sarsaparilla paled in comparison to the 17,047 pounds of *quina* that arrived in Spain the same year. In light of the rapid accumulation of the bark, it is no wonder that Martínez Toledano recommended to his superiors that the Crown consider selling some of its *quina* lest perfectly good bark were to rot in the royal warehouses and the *Casa de Geographia*, see: José Martínez Toledano, "Mem[ori]a de los Generos Medicinales q[u]e han venido oy dia veinte de Ag[os]to de 1770 de la remesa ultima," San Ildefonso, 24 August 1770, AGS, Hacienda, 959-2, Carpeta 110.

First mention of the possibility of selling some of the surplus *quina*, after the pharmacists had determined that the Crown needed 16 to 18 *arrobas* (400 to 450 pounds) annually for its purposes, appeared in a report to the Duque de Losada in February in 1771, see: [Anonymous], "Relación con notas marginales del expediente en que consta la quina entregada en la botica real, procedente de la Casa de Geografia y de una remesa llegada de

January 1773, as in previous years, the pharmacists received a large shipment of *quina* from Loja. It was the second shipment under the auspices of the new Magistrate of the Forests, Pedro de Valdivieso. Their first task was to assess the quality of the bark. This was a precaution especially bark often degraded while in transit and royal officials and merchants regularly engaged in fraud. The pharmacists had to be sure that this *quina* was of the highest quality since it was to be used on the royal family, given as gifts to notables, and distributed to Spanish hospitals by the Crown. Ultimately, the pharmacists determined that none of it – over 15,000 pounds of bark – was useable for royal purposes.[79] In a letter to Julian de Arriaga, Minister of the Indies, in April 1773, Miguel de Muzquiz, Chamberlain of the Royal Household, reported, "[the royal pharmacists] did not find in any of [the boxes] quina which could

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Quito," c. February 1770, AGS, Hacienda, 959-2, Carpeta 107. Some of the surplus *quina* was probably that included as part of a gift shipment of medicaments sent to the King of Morocco in April in 1771, see: Marques de Grimaldi to the Duque de Losada, Aranjuez, 17 April 1771, APRM, Reindos, Carlos III, Legajo 197-3, nn; "Nota de varios encargos que hace el Rey de Marruecos," c. 1771, APRM, Reinados, Carlos III, 197-3, nn. In May 1771, the Crown agreed to sell some of its *quina* to Manuel de la Peña, a merchant in Madrid, see: Manuel de la Peña to Miguel de Muzquiz, Madrid, 6 May 1771, APRM, Reinados, Carlos III, Legajo 197-1, nn.; Miguel de Muzquiz to Duque de Losada, Aranjuez, 7 May 1771, APRM, Reinados, Carlos III, 197-1, nn.; Duque de Losada to José Martínez Toledano, Aranjuez, 10 May 1771, APRM, Reinados, Carlos III, 197-1, nn.; José Martínez Toledano to the Duque de Losada, Aranjuez, 12 May 1771, APRM, Carlos III, 197-1, nn.

[79] Manuel González Garrido, et. al, "Representacion que han hecho los Ayudantes y demas Dependientes de la Botica de S[u] M[ajestad] al Boticario Mayor Don Josef Ma[rti]n[e]z Toledano en vista del exacto reconocimiento que se les mando executar de los 94 cajones de Quina," Madrid, 5 February 1773, AGI, Indiferente 1554, fols. 16r-19r. In contrast to this report, a short report from an examination (*reconocimiento*) of the shipment up its arrival in Cádiz indicated that a greater proportion of the shipment was good quality. The unidentified authors of this report noted that a "greater part [of the cascarilla is] good" and could fetch a price of 9 *reales* per pound. It was also noted that "five or six" boxes were "less superior" valued at five to six *reales* per pound, "six or eight" boxes contained "most inferior bark" valued at "three to four" *reales* per pound, and an additional "five or six" boxes of "thin and fine" cascarilla that "had partially lost its virtue" was valued at "five to six" *reales* per pound. This evaluation of this shipment does not suggest the kind of massive fraud and adulteration that the pharmacists in Madrid found six months later. Surprisingly, none of the officials involved in the investigation of the fraud reveal awareness of this "examination and valuation" of the shipment, see: "Reconocimiento y avaluo de 94 caxones de cascarilla que se han conducido de Lima en los Navios del Rey S[a]n Lorenzo, Septentrion, y Astuto para la R[ea]l Botica," Cádiz, 30 June 1772, AGS, Hacienda 959-2, Año 1772: Quina y Cacao, Carpeta 140, fol. 1r.

be destined for the royal service [*servidumbre*] or could be used as the gifts, which His Majesty is accustomed to giving."[80]

Table 2.1: Shipments of *Quina* from Spanish America to Cádiz 1769-1771[81]

Ship	Port of Origin	Cargo	Weight (lbs)	Date of Arrival (Day/Month/Year)
Castilla	Tierra Firme	125 *petacas*	16,646	09/04/1767
San José	Tierra Firme	67 *cajones*	6,500	23/12/1768
Galga	Lima	12 *cajones*	5,000	18/08/1770
Prusiano	Lima	18 *cajones*		
Aurora	Lima	14 *cajones*	3,000	09/09/1770
Diamante	Lima	18 *cajones*	3,072	22/09/1770
-	Quito	22 cajones	3,000	26/09/1770
Hércules	Lima	14 *cajones*	2,975	29/11/1770
-	-	68 *cajones*	6,500	01/1771

An investigation into the cause of the corruption of the shipment ensued. Initially, officials in Spain suspected theft, especially since assistants at the royal pharmacy had discovered a chisel inside one of the boxes, but the pharmacists were

[80] Miguel de Muzquiz [to Julian de Arriaga], Aranjuez, 26 April, 1773, AGI, Indiferente 1554, fols. 12r-15v.

[81] Data for this table are drawn from a similar table in Appendix 2 of: María Andrés Turrion, "Quina del Perú para la Real Hacienda Español (1768-1807): notas sobre su estanco," in: *La Expedición botánica al Virreinato del Perú (1777-1788)*, Volume I, edited by Antonio González Bueno (Barcelona: Lunwerg, 1988), 79. Data in documents from the Archivo General de Simancas, Hacienda 959-2, confirm those of Turrion. See also: Filemón Arribas Arranz, *Catálogo XV: Papeles sobre la introducción y distribución de la quina en España* (Valladolid, 1937). M. E. Alegre Pérez notes that a shipment of 50 boxes of *quina* arrived in Spain from Lima in 1766 but does not cite documents to support this claim. Thus far, the earliest shipping records of *quina* shipments from the American colonies for the Royal Pharmacy are those pertaining to the 1767 shipment noted by Andrés Turrion. See: M. E. Alegre Pérez, "Drogas Americanas en la Real Botica," in: *La ciencia española en ultramar*, edited by Alejandro R. Díez Torre, et. al. (Madrid: Doce Calles, 1991), 217-233.

hesitant to place blame.[82] "We cannot determine," they wrote, "by our own judgment if the *quina* acquired the indicated vices in Quito, while in transit, or in the Ports and Pathways of this Kingdom [Spain]."[83] They did, however, suggest two possibilities: 1) "that [the bark] could have been packaged with some humidity [in the boxes];" or, 2) that there was "some kind of manipulation (*manejo*) after the packaging [of the bark]."[84] One of these explanations implicated Pedro de Valdivieso and his bark collectors; the other implicated the officials that handled the boxes in between the departure from Loja and their arrival in Madrid. Drawing on evidence from a report submitted by two inspectors at Cádiz – Diego de Robles, a pharmacist, and Francisco Manjon, an "inspector (*juez vehedor*) and royal official" – as well as his own conviction that theft of the bark from the royal warehouse in Madrid was "morally impossible," Miguel de Muzquiz eliminated the pharmacists' second explanation."[85] In other words, the fraud had not occurred in Spain. Muzquiz felt that Robles and Manjon's report described *quina* as poor quality as that which the Royal Pharmacy assessed in February of 1773.[86] As to the "chisel" found in one of the boxes, Muzquiz

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[82] Manuel Gonzalez Garrido, et. al., "Copia de la Representacion que han hecho los Ayudantes, y demas Dependientes de la Botica de S[u] M[ajestad] al Boticario mayor D[o]n Josef M[a]r[ti]n[e]z Toledano," Madrid, 5 February 1773, AGI, Indiferente 1554, fols. 16r-19r.
[83] Manuel Gonzalez Garrido, et. al., "Copia de Representacion que han hecho los Ayudantes y demas Dependientes de la Botica de S[u] M[ajestad] al Boticario mayor D[o]n Josef M[a]r[ti]n[e]z Toledano," Madrid, 5 February 1773, AGI, Indiferente 1554, fols. 18v.
[84] Manuel Gonzalez Garrido, et. al., "Copia de Representacion que han hecho los Ayudantes y demas Dependientes de la Botica de S[u] M[ajestad] al Boticario mayor D[o]n Josef M[a]r[ti]n[e]z Toledano," Madrid, 5 February 1773, AGI, Indiferente 1554, fol. 18v.
[85] Miguel de Muzquiz [to Julian de Arriaga], Aranjuez, 26 April 1773, AGI, Indiferente 1554, fol. 14r.
[86] My own reading of the report from Robles and Manjon contrasts with that of Muzquiz. While Muzquiz takes their report as evidence that the entire shipment was of poor quality, the anonymous document at the *Archivo General de Simancas* reports that a "greater part [of the cascarilla is] good" and could fetch a price of 9 *reales* per pound. It was also noted that "five or six" boxes were "less superior" valued at five to six *reales* per pound, "six or eight" boxes contained "most inferior bark" valued at "three to four" *reales* per pound, and an additional "five or six" boxes of "thin and fine" cascarilla that "had partially lost its virtue" was valued at "five to six" *reales* per pound. This evaluation of this shipment does not suggest the kind of massive fraud and adulteration that the pharmacists in Madrid found six months later. From

explained that, after the inspection, the boxes were hastily re-sealed so that the boxes could be transported aboard the ships "Santa Lucia and Santa Theresa" which presumably carried the boxes to Cartagena (Spain), the next stop on their journey to Madrid.[87]

Ultimately, imperial officials in Spain blamed ignorance: bark collectors in Loja did not know how to identify and properly harvest superior *quina*.[88] So, the problem of corrupted *quina* was cast as a problem of knowledge (or lack of it). Previously, the Crown had relied on local officials in South America to solve such problems.[89] Recall that, in 1768, José Diguja, the President of Quito, had been ordered to produce those decrees and instructions that he thought would improve the quality of the monopoly's shipments.[90] Pedro de Valdivieso's appointment as Magistrate of the Forests was part of Diguja's reform program. In this context, the degraded shipment of 1773 was even more troubling. As a result, the Crown and its advisors were receptive to an offer from the royal pharmacists to solve the problem. Chamberlain Muzquiz relayed

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this description, it would seem that, at most, twenty-six boxes contained *quina* of inferior quality. However, one of the limitations of all these reports from the various assessments of bark is that it is impossible to determine by what standard or method they judged the bark. Therefore, it is entirely possible that while the inspectors at Cádiz may have found *quina* that met their standards for "good *quina*," the royal pharmacists may have employed more stringent standards or methods that disqualified the majority of the bark.

[87] Miguel de Muzquiz [to Julian de Arriaga], Aranjuez, 26 April 1773, AGI, Indiferente 1554, fol. 14v. Muzquiz does not identify the destination of these ships but I am assuming that they were involved in moving the *quina* from Cádiz to Madrid.

[88] Migual de Muzquiz, Chamberlain of the Royal Household, made the final call. He did so in spite of other mitigating factors such as the fact that it took close to two years for the bark to reach Madrid from Loja (see note 44) and the presence of a chisel in one of the boxes, which suggested that someone had previously opened the boxes, see: Miguel de Muzquiz to Julian de Arriaga, Aranjuez, 26 April 1773, AGI, Indiferente 1554, fols. 12r-15v.

[89] Much of the bark received in the late 1760s and early 1770s turned out to be useless. Upon receipt of a shipment of 3,240 pounds of cinchona bark in 1766, the pharmacists deemed only 112.5 pounds of bark (or 3.7%) useable. As for a shipment of 17,125 pounds in 1767, the pharmacist approved only 750 pounds of bark (or 4.4%), see: Marqués de Esquilache to Julian de Arriaga, El Pardo, 4 March 1766, AGI, Indiferente 1552, fols. 762r-763v; Miguel de Muzquiz to Julian de Arriaga, San Ildefonso, 23 September 1767, AGI, Indiferente 1552, fols. 809r-812v.

[90] José Diguja to Pedro de Valdivieso, Quito, 5 October 1768, ANH/Q, Fondo Especial, box 25, vol. 68, no. 2897, fols. 150r-154r.

to Julian de Arriaga, Minister of the Indies, that the pharmacists would be providing "an Instruction which explains all the circumstances that should be present in America at the time of collection, desiccation, reposition [i.e. packaging] and transportation of *Quina*" as well as a sample of that *quina* which "should be collected to the exclusion of any other species or quality."[91] Indeed, in their original report on the shipment, the pharmacists observed, "since the King, is the Lord and Owner of this Plant, no species of *quina* other than that which is the most noble by its Nature, should be sent to His Majesty."[92] But what constituted "noble" *quina*? Their answer was to send the instructions and sample of superior *quina*. It was this crucial knowledge – of superior quality bark and how to produce it – that the pharmacists tried and, ultimately, failed to transfer to Loja.

Although existing documents give few details of the methods and standards used at the Royal Pharmacy, records from examinations of the 1773 shipment suggest that the pharmacists favored observation of the physical characteristics of the bark over therapeutic tests of its medical efficacy.[93] Consider that bark from this shipment was only tested in hospitals in May 1773 three months *after* the pharmacists had dubbed it useless according to its physical characteristics (Table 2.2).[94] By that time, the pharmacy's instructions and sample were well on their way to

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[91] Miguel de Muzquiz [to Julian de Arriaga], Aranjuez, 26 April 1773, AGI, Indiferente 1554, fol. 15r.

[92] Manuel Gonzalez Garrido, Diego Lopez Manzera, Juan Daiz, Antonio Sanchez, Luis Blet, and Leandro Martin Sandoval to José Martinez Toledano, Head Pharmacist, Madrid, 5 February, 1773, AGI, Indiferente 1554, fol. 19r.

[93] Ibid, fols. 16r-19r. It is likely that the pharmacists used analytical techniques common in early modern pharmacy, see: De Vos, "The Art of Pharmacy;" Andreas-Holger Maehle, *Drugs on Trial: Experimental Pharmacology and Therapeutic Innovation in the Eighteenth Century* (Rodopi: Amsterdam: 1999); Jonathan Simon, "Analysis and the hierarchy of nature in eighteenth-century chemistry," *British Journal of the History of Science* 35 (2002), 1-16.

[94] In March, as his assistants were composing the instructions for bark collectors in Loja, José Martínez Toledano sent samples from the 1773 shipment for testing at Royal Hospitals in Madrid. By allowing the bark to dry out, Martínez Toledano was able to recover 37 *arrobas* (925 pounds) of *quina*. He then sent one pound of this bark as a powder to Patricio Bustos,

Loja. These tests, in fact, revealed that much of the bark *was* medically efficacious. However, the Crown never informed colonial officials of these results nor did it rescind the order to collect bark according to the pharmacy's sample and instructions. Upon learning that the bark of the 1773 shipment was efficacious, José Martínez Toledano, the Chief Pharmacist, remarked that the bark "should not be sent to Foreign Courts because it lacks [the proper] color and they will spurn it at a glance."[95] For the Crown and its pharmacists, physical characteristics, such as flavor, odor, internal and external color, and thickness, were what distinguished the very best bark. This instance is a key example of the political character of this knowledge of the bark, especially since officials ignored empirical evidence and, instead, emphasized political need.

Administrator of the Royal Hospitals, for testing. On March 20, 1773, Dr. Josef Salomon y Morales and Dr. Vicente Velinchon reported that they had "experimented" with the *quina* on "various patients" and found that it was of good quality. Encouraged by these results, Martínez Toledano identified an additional 240 *arrobas* (6,000 pounds) of *quina* that appeared potentially useful. Another round of testing at the Royal Hospitals confirmed that the *quina* was medical efficacious but not as good as the first sample that Martínez Toledano had sent. In the end, Martínez Toledano found that only 70 *arrobas* (1750 pounds) were absolutely useless and needed to be destroyed. This was quite an improvement over the original assumption that the entire shipment of over 15,000 pounds of *quina* was useless. For the reports on these additional tests, see: Josef Salomon y Morales and Vicente Velinchon to José Martínez Toledano, [Madrid], 20 March 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.; Eugenio Escolano, Bartolome de Siles, and Josef Salomon [y] Morales to José Martínez Toledano, Madrid, 14 May 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.; José Martínez Toledano to Duque de Losada, Aranjuez, 15 May 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.

[95] José Martínez Toledano to Duque de Losada, Madrid, 15 May 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.

Table 2.2: Dates of Examinations of *Quina* Shipments and Bark Samples in Madrid and Loja circa 1773

Year	Date	Event	Location
1768	October 5	Pedro de Valdivieso appointed "Magistrate of the Forests" in Loja.	Loja
1769	October	Valdivieso sends his first *quina* shipment to the Royal Pharmacy including a box of bark samples.	Loja
1772	June	Valdivieso's second shipment of *quina* arrives in Cádiz and receives a positive review from inspection officials in the port.	Cádiz
1773	January	The Royal Pharmacy receives Valdivieso's second shipment containing over 15,000 pounds of bark.	Madrid
1773	February	Royal pharmacists determine that the entire shipment is useless.	Madrid
1773	March	José Martínez Toledano, Head Pharmacist, sends samples of the bark to hospitals for testing. Physicians report that the bark is efficacious.	Madrid
1773	March	The royal pharmacists send their instructions and samples of superior *quina* to bark collectors in Loja.	Madrid
1773	April	Miguel de Muzquiz, Chamberlain of the Royal Household, blames the ignorance of bark for the poor quality of the *quina* the recent shipment.	Madrid
1773	May	Toledano sends more bark for testing in hospitals. Physicians again find the bark to be efficacious.	Madrid
1773	September 16	The royal pharmacy's instructions and bark sample reach Valdivieso in Malacatos. José Diguja, the President of Quito, instructs Valdivieso to collect only that bark which matches the pharmacy's sample.	Malacatos
1773	September 16	Valdivieso collects testimony from his bark collectors on the quality, characteristics, and origins of the pharmacy's sample.	Malacatos
1773	September 20	The Town Council of Loja reviews the pharmacy's sample alongside bark from Loja collected by Valdivieso and concurs that the pharmacy's sample is inferior.	Loja
1773	November	José Diguja, the President of Quito, assembles a group of experts to examine bark samples sent by Valdivieso to compare with the royal pharmacy's sample.	Quito
1773	December 20	Diguja writes to the Minister of the Indies to inform him that the pharmacy's bark sample is of inferior quality. He includes a box of bark samples with his letter.	Quito

The primacy assigned to physical characteristics can be explained by considering how the pharmacy used *quina*. Royal pharmacists separated cinchona bark into four classes from best to worst: first-class *quina* (*primera suerte*) was for the Royal Family, second-class bark (*segunda suerte*) was given as gifts to notables and foreign dignitaries, third-class (*tercera suerte*) bark was donated to Spanish hospitals, and bark of the fourth class (*cuarta suerte*) was either burned or sold as a dyestuff.[96] Therefore, the Royal Pharmacy required bark that was "noble by nature," as the pharmacists put it, because it was either the life of the King or his reputation as a gift-giver that depended on the quality of the pharmacy's *quina*. The empirical culture had its limits.

Although pharmacists and physicians did correlate the bitterness of the bark with its medical efficacy, in practice, the pharmacists did not treat these criteria as sufficient to distinguish noble from common *quina*. In fact, many assumed that all *quina* had some medical virtue. Consequently, the relative availability of bark with certain physical characteristics became an important factor in Spanish conceptions of what separated superior from inferior bark. While many could acquire efficacious *quina*, especially since the King donated much of the monopoly's bark to Spanish hospitals, it would have been a mark of distinction to receive bark from the Crown that was pretty as well as potent. Ultimately, in this culture of the court and royal gift economy, the quality of *quina* derived from observable physical properties to the

[96] María Luisa de Andrés Turrión, "Quina del Peru para la Real Hacienda Española (1768-1807): Notas sobre su <<Estanco>>," in *La Expedición Botánica al Virreinto del Perú (1777-1788)*, edited by Antonio González Bueno (Barcelona: Lunwerg Editores, 1988), 71-84; María Luisa de Andrés Turrión and Maria Rosario Terreros Gómez, "Organización administrativa del Ramo de la Quina para la Real Hacienda española en el virreinato de Nueva Granada," in *Medicina y Quina en la España del Siglo XVIII*, edited by Juan Riera Palmero (Salamanca: EUROPA Artes Gráficas, 1997), 37-43.

exclusion of other aspects.[97] In addition, rarity of physical characteristics became that which distinguished noble from common bark at the court in Madrid. In this context, moreover, royal pharmacists served, in effect, as connoisseurs of *quina*.[98] They had to have not only knowledge of the bark but also knowledge of the prevailing "tastes" for the bark among the members of European court culture and the royal gift economy.

We do not know exactly what the sample looked like that the Royal Pharmacy sent to Loja in 1773. As for the accompanying set of instructions, they focused mainly on techniques for protecting the bark from humidity and gave no verbal description of the physical characteristics of superior quality *quina*.[99] This suggests that the pharmacists thought that the sample spoke for itself. As we will see, this was a false assumption. The instructions do reveal that the pharmacists considered the

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[97] Merchants, bark collectors, and botanists often commented on the fickle and seemingly arbitrary tastes of European consumers especially as the desired traits of the bark – mainly color and thickness – fluctuated over time.

[98] On connoisseurship, see: Ursula Klein, "Technoscience avant la lettre," *Perspectives on Science* 13 (2005), 226-266; J. V. Pickstone, "Thinking Over Wine and Blood: Craft-Products, Foucault, and the Reconstruction of Enlightenment Knowledges," *Social Analysis* 41 (1997), 99-108.

[99] Out of the eight propositions of the pharmacists' instructions, all except the first and fifth propositions specifically addressed the problem of humidity. Bark collectors and officials were instructed to collect "barks from Trees that grow on terrain exposed to sun and air, avoiding always those [trees] that grow in the shade, marshes or places of excessive humidity." After having been stripped from the tree, the bark was to be taken to "places free of all humidity where the sun easily penetrates in order for quick desiccation [of the bark]." Furthermore, bark collectors and officials were instructed to take care that "neither dew nor any extraneous humidity reaches [the bark] during the time of desiccation." For good measure, the pharmacists noted that the dried bark should maintain its "color and odor" and that it should be stored in "a dry place." The bark was to be packaged in boxes of "dry wood" and covered with "leather" and "canvas" while making sure that the bark was packed in such a way as to avoid "breakage" during the "long transportation period." After the fifth proposition which briefly discussed the method for sealing and marking the boxes, the next proposition emphasized that "if they are not embarking immediately, the boxes should be stored in a dry place" and, in the following proposition, the pharmacists noted that the boxes should be stored in the "part of the Ship that seems to be least exposed to humidity." Finally, the pharmacists explicitly noted that the same precautions against exposure to humidity should be taken when unloading the boxes from the ships in port and in transporting the boxes to Madrid, see: Manuel Gonzalez Garrido and Diego Lopez Manzera, "Copia de la Ynstruccion...," [Madrid], 16 March 1773, AGI, Indiferente 1554, fols. 20r-v.

sample an example of superior *quina*. They explained that bark collectors should "select *Quina* according to the sample that is in the accompanying box to the exclusion of any other species or quality of bark."[100] Upon receiving the pharmacy's materials late in the summer of 1773, José Diguja, the President of Quito, forwarded them to Pedro de Valdivieso in Loja. In addition, Diguja ordered Valdivieso to examine the pharmacy's sample and "throw out all other bark that has been collected which is not of the desired type."[101] Upon initial receipt of the pharmacy's sample, Diguja did not question the authority and expertise of the Royal Pharmacists that it embodied (nor did he have any reason to).

In his letter to Valdivieso, Diguja did, however, mention some specific concerns about the pharmacy's instructions. He cautioned Valdivieso about the pharmacists' proposed method for drying the bark in the sun. "I am informed," Diguja wrote, "that [the bark] turns black with the benefit of the sun and that experience teaches [that the bark] dries better and benefits more from shade and air devoid of all humidity."[102] Diguja did not necessarily open the door for attacking the expertise of the Royal Pharmacy but he certainly left it ajar. In the end, he instructed Valdivieso to examine whether the bark dries better in shade or sun. He wrote, "if it is so [that the bark dries better in the shade than in the sun], I authorize Your Grace to continue with the same method [*beneficio*]."[103] However, if Valdivieso did choose to dry the bark in the shade, Diguja asked that he "dry in the sun enough bark for two or three boxes,

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[100] Manuel Gonzalez Garrido and Diego Lopez Manzera, "Copia de la Ynstruccion...," [Madrid], 16 March 1773, AGI, Indiferente 1554, fols. 20r-v.
[101] José Diguja to Pedro de Valdivieso, Quito, 4 September 1773, AGI, Quito 239, fol. 123r. Diguja at this point revealed to Valdivieso that he had an alternate theory of the cause of the corruption. He suggested that substitution of the bark occurred at the warehouses in the port of Callao, near Lima. Officials in South America conducted an investigation into the royal warehouse in Callao but the results were ultimately inconclusive, see:
[102] José Diguja to Pedro de Valdivieso [Copy], Quito, 4 September 1773, AGI, Quito 239, fol. 123r.
[103] Ibid.

which will be kept separate, so that the Royal Pharmacy could examine the quality [of this bark]."[104] These samples were to serve as proof of the pharmacists' error. Diguja ended his letter by urging Valdivieso to make sure that there would not be "another case like this one."[105]

Valdivieso received Diguja's letter as well as the pharmacy's materials on September 16, 1773.[106] The time and place could not have been more opportune. Valdivieso was at that "House of His Majesty for the receipt and packing of [*quina*]" in Malacatos, a small village east of Loja, where he went each year to receive *quina* gathered over the summer by his bark collectors in order to prepare the next shipment for the monopoly.[107] Consequently, when the pharmacy's sample arrived, it was received and reviewed not only by Valdivieso but also by twenty to thirty experts on the cinchona tree and its bark.[108] He later testified to opening the box "in the presence of various white men [*hombres blancos*] and many natives [*naturales*], all with experience who gathered around on the occasion of having come to deliver their respective *arrobas* of *cascarilla*."[109]

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[104] Ibid.
[105] Ibid.
[106] Pedro de Valdivieso, *Auto*, [Malacatos], 16 September 1773, AGI, Quito 239, fols. 123v-124r.
[107] Because moisture compromised the bark's medical virtue, bark collection occurred during the dry season from April to August, see: M. Petitjean and Y. Saint-Geours, "La economía de la cascarilla en el corregimiento de Loja," *Cultura: Revista del Banco Central del Ecuador* V, no. 15 (1983), 171-207. Valdivieso related the conditions of his receipt of the "little box" (*cajonsillo*) from the President of Quito at the beginning of an *auto* that he issued on September 16, 1773, see: Pedro de Valdivieso, "Auto," [Malacatos], 16 September 1773, AGI, Quito 239, fols. 123v-124r.
[108] Valdivieso testified that he opened the box containing the sample "in the presence of various white men and many natives, all with experience [harvesting the bark], who were gathered [at Malacatos] to deliver their respective quantities of [*Quina*]," see: Pedro de Valdivieso, "Decree," [Malacatos], 16 September 1773, AGI, Quito 239, fols. 123v-124r. Testimonies from other witnesses provided estimates that twenty to thirty people were present at the examination.
[109] Pedro de Valdivieso, "Auto," [Malacatos], 16 September 1773, AGI, Quito 239, fols. 123v-124r.

Valdivieso took testimony from seven of the examiners ranging from an indigenous laborer to an *hacienda* owner.[110] He probably did so because they had made the surprising discovery that the Royal Pharmacy's sample was not from Loja. All examiners noted that the durability, color, and taste of the pharmacy's sample differed from the bark from Loja as in the case of Pedro Cevallos, an indigenous laborer, who reported that he "detected a hint of acidity in the bitterness of the pharmacy's sample [while *quina* from Loja has] a pure and constant bitterness that lasted longer."[111] Both Cevallos and Mathias de Salazar, a resident of Loja and owner of a *hacienda* in Vilcabamba, noted that the Royal Pharmacy's sample was "harder" than the bark from Loja.[112] As to flavor, Cevallos noted that "in the bitterness [of the bark] a hint of acidity [*agrio*] can be detected" while in the bark from Loja "one perceives a pure and constant bitterness that lasts longer than that of the sample."[113] Two additional witnesses, Nicolas del Carpio and Matheo Benites, simply observed that a direct comparison of the sample from Madrid with the bark recently collected in Loja revealed the differences between the two samples.[114] Thus, testimony from a

[110] Examiners included: Antonio Blanco de Alvardo (a forty-eight year old resident of the City of Loja), Alexandro Toledo (thirty-six years old), Juan de Aguirre de Dicastillo (a forty-four year old from Jaen), Pedro Cevallos (a "native" (*natural*) of Vilcbamba more than thirty-years old), Mathias de Salazar (a resident of Loja and owner of an *hacienda* in Vilcabamba), Nicolas Carpio (a resident of Loja and owner of an *hacienda* in Malacatos), and Matheo Benites (the *Alcalde Mayor de Naturales* in Malacatos). Their testimonies were taken on September 17, 1773, see: AGI, Quito 239, fols. 124r-130r.

[111] Pedro Cevallos, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 126r-127r.

[112] Pedro Cevallos, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 126r-127r; Mathias de Salazar, "Certficación," Malacatos, 17 September 1773, AGI, Quito 239, fols. 127v-129r.

[113] Pedro Cevallos, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 126r-127r.

[114] Nicolas Carpio, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 127r-v; Matheo Benites, "Certificación," Malacatos, 17 September 1773, AGI, Quito 239, fols. 129r-130r.

variety of witnesses supported the claim that the Royal Pharmacy's sample was not from Loja.[115]

Meanwhile, several examiners, who had experience harvesting cinchona bark in the neighboring Province of Jaen (Map), were able to identify the pharmacy's sample as a product of Jaen.[116] For example, Antonio Blanco de Alvarado, a forty-eight year old resident (*vecino*) of Loja, stated that the sample was "different from that collected in the hills of Uritusinga and Cajanuma and very similar to that collected in the Hills of the Province of Jaen."[117] Alvarado was certainly qualified to tell the difference. In addition to thirty years of experience as a bark collector, he had harvested *cascarilla* in Jaen in 1770 – the year that Valdivieso sent his second shipment, the very "corrupted" shipment that arrived in Madrid in 1773. Two other witnesses, Alexandro Toledo and Juan de Aguirre de Dicastillo, also had experience working with *cascarilla* from Jaen and corroborated Alvarado's testimony on the origins of the Royal Pharmacy's sample.[118]

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[115] Antonio Blanco de Alvarado came to the conclusion that the bark was from Jaen based on the physical features of the bark – especially its hardness – which Alvarado and other witnesses claimed were a product of the way in which *cascarilla* was dried in Jaen. The procedure in Jaen, according to Alvarado, was to chop down the whole tree and let the bark "air out" for "six or seven days" with the tree lying on the forest floor, see: Antonio Blanco de Alvarado, "Testimonio," Malacatos, 16 September 1773, AGI, Quito 239, fol. 124v. Nicolas Carpio, who did not have direct experience harvesting *cascarilla* in Jaen, built on Alvarado's testimony by explaining that such a production process could not be used in Loja. Since *cascarilla* trees in Loja were so scarce, explained Carpio, bark collectors did not have the luxury of indiscriminately chopping down the tree lest the supplies become scarcer. Carpio further explained that it took bark collectors one to two months to produce one *arroba* (twenty five pounds) of *quina* whereas fifteen years earlier Carpio recalled collecting one *arroba* in two to three days, see: Nicolas Carpio, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 127r-v.

[116] Antonio Blanco de Alvarado, Alexandro Toledo, and Juan de Aguirre de Dicastillo testified to having experience harvesting bark in Jaen.

[117] Antonio Blanco de Alvarado, "Testimonio," Malacatos, 16 September 1773, AGI, Quito 239, fols. 124r-125r.

[118] Alexandro Toledo, "Testimonio," Malacatos, 16 September 1773, AGI, Quito 239, fols. 125r-v; Juan de Aguirre de Dicastillo, "Testimonio," Malacatos, 16 September 1773, fols. 125v-126r. All of these witnesses seem to assume that the Royal Pharmacy's bark sample

This finding presented a problem for Valdivieso. After all, the objective was to provide the Crown with the best bark, but, as Valdivieso and many others knew, the best *quina* came from Loja not Jaen. In contrast to the royal pharmacists, experts in Loja used the bark's physical characteristics as clues to its geographical origin – the main indicator of quality for those involved in the commercial *quina* trade. Ironically, while this sample represented the Royal Pharmacy's attempt to impose their knowledge on bark collectors, it put the expertise and knowledge of the pharmacists into question.

To further support his credibility as an expert on *quina*, Valdivieso also provided testimony regarding his techniques for preparing and packaging the bark. These accounts revealed that individual bark collectors dried the bark before bringing it to Valdivieso. As Mathias de Salazar explained, many bark collectors were already drying their bark in the sun, as requested in the Royal Pharmacy's instructions. Due to the scarcity of cinchona trees, Salazar explained, it took bark collectors most of the summer to acquire their requisite one to two *arrobas* (25-50 pounds) of *quina* from the hills of Loja. As a result, they had little time leftover for drying the bark so they put it in the sun to facilitate this process.[119] Many of the witnesses noted that Valdivieso was meticulous in selecting only the best bark and making sure that the bark was fully protected from humidity. Salazar asked, "who has not seen and experienced the detailed attentions [of Valdivieso] in this Royal Service[?]"[120] Matheo Benites stated that he was witness to the "great care,...,that Governor Don Pedro Xavier de

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came from the bark that Valdivieso sent in 1770. There is no evidence of where the Royal Pharmacy got its sample.

[119] Mathias de Salazar, "Testimonio," Malacatos, 17 September 1773, AGI, Quito 239, fols. 127v-129r.

[120] Ibid.

Valdivieso [took] in examining all of the *cascarilla arroba* by *arroba*."[121] This testimony was a response to the implications of Spanish officials and pharmacists that Valdivieso's techniques were flawed.

What of the problem discovered with the pharmacy's sample? Surely, it was clear that the flaw was in the techniques employed by the Royal Pharmacists. Although he trusted the results of the examination of the sample at Malacatos, Valdivieso was not quite ready to openly refute the pharmacy. Instead, he asked the Town Council of Loja to examine the sample. Yet, unlike the bark collectors who had experience harvesting *quina*, the council members were, in general, ignorant of the different kinds and qualities of bark. Eager to enlist their support, Valdivieso made things easier for the council members by providing samples of bark from Jaen and from Loja for comparison with the pharmacy's sample.[122] He also included a sample of "fine [bark] from the hills of this Jurisdiction [Loja]."[123]

The Town Council confirmed the diagnosis of Valdivieso's bark collectors. First, a group of "experienced deputies" of the council, composed of Manuel de Riofrio, Bartholome de Bivanco, and Bernardino de los Rios, examined the various samples of the bark. They reported: "comparing the quality of the sample from the little box with that of Loja, a notable difference was found in the color, exterior [*envés*], and bitterness between one and the other."[124] They also confirmed that

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[121] Matheo Benites, "Certificación," Malacatos, 17 September 1773, AGI, Quito 239, fols. 129r-130r.
[122] Along with the Royal Pharmacy's sample, Valdivieso sent "five bundles [of bark] from the Province of Jaen four of which were sent by my request from the Governor [of Jaen] Don Patricio de Vega and one from Don Bernardo de Andrade Lieutenant of Zumba in the mountains,"see: Pedro de Valdivieso, "Exorto del comisionado," Loja, 20 September 1773, AGI, Quito 239, fols. 130r-v.
[123] Pedro de Valdivieso, "Exorto del comisionado," Loja, 20 September 1773, AGI, Quito 239, fols. 130r-v.
[124] Manuel de Riofrio, et. al., "Reconocimiento," Loja, 20 September 1773, AGI, Quito 239, fols. 130v-131r.

Valdivieso's samples of bark from Loja were "superior quality" – a testament to his expertise as a bark collector. The next day, the Town Council as a whole issued a statement in which they observed, "we do not know what reason or rule the Doctors and Employees of the Royal Pharmacy have for choosing the bark of a specific part of the plant when here the people who collect the bark cannot distinguish a difference."[125] Bark harvested from trunk tended to be thicker than that from branches; thickness was one of the key physical characteristics that the royal pharmacists used to assess the bark.[126] Here, council members in Loja openly rejected the use of this physical characteristic – thickness – in determining the quality of *quina*. What matter most was where the bark was harvested. In their assessment of the sample from the Royal Pharmacy, Valdivieso, the bark collectors, and the City Council of Loja worked hard to make the case that only bark from the hills of Uritusinga and Cajanuma in Loja was superior. In addition, they used the opportunity to highlight the arbitrariness of European tastes in *quina*.

Valdivieso next sought to convince the President of Quito, José Diguja, by sending a box of nine samples – the first five were from Jaen, the sixth was the Royal Pharmacy's sample, the seventh was bark from Cuenca and samples eight and nine were from Loja. In effect, Valdivieso created a miniature and mobile natural history collection of cinchona bark. Note the strategic arrangement of the samples with the Royal Pharmacy's sample sandwiched between those from Jaen and from Loja to promote comparison. Valdivieso also pointed out that the Jaen hypothesis – so to speak – had the advantage of explaining the humidity that the pharmacists observed in the boxes. Since the rainy season lasted for eleven months in Jaen, Valdivieso

[125] Francisco Palacios Vallejo, et. al., "Reconocimiento," Loja, 21 September 1773, AGI, Quito 239, fols. 131v-132v.
[126] Manuel Gonzalez Garrido and Diego Lopez Manzera, "Copia de la Ynstruccion...," [Madrid], 16 March 1773, AGI, Indiferente 1554, fols. 20r-v.

reasoned that it was more "difficult to get the *cascarilla* to the [level of] dryness required within a day or two after cutting."[127] Insufficient drying time in Jaen was one of Jaen's unique characteristics as a place that explained the pharmacy's findings. As to the Royal Pharmacy's selection of thin bark from the branches, Valdivieso noted, "they can perform the most copious experiments on all of these classes [*cortezon, cortezonsillo, medio cañuto, cañuto entero y cañutillo*] and they will find the same efficacy in the virtue without finding a reason to throw out any class but if they were to find one [a reason to reject a certain class of bark]." "I hope that they will inform me [of the results]," he added.[128] Valdivieso wrote to Diguja:

> I should inform Your Lordship that obedience is indispensable to the execution of the Royal Will. However, the Instruction from the Individuals of the Royal Pharmacy for the selection of *Quina* lacks the full knowledge of its qualities and nature that comes from being able to examine [the tree] and from longstanding experience of knowing how to distinguish which of this species have been spurned for decades as much by natives as by merchants.[129]

Here, Valdivieso challenged the Royal Pharmacy's authority and rejected their knowledge by implying that it was, in fact, the royal pharmacists who could not distinguish superior from inferior *quina*.[130]

In Quito, José Diguja, assembled a group of experts, including Ignacio Checa, a former *Corregidor* of Loja, Juan de Zaldumvide, a former Governor of Jaen, Friar Joseph del Rosario, the Prefect of the Royal Charity Hospital in Quito, and Luis Espejo, a surgeon, to examine the samples sent by Valdivieso. This group concurred with previous examinations and described the pharmacy's sample as "that inferior

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[127] Pedro de Valdivieso [to José Diguja,] Loja, 24 September 1773, AGI, Quito 239, fol. 134v.
[128] Ibid., fol. 138r.
[129] Ibid., fol. 138v.
[130] This passage echoes the phrase, "Obedezco pero no cumplo," (I obey but do not comply), which was used by colonial officials to acknowledge but not enact orders from the Crown that would be detrimental to local conditions, see: Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988).

quality bark which the Territories of Jaen and Guancabamba produce."[131] Upon inspecting a box of *cascarilla* from Loja sent by Valdivieso, the commissioners noted that the *cascarilla* in this box "was found to be the best of that which is known to be harvested in Loja." This bark from Loja, they continued, was "different in every respect from that which was examined from the little box that was sent by the Royal Pharmacy."[132]

Diguja was convinced. On December 20 1773, just three months after ordering Valdivieso to collect only that bark which matched the pharmacy's sample, he informed the Minister of the Indies in Spain that "the *Quina* which has been selected by the Royal Pharmacy and [which] I have been ordered to send is [considered] entirely useless and contemptible by those who have knowledge of this specific."[133] He further explained that the pharmacy's sample was "not [from], nor was it harvested in the Forests of Loja but in those of Jaen de Bracamoros, Piura and other [places] like these that produce *quina* that is not of superior quality."[134] "Since such [bark] does not have value," Diguja further noted, "Merchants make a mixture of that bark with bark from Loja with which they deceive those who have little knowledge

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[131] Meanwhile, they hailed Valdivieso's *quina* as "the best of that which is known to be harvested in Loja." Ignacio Checa, et al., "Reconocimiento," Quito, 9 November 1773, AGI, Quito 239, fol. 140v.

[132] Ignacio Checa, et al., "Reconocimiento," Quito, 9 November 1773, AGI, Quito 239, fol. 140v.

[133] José Diguja to Julian de Arriaga, Quito, 20 December 1773, AGI, Quito 239, fol. 102r. Diguja's letter to the Minister of the Indies stretched to twelve manuscript pages and focused on several themes. The theme that received the least attention was Diguja's explanation of the cause of the poor quality of the 1770 shipment. Convinced that Valdivieso's techniques in harvesting and packaging the bark were impeccable and that the corruption was the result of theft and substitution of the bark while in transit, Diguja directed Arriaga's attention to the port of Callao in the Viceroyalty of Peru. As evidenced by a similar point that Diguja made in a letter to Valdivieso three months earlier, Diguja had been suspicious of Callao for a while. Between the findings of Miguel de Muzquiz in Spain and those of Valdivieso, all other explanations for the corrupted shipment had been eliminated. A switch at Callao was the only remaining possibility in Diguja's estimation.

[134] José Diguja [to Julian de Arriaga], Quito, 20 December 1773, AGI, Quito 239, fol. 104r.

of this specific."[135] Diguja's implication is clear. Not only did the Royal Pharmacy lack sufficient knowledge of *quina* to make determinations as to its quality but the royal pharmacists had also revealed themselves as dupes in their choice of the bark from Jaen to use as a sample for guiding the selection of bark for the King.[136] Thus, Diguja went one step further than Valdivieso in rebuking the Royal Pharmacy.[137] Diguja also – *à la* Valdivieso – sent a box of bark samples to the Minister of the Indies and encouraged him to see for himself that the pharmacy's bark was "inferior, stale, and not from Loja."[138]

Conclusion

Since 1751, the movement of cinchona bark had been unidirectional from west to east, New World to Old. Merchants and the Spanish Crown extracted large quantities for consumption by Europeans while officials of the imperial bureaucracy sent samples of *quina* for examination at the Royal Pharmacy. In 1773, the Royal Pharmacy sent a bark sample against this current back to South America in an attempt to extend its knowledge and expertise to Loja. However, the pharmacy's knowledge did not travel with the bark. When it arrived in Loja, Valdivieso and his bark collectors created knowledge of the sample anew.

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[135] Ibid.

[136] Later in his letter, Diguja made a similar comment in stating that this bark of the Royal Pharmacy's sample "does not have the least value [*estimación*] nor use among those who know how to identify it and only Merchants and those ignorant of this specific send it, for the purpose of doing business, and sell it in Europe to those who have no knowledge of its poor quality." Again, the implication is that the Royal Pharmacy is to be included among the group of "those who have no knowledge of its poor quality," see: José Diguja [to Julian de Arriaga], Quito, 20 December 1773, AGI, Quito 239, fols. 108r-109v.

[137] Later in his letter, Diguja further emphasize the ignorance of the pharmacists in his observation that the pharmacy's sample "does not have the least value [*estimación*] nor use among those who know how to identify it and only Merchants and those ignorant of this specific send it, for the purpose of doing business, and sell it in Europe to those who have no knowledge of its poor quality," see: Ibid., fols. 108r-109v.

[138] Ibid, fols. 102v-103r.

Multiple examinations in Loja and Quito revealed that the sample was inferior quality and *not* the best bark as the Royal Pharmacy claimed. This finding, in turn, led many officials, including even the President of Quito, to doubt if not deny the authority and expertise of the Royal Pharmacy. Consider the transformation of Pedro de Valdivieso. Whereas in 1769 Valdivieso collaborated with the Royal Pharmacy in the production of knowledge by sending a box of samples for testing in Madrid, in 1773, this collaboration broke down and Valdivieso openly challenged the Royal Pharmacy's expertise and rejected their knowledge. The pharmacy had failed.

This failure is striking when juxtaposed with Valdivieso's relative (if limited) success.[139] Through circulating collections of bark samples, Valdiviso enlisted the Town Council of Loja and the President of Quito in support of his assessment of the pharmacy's sample. These collections were so effective that the President of Quito even suggested that no expertise was needed to identify different barks. He observed in a letter to the Minister of the Indies: "it is not necessary to be a Botanist in order to distinguish the difference between these classes [of bark]."[140] It is not clear why he singled out botanists over pharmacists; either way, the message was clear: distinguishing between barks did not require scientific expertise. This view, of course, ignored the fact that the collective knowledge and expertise of Valdivieso and his bark collectors were essential to selecting which barks to set alongside the pharmacy's sample.

What explains the pharmacy's failure at circulating knowledge of cinchona bark? Using the same sample and similar techniques (collection and comparison), pharmacists and bark collectors produced different results. Differences in the

[139] There is no evidence that Valdivieso tried to convince the pharmacists of their error.
[140] José Diguja to Julian de Arriaga, Quito, 20 December 1773, AGI, Quito 239, fol. 110v.

sociocultural contexts were significant. The royal pharmacists assessed and selected their bark according to the values of the royal gift economy in Madrid. In this context, physical characteristics of the bark were the key to distinguishing superior from inferior bark. Meanwhile, Valdivieso and bark collectors in Loja as well as officials in Quito assessed the bark according to the values of a commercial economy in which physical characteristics were merely clues to geographical origin – the main determinant of the bark's quality. If anything, the royal pharmacists learned that knowing *quina* in Madrid was one thing; acting on it in Loja was another. It was in action that the fragility of the pharmacy's power as an institution of imperial science became evident. In addition, this case further refines my claim about the imperial culture of knowledge production. While there was to a certain extent a common culture of knowledge production embedded in the imperial bureaucracy that connected forest to pharmacy and vice versa, this culture of knowledge production was, in turn, embedded in the larger social and cultural contexts that comprised the Atlantic World in the late eighteenth century. Consequently, since it stretched over a vast geographical expanse, the imperial bureaucracy encountered and interacted with a wide variety of contexts.

Unfortunately, there are no documents of the reaction in Spain to Valdivieso's rejection of the pharmacy's sample. Records from shipments after 1773 do suggest that the problem of corrupted *quina* shipments ceased. These records also show that Valdivieso continued to harvest *quina* from the forests of Loja.[141] Valdivieso prevailed. Yet, at the end of this whole affair, it is likely that pharmacists in Madrid

[141] For invoices of shipments from 1774 to 1779, see: Pedro de Valdivieso, "Factura," Loja, 6 December 1774, AGI, Quito 239, fols. 192r-193r; Pedro Valdiviso, "Factura," Loja, 8 November 1776, AGI, Quito 239, fols. 242r-243r; Pedro de Valdivieso, "Factura," Loja, 7 Novembber 1777, AGI, Quito 239, fols. 321r-322v; Pedro de Valdivieso, "Factura," Loja, 17 October 1778, AGI, Quito 239, fols. 354r-355v; Pedro de Valdivieso, "Factura," Loja. 7 November 1779, ANH/Q, Cascarilla, box 2, *expediente* 4, fols. 7r-8v.

and bark collectors in Loja remained just as entrenched in their local conceptions of *quina*.[142] As for the King, he still got his "noble" *quina* just not according to the criteria of his pharmacists.

[142] The pharmacy's conception of superior *quina* persisted. In 1790, during another period of reform to the monopoly, the Crown sent the pharmacy's 1773 instructions to Loja.

Chapter 3

Not Expertise but "Vain Science:"
South American Perspectives on European Experts and Imperial Policies
(1776-1779)

Within the culture of knowledge production embedded in and constituted by the Spanish imperial bureaucracy, there had been an implicit division of intellectual labor between local experts in Spanish America and learned experts in Spain in the 1750s and 1760s. We have also seen that the effective administration of the *estanco de quina* was a problem of knowledge as much as it was a problem of imperial governance. With regard to cinchona bark, the division of intellectual labor meant that local experts in South America were essential to identifying and describing the problems that learned experts in Madrid were then asked to solve.[1] Consequently, local experts in Quito possessed considerable autonomy and authority vis-à-vis their counterparts in Madrid. Such a division of labor reflected the high value placed on empirical methods within the imperial culture of knowledge production. It also reflected the practicalities and difficulties of knowing the New World. Since the sixteenth century, the Crown had generally preferred to solicit information from local officials and informants already in the Americas, rather than send experts from Madrid to collect the information directly.

In the late 1770s, bureaucrats in the *Audiencia* of Quito initiated an attack on learned experts not just in Spain but also in all of Europe. Fraud and scarcity still plagued the *quina* trade, and imperial policies and European expertise appeared

[1] The cooperative efforts between Pedro de Valdivieso and the Royal Pharmacy illustrate this point (Chapter 2).

powerless to solve these problems. Thus, bureaucrats suggested that the learned experts – botanists, pharmacists, physicians, and chemists – had little utility to the *estanco de quina*. This was a significant moment for the monopoly when local experts in America were poised to establish themselves as the pre-eminent experts on the cinchona tree and its bark to the exclusion of learned experts in Europe.

Even though these efforts were unsuccessful in the long term, American critiques of European expertise further highlight the workings and possibilities of the imperial culture of knowledge production. More than that, this episode reveals how imperial subjects could cast European sciences as impotent and ineffective. Indeed, from the American perspective, science had not only failed the Crown but had also failed the empire as a whole. Rather than provide solutions, European experts only compounded the confusion largely because of their lack of first-hand knowledge of American nature, or so the local experts in South America claimed. By taking advantage of the techniques of the imperial culture of knowledge production and the high value placed on empiricism and direct observation, local experts were able to cast doubt upon the efficacy of European science to the investigation and administration of *quina*.

This episode, thus, provides an American counterpoint to European conceptions of the limits of science in imperial contexts (explored in later chapters). Both the social and geographical location of scientific practitioners and their critiques is a key element here. One distinctive feature of the American critiques discussed below is their attention to the relationship between knowledge and value. Local officials and experts emphasized the importance of empirical observation of the natural world in South America as the path to true knowledge. In order to really know about *quina*, one had to observe the cinchona tree *in situ*. Knowledge gained from

direct observation of the tree in South America was the best determinant of its medicinal and commercial value, according to local experts in the *Audiencia* of Quito. As several critics argued, Europeans, including scientific practitioners, took the wrong approach. The problem was that Europeans used society not nature as the source of value. American critics argued that European knowledge of *quina* was not knowledge of its natural qualities but rather knowledge of social tastes and preferences for certain kinds of bark over others. Europe's merchants and learned experts helped to support this situation by focusing on subjective knowledge of the social world (the tastes of consumers) rather than on the objective knowledge produced by direct study of the natural world. In this way, local experts in South America cast their attack on learned experts in Europe not simply as a matter of methods but also as a matter of the proper relationship between society and nature, value and knowledge, New World nature and Old World desire. In this, a critique about the proper locus of value and knowledge (society vs. nature) drew additional potency and volatility from larger geopolitical tensions between experts in South America and their counterparts in Europe.

European Science as "Vain Science:" The View from New Granada

The most forceful and salient critique of the role of European experts in the *estanco de quina* came from a customs official in port of Guayaquil. Miguel García de Cáceres included his critique as part of a report to José García de Leon y Pizzaro, the new *Visitador General* to the *Audiencia* of Quito. Indeed, García de Cáceres had promised García de Leon a "reasoned proposal" for reforming the *estanco de quina*. Learned experts were part of the problem, according to García de Cáceres, and he emphasized two major problems with European knowledge of cinchona bark: it was

vain and biased. These characteristics in turn meant that the contributions of learned experts were both useless and ineffectual. García de Cáceres' message was clear: one of the sources of disorder in the *quina* trade and its regulation was European science. Before considering his critique in more detail, let us first consider the conditions that gave rise to it.

One immediate condition was the arrival of the new *Visitador General* to Quito in 1778. José García de Leon y Pizarro had come from Spain, where he was a career bureaucrat in the service of the Bourbon Crown. García de Leon was a reformer in the same mold as his mentor and patron, José de Gálvez, who had just become Minister of the Indies in 1776. These new appointments represented somewhat of a sea change in the personnel of the Spanish imperial bureaucracy.[2] Gálvez was one of the most influential and reform-minded Ministers of the Indies under the Bourbons. While on his own *visita* of New Spain (1765-1772), Gálvez initiated substantial reforms to increase revenue extraction from the viceroyalty, strengthen the power of the state, especially the Crown, and restrict the political influence of American elites, especially *criollos*.[3] García de Leon looked to produce similar results in Quito.

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[2] Mark A. Burkholder and D. S. Chandler, *From Impotence to Authority: The Spanish Crown and the American Audiencias, 1687-1808* (Columbia: University of Missouri Press, 1977); Mark A. Burkholder, "The Council of the Indies in the Late Eighteenth Century: A New Perspective," *The Hispanic American Historical Review* (1976), 404-423.

[3] Kenneth Maxwell, "The Atlantic in the Eighteenth Century: A Southern Perspective on the Need to Return to the 'Big Picture'," *Transactions of the Royal Historical Society, Sixth Series* 3 (1993), 209-236; Allan J. Kuethe, "The Early Reforms of Charles III in the Viceroyalty of New Granada, 1759-1776," in *Reform and Insurrection in Bourbon New Granada and Peru* (Baton Rouge: Louisiana State University Press, 1990), 19-40; Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988); D. A. Brading, "Bourbon Spain and its American Empire," in *The Cambridge History of Latin America*, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984); D. A. Brading, "Review: Bourbon Spain and Its American Empire," *The Historical Journal* 24 (1981), 961-969.

His appointment also represented a delayed response from Spain to the 1765 insurrection in Quito that convinced the Crown and its advisors that the region was in need of reform.[4] García de Leon's *visita* as a result had the explicit aim of "making the administrative structure of the state more centralized and efficient."[5] Another objective was to increase revenue from the colonial treasuries. Both García de Leon and his successor, Juan Villalengua y Marfil, squeezed additional revenue from Quito's coffers by levying new taxes, reorganizing the collection of existing taxes, and imposing royal monopolies on products such as cane liquor (*aguardiente*). In order to achieve these objectives, García de Leon was given extraordinary power through simultaneous appointment as "*visitador*, president-regent (the newly created post of presiding officer), treasury sub delegate, and *capitan general* (with supreme military power) in the *Audiencia* of Quito."[6]

The Crown also ordered García de Leon to give "special attention" to the "cultivation, conservation, and proliferation of [*Quina*] Trees."[7] Since García de Leon, like his mentor Gálvez, favored royal monopolies as a means to extract revenue, he supported the *estanco de quina* especially as a result of his positive experience with "the monopolies of Tobacco, *Aguardiente de Caña*, Gunpowder and other products."[8] Even though he had brought a copy of Miguel de Santisteban's 1753 report, García

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[4] Kenneth Andrien, *The Kingdom of Quito, 1690-1830: The State and Regional Development* (Cambridge: Cambridge University Press, 1995), 189; Anthony McFarlane, "Identity, Enlightenment and Political Dissent in Late Colonial Spanish America," *Transactions of the Royal Historical Society, Sixth Series* 8 (1998), 309-335; Anthony McFarlane, "The Rebellion of the *Barrios*: Urban Insurrection in Bourbon Quito," in *Reform and Insurrection in Bourbon New Granada and Peru* (Baton Rouge: Louisiana State University Press, 1990), 197-254; Anthony McFarlane, "Civil Disorders and Popular Protests in Late Colonial New Granada," *Hispanic American Historical Review* 64 (1984), 17-54.
[5] Andrien, *Kingdom of Quito*, 190
[6] Ibid., 192
[7] I have not yet located a copy of the original instructions to García de Leon. García de Leon paraphrased them in a letter to José de Gálvez, see: José García de Leon y Pizarro to José de Gálvez, Quito, 18 April 1779, AGI, Quito 240, N. 36, fol. 175r
[8] Ibid., fol. 178r.

de Leon also consulted a variety of local experts. “I endeavored,” he reported, “to speak, confer, and treat of this important [issue], no only with Merchants but also the Porters [*Portadores*], or harvesters as we call them, who transport [the bark] to [Guayaquil].”[9] He also collected samples of “the most useful species.”[10] All of these activities were, as we have seen, the routine techniques of the imperial culture of knowledge production embedded in the imperial bureaucracy. García de Leon soon encountered Miguel García de Cáceres, whom he appointed to the customs office in Guayaquil.[11] Perhaps in return for the appointment, García de Cáceres offered to develop a “reasoned proposal” (*un proiecto razonado*) for reforming the *estanco de quina* in Quito. Access to customs records in Guayaquil as well as his previous position as Governor of Jaen, a major *quina*-producing region, served García de Cáceres well in this task. In a letter to the Minister of the Indies, García de Leon described García de Cáceres as a “subject of philosophical and natural knowledge, experienced in the commerce of this product [*genero*], and [in possession] of the greatest zeal for the service of the King.”[12]

An Emerging Critical Discourse in New Granada

In addition to the immediate needs of the *Visitador General*, García de Cáceres’ critique of European learned expertise was also the product of an emerging critical discourse among officials in New Granada in the late 1770s (Table 3.1). This discourse is most evident in a series of reports and recommendations submitted to the Viceroy of New Granada. In January 1776, the Crown sent two orders to Viceroy

[9] Ibid., fol. 175v.
[10] Ibid., fol. 176r.
[11] Miguel García de Cáceres official title was *Administrador Particular de Alcavalas y Aduana* indicating that he handled customs duties and taxes on trade.
[12] García de Leon to Gálvez, 18 April 1779, fol. 177r.

Manuel Antonio Flores.[13] These orders informed the Viceroy that all future shipments (royal *and* private) of *quina* could only be transported to Spain via Callao, the port associated with Lima.[14] One of the orders also solicited information on the *quina* trade and opinions on expanding and extending the *estanco de quina*. It instructed the Viceroy to form a *junta* to look into the matter. Shortly after receiving the Crown's order, Viceroy Flores convened the *Junta General de Tribunales*, which included Flores, members of the *Audiencia*, and officials from the royal treasury.[15] This *Junta* solicited reports from the President of Quito, José Diguja, as well as several officials in New Granada's main *quina*-producing regions including Loja, Cuenca, Jaen, and Guayaquil. Even though they were asked to answer four specific questions, several respondents included their general observations and opinions on the situation with *quina*.[16]

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[13] El Rey, "Real Cedula" to "Manuel Antonio Flores, Governador y Capitan General del Nuevo Reyno de Granada," El Pardo, 20-I-1776, ANH/Q, Cascarilla, Box 1, *expediente* 11, fols. 11v-13r; El Rey, "Real Cedula" to "Virrey Governador y Capitan General de las Provincias del Perú," El Pardo, 20-I-1776, ANH/Q, Cascarilla, Box 1, *expediente* 11, fols. 86v-87v.

[14] In effect, these orders created a bottleneck at Callao through which all, legal *quina* had to pass. Previously, merchants in New Granada had had the option of shipping the bark north to the Isthmus of Panama via the port of Guayaquil. The royal decrees give little explanation for the change. Some indication of the reason may be found in the Crown's earlier order that shipments for the Royal Pharmacy could only travel to Spain via Callao and Cape Horn, at the southern tip of South America. It was a measure to explicitly safeguard the Crown's quina from the port of Portobelo, on Panama's eastern coast, where fraud was of special concern since the English maintained a trading factory there. Many officials in Madrid believed that this factory gave the English unfettered access to South American goods.

[15] Junta General de Tribunales, Santa Fe, 23 May 1776, fols. 13v-19v.

[16] Transcriptions of the following reports are all found in ANH/Q, Cascarilla, box 1, exp. 11: Pedro de Valdivieso to Manuel Antonio Flores, Loja, 7 August 1776, fols. 24r-27v; Marcos de Lamar and Alvaro de Leon, "Informe," Cuenca, [29] July 1776, fols 29v-39v; Josef Gabriel de [Ycanaz?], Josef Gazan and Miguel de Cueto to Manuel Antonio Flores, Guayaquil, 19 August 1776, fols. 39v-41v; Marques de Villa Orellana, "Informe", Quito, 18 August 1776, fols. 43r-53r; Nicolas Antonio de Carrion y Vaca, "Informe", Quito, 28 August 1776, fols. 53r-66v; Ignacio Checa, "Informe", Quito, 26 July 1776, fols. 66v-73r; Juan de Zaldumbide, "Informe", Quito, 21 July 1776, fols. 73r-74v; Miguel Sanchez Muñoz, "Informe", Cuenca, 24 September 1776, fols. 82v-85v; Antonio Lopez, "Informe", San Felipe, 18 November 1776, fols. 94v-99r; Miguel Senturion and Andres de Oleaga, "Informe", Guayana, 5 August 1776, fols. 108r-110r; Melchor Correa, "Informe", Portovelo, 14 December 1776, fols. 110r-v; Maximo de Bouchet, "Informe", [Cu]maná, 10 January 1777, fols. 111r-v; Josef de Linares and Andres de Oleaga, "Informe", Guayana, 6 February 1777, fols. 111v-113r.

Table 3.1 Dates and locations of main events and documents related to Miguel García de Cáceres' "reasoned proposal" of 1779

Year	Date	Event	Location
1776		José de Gálvez appointed Minister of the Indies.	Spain
1776	January	Royal order issued requiring all shipments of *quina* to pass through the port of Callao near Lima.	Madrid
1776	January	Royal order issued to the Viceroy of New Granada, Manuel Antonio de Flores, asking for information and recommendations on expanding the *estanco de quina* beyond the province of Loja.	Madrid
1776	May	Viceroy Flores establishes the *Junta General de Tribunales* to investigate the Crown's queries about the *estanco de quina*.	Santa Fe de Bogotá
1776	August to February	Officials in Loja, Cuenca, Guayaquil, and "Guayana" submit reports and recommendations solicited by the *Junta General de Tribunales.*	(Various)
1778	?	José García de Leon y Pizarro arrives in the *audiencia* of Quito to begin his *visita general*.	Quito
1779	March 16	Miguel García de Cáceres, a customs official in Guayaquil, submits his "reasoned proposal" regarding the *estanco de quina* to *Visitador General* Leon y Pizarro.	Guayaquil

Many expressed skepticism toward European knowledge of the cinchona tree and its bark. In particular, they targeted the European obsession with the question of the quality of the bark – a central issue for the Crown and the *estanco de quina* since 1751. Consider the report submitted by the Marquis de Villa Orellana, a *quina* trader from Cuenca. He gave his own assessment that, in the past, there had been too much preoccupation with certain "accidental" qualities of the bark such as its "curled shape" (*la figura de canuto*) and color.[17] Just as Valdivieso and his bark collectors had done a few years earlier, Orellana challenged European methods and criteria for assessing the bark. Furthermore, Orellana's comment stressed that Europeans had not developed knowledge of the bark's essential qualities because of their fixation on

[17] Marquis de Villa Orellana, "Informe" [copy], Quito, 18 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 47v

its accidental qualities. He offered a simple solution: transport *quina* not as whole bark but as an "extract in Paste or in salts." This process offered "the convenience of reducing [the bark] to its most noble and spirituous material" and eliminated those accidental qualities that led European astray.[18] Indeed, this technique would have made it impossible for Europeans even to consider such qualities in their evaluations of the bark. Thus, Orellana's report cast the main criteria used by Europeans for assessing the bark as irrelevant to assessing the true qualities of a given *quina* sample. It was an early formulation of García de Cáceres' vanity critique.

Nicolas Antonio de Carrion y Vaca, a respondent in Quito, also expressed dissatisfaction with European criteria for evaluating the bark. Unlike Orellana, he did not entirely reject the use of physical qualities as clues to the bark's essence, but thought that Europeans were using the wrong ones. "*Quina* of the first class," according to Carrion, was distinguished by several characteristics including: "a burnt color" (*un color ensendido*) on the inside, "a black exterior color" (*el embes es nigricante*), a special type of cracking indicating lack of humidity, breakage "like glass," and a "rough and granulated" texture."[19] Where Europeans went wrong was in their emphasis on the thickness of the bark. For Carrion, it was still an open question "whether the best *cascarilla* is *canutillo* [thin bark from branches] or *costrón* [thick bark from the trunk]."[20] This issue was especially important since merchant "contracts" often specified the desired thickness of the bark.[21] Here, Carrion connected the problems of knowledge and value. What troubled him was that there

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[18] Ibid., fol. 48r. Some merchants did begin trading in *quina* extract in the 1770s and 1780s but the volume of trade was only a small fraction of the total trade in the bark, see: Carlos Contreras, *El Sector Exportador de una Economia Colonial: La Costa del Ecuador entre 1760 y 1820* (Quito: Facultad Latinoamericana de Ciencias Sociales/ABYA-YALA, 1990).
[19] Nicolas Antonio de Carrion y Vaca, "Informe" [copy], Quito, 28 August 1776, ANH/Q, Cascarilla, box, 1, exp. 11, fols. 63v-64r.
[20] Ibid., fol. 64r.
[21] Ibid.

was an incongruity: the commercial valued assigned to *quina* was not based on true knowledge of the bark. Merchant contracts that erroneously singled out thin bark as the best were the proof. To Carrion, such contracts alone were evidence that consumer tastes rather than true knowledge of *quina* were determining the value of different kinds of cinchona bark. He then cast the question of thickness as a non-issue. "I pay no attention to whether [*canutillo*] is better than [*costrón*]," he explained, "since the dispute only exists among Merchants who know little or are totally ignorant of Botany."[22]

This specific critique fit into his broader distinction between the true knowledge of "Intelligent [people]" (*los Ynteligentes*) and the false knowledge of merchants. In Carrion´s view, the veracity of the knowledge of "los ynteligentes" derived from direct examination of the bark. Conversely, merchants had knowledge only of consumer tastes and demands. As a result, they sought to match their products to consumer desires. From Carion's perspective, this distorted the correct relationship between knowledge and value since fickle consumer taste rather than the product's natural qualities determined value in terms of both desirability and price. The interests of merchants and their association with market made their knowledge inherently subjective and false, from Carrion's perspective.[23]

Carrion still believed in the possibility of true knowledge of *quina*. The problem was that experts had not conducted the necessary tests. Returning to the

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[22] Ibid., fols. 63v-64r.

[23] Marquis de Villa Orellana's report also cast doubt on the knowledge offered by those directly involved in the commercial trade in quina. Orellana described how, after the discovery of quina in Cuenca in 1725, the citizens of Loja, fearing that "their [bark] might be spurned," encouraged "attempts to discredit [quina from Cuenca] in the Factories of Panama and Portobelo where the English purchased [quina]." Ultimately, quina from Cuenca received a favorable assessment on the basis of "the Report from [their own] Eyes which could not perceive a difference" and "the many medical experiences that were had," see: Marquis de Villa Orellana, "Informe" [copy], Quito, 18 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 45v.

problem of *canutillo* versus *costrón*, Carrion conceded that the former did have the advantage of being easier to reduce to a powder for therapeutic use. However, this advantage said nothing of its medical efficacy. He noted, "it is not known if [*costrón*] is inferior in quality."[24] "To me it seems," Carrion continued, "that the only way to know the gradations of activity [between *canutillo* and *costrón*] would be by means of a physical investigation conducted by Intelligent Persons." Such investigation "could be done chemically or by repeated experience which is the most certain test."[25] These lines provide only the briefest sketch of who might qualify as an "*ynteligente*" or expert. Notably, he places emphasis on empirical observation and chemical testing. While he agreed that such testing might yield true knowledge, the real failure of European scientific experts was that they had not bothered to perform an investigation of the influence of bark thickness on its medical virtue. Consequently, there was still a significant amount of "uncertainty" as to the efficacy of *costrón* and, after ridiculing the tests used by merchants in the *quina* trade, he concluded "until a formal experiment [*experiencia*] is made by Persons who understand physical principles, I fear that causes will be confused with effects."[26] Until then, the only "knowledge" available – if one can call it that – was merchant knowledge of what consumers preferred regardless of whether this preference was based a quality that reflected the essence of the bark.

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[24] Nicolas Antonio de Carrion y Vaca, "Informe" [copy], Quito, 28 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 64v.

[25] Ibid., fol. 64v-65v. He described two tests used by merchants. In one test, merchants would examine the "durability of the outer layer of *quina*" with their "thumbnail" (that bark which resisted most was considered to be better quality presumably because this indicated that the bark was fully dried). Another test involved submerging two *canutillos* of equal "mass" and equally "dried" in a glass of water (that bark which sank to the bottom first was the "most advantageous quality").

[26] Ibid., fol. 65v.

The View from Guayaquil

In his 1779 report to García de Leon, García de Cáceres drew on the two main tropes represented by Orellana's and Carrion's report: the vanity of European science and its connection to the world of commerce. His report had two main purposes. First, he provided García de Leon with an estimate of the cost of collecting, preparing, packaging, and transporting to Spain 16,000 *arrobas* of *quina* (400,000 pounds), the target amount of bark for the annual shipments. His total projected cost was 178,844 *pesos*, 2 *reales*. If the Crown were to sell the bark in Spain at his suggested price 2 *pesos*/pound, then he estimated an annual profit of 621,155 *pesos*, 6 *reales*.[27] A second purpose of his report was to convince readers that the efforts to identify and assess the quality of different kinds of *quina* were futile enterprises. They only distracted from the real problem: scarcity of cinchona trees.

The majority of the report focused on showing that neither merchants nor experts had established sufficient criteria for assessing the quality of *quina*. Indeed, he characterized all previous assessments of *quina* as being based on caprice rather than true knowledge. Here, he echoed Carrion's distinction that true knowledge was knowledge of the bark and its natural qualities as observed directly. Unlike Carrion, however, García de Cáceres gave little credence to the knowledge of experts especially the learned experts of Europe. Whereas Carrion made a distinction between merchant and scientific knowledge, García de Cáceres treated them as equivalent. "It is not easy to establish," he observed, "much less agree on the origin of the criteria with which Merchants and Chemists discuss and decide the selection of

[27] Miguel García de Cáceres, "Informe" [copy], Guayaquil, 16 March 1779, AGI, Quito 240, N. 36a, fol. 181r-192v. A printed copy was sent back to Quito in 1786 along with another round of royal policies on the *estanco de quina*, see: Miguel García de Cáceres, "Informe," Guayaquil, 16 March 1779, ANH/Q, Cascarilla, box 3, exp. 7, fols. 1r-14r.

this specific [i.e. *quina*]."[28] Merchants and other "experts from Europe" (*inteligentes de Europa*) were to be treated in the same terms especially since they were equally susceptible making false determinations.[29] He observed, "those that call themselves experts [*inteligentes*], as much from America, as from Europe approve the same cascarilla in the afternoon which they rejected in the morning."[30]

It was a bold move in the part of García de Cáceres, especially considering that making sure the King got the best bark had been the central occupation of the *quina* monopoly since its inception in the 1750s. Fortunately, he had ample evidence to support his position. He began with a historical observation. "In the past," García de Cáceres observed, "there have been various epochs of 10, 15, or 20 years in which some kind of sudden shift has affected those Countries [i.e. Europe] in the solicitation of all kinds of species of *Cascarilla* including the best [ones]."[31] European tastes in *quina* had vacillated over the years. What was considered the best bark in one decade was considered the worst in the next. Such shifts in taste and demand suggested to García de Cáceres that distinctions of the quality of *quina* had been "without any other fundamental [principle] than that of the caprice of traders or the proportions of the [contracts] which [these traders] have made in advance with the harvesters [*cosecheros*]."[32] García de Cáceres flatly rejected such a system in which exchange in the market was the sole determinant of the value of *quina*.[33]

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[28] Miguel García de Cáceres, "Informe" [copy], Guayaquil, 16 March 1779, AGI, Quito 240, N. 36a, fol. 181v. In translating, I have altered the passage a bit to make the language clearer. The original is: "No es fácil establecer, y mucho menos concordar, el orígen de las preocupaciones con que los Negociantes y Quimicos hablan, y resuelven en la elección de este específico."
[29] Ibid., fol. 181v and 184r.
[30] Ibid., fol. 181v.
[31] Ibid.
[32] Ibid.
[33] García de Cáceres and many of his contemporaries made no distinction between the price and value of an object. They appear to have had some conception of absolute or objective

Costrón – a thick bark, also known as *cortezon*, harvested from the trunk or fatter branches of the cinchona tree – provided a good example. Recently, explained García de Cáceres, the "traders of America" had developed a "total disdain" for the "trunks and thick branches" of cinchona trees and, as a result, did not collect bark from these parts. He contrasted the current state of affairs with "the early years" of the *quina* trade when thick bark was "far from being considered as useless."[34] Shortly after the discovery of *cascarilla* by Europeans, "considerable portions" of thick bark were sent to Spain for consumption and, at that time, *costrón* was regarded with as much or more esteem than "thin bark" (*canuto delgado*).[35] What accounted for this reversal in the fortune of *costrón*? It was not, in García de Cáceres' estimation, the result of any new knowledge of this kind of bark. The shift could only be attributed to the fickleness of European tastes.

To make matters worse, Europeans had even failed to consistently apply their own (faulty) criteria for assessing the bark. Many experts in Europe not only considered acidity, bitterness, and the presence of resin to be characteristics of good quality bark, but some experts suggested that these three qualities were also the locus of the bark's medicinal virtue.[36] Yet, in García de Cáceres' view, further testing of *costrón* would reveal that thick bark has "more acidity and more bitterness" as well

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value of objects like *quina* that derived from the essence or natural qualities of the object itself. From this perspective, letting traders and merchants determine the value of quina based on European demand created a disjunction between quina's natural value and its exchange value. *Projectistas* and reformers like García de Cáceres supported the royal monopoly as a way to align the natural and exchange values of cinchona bark.

[34] García de Cáceres, fol. 184r.

[35] Ibid.

[36] Andreas-Holger Maehle, *Drugs on Trial: Experimental Pharmacology and Therapeutic Innovation in the Eighteenth Century* (Rodopi: Amsterdam: 1999); Saul Jarcho, *Quinine's Predecessor: Francesco Torti and the Early History of Cinchona* (Baltimore: Johns Hopkins University Press, 1993).

as more "glutinous humor" than thin bark.[37] Thus, based on their own criteria for assessing the bark, Europeans had no basis for their bias against *costrón*. Preference rather than principles ruled the day from García de Cáceres' perspective.[38]

His view was further supported by European aversion to *quina* from certain regions of South America. Geographical origin of the bark was yet another criterion for assessing its quality. Here, García de Cáceres pointed to the practices of a few trusted and well known names in the *quina* trade – Pedro de Valdivieso, the Magistrate of the Forests in Loja who supplied the Royal Pharmacy, Nicolas Salazar, a prominent Piura merchant, and José Antonio Lavalle, a prominent merchant in Lima. Valdivieso, García de Cáceres explained, did not share the European bias against *costrón*.[39] He applauded Valdivieso for not committing the same error as Europeans. Yet, Valdivieso still had to convince the Crown and Spanish officials to accept such bark. To do so, he employed a method similar to the one suggested by the Marquis de Villa Orellana. Valdivieso would pulverize the so-called inferior *costrón* into a powder and send it in bamboo tubes (known as *caña brava* or *Guayaquiles*).[40] He sealed the tubes with "tar" and packaged them into boxes with

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[37] *Costrón* was a bit of a special case. European bias against it had attracted the attention (if not the critique) of officials and others in American quina trade as scarcity drove many bark collectors and merchants to seek out new sources of cinchona bark. If bark collectors and merchants could include *costrón* in their shipments, then the extraction of bark would be less damaging to the forests. More bark could be harvested from a single tree (rather than discarding or ignoring bark that was too thick for European consumers).

[38] García de Cáceres, fols. 184r-v.

[39] Ibid., fol. 184v. Valdivieso had previously tried to convince José Diguja, the President of Quito, of the utility of *costrón*, see: José Diguja to Pedro de Valdivieso, Quito, 8 February 1769, ANH/Q, Fondo Especial, vol. 72, no. 2972-3, fols. 194r-v; Pedro de Valdivieso to José Diguja, Loja, 8 March 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-13, fol. 88v.

[40] García de Cáceres, fol. 184v. In 1769, Valdivieso sent a sample of this powdered *quina* packaged in bamboo tubes to the Royal Pharmacy for testing, see: Pedro de Valdivieso, "Factura instructiva de la Cascarilla q[u]e se [h]a acopiado p[ar]a la Real Botica este año de 1769," Loja, 26 October 1769, ANH/Q, Fondo Especial, vol. 72, no. 2970-67, fols. 155r-157v. There are no documents of the pharmacy's assessment of this bark and mode of

much “attention and cleanliness” (*curiosidad y aseo*). In Spain, Valdivieso’s powdered bark received “repeated praise” and was deemed “superior” such that the pharmacy requested a portion of powdered bark each year.[41] García de Cáceres explained, “[Valdivieso] found a subtle method for selling these rejected [barks] in Spain.” Moreover, this case confirmed “the vain science of those Professors.”[42] It was definitive proof of Orellana’s suggestion that Europeans focused too much on the bark’s accidental qualities rather than its essential ones.

While Valdivieso’s case offered strong support of García de Cáceres’ thesis, European experts, in their defense, could point to the fact that Valdivieso’s bark in these cases was ground up. If they had had the whole pieces of bark, surely European experts would have spotted Valdivieso’s duplicity. Not so, responded García de Cáceres. Here, he pointed to another example from the famed Valdivieso. In the 1770s, facing the increasing scarcity of cinchona trees, Valdivieso began to collect “considerable portions” of the bark from Cuenca. It was another example of European fickleness. When collected and supplied by Valdivieso, *quina* from Cuenca was given by Europeans “the preeminence of the most select [bark].”[43] Meanwhile, bark collected from the “same forests of Cuenca and exported through Guayaquil” was avoided and sold at an “very inferior price.”[44] There was no other explanation for

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transportation. García de Cáceres’ account suggests that the pharmacy found the method acceptable.

[41] The shipping records from the period after 1769 do not indicate that Valdivieso continued to send powdered bark using this method. Considering that the Crown was especially keen on having a detailed invoice of each shipment as a precaution against fraud, this evidence suggests that the practice did not continue.

[42] García de Cáceres, fol. 184v.

[43] Ibid.

[44] Ibid.

the different assessments of virtually the same bark except the caprice of Europeans. Once again, their "expert knowledge" turned out to be "vain science."[45]

García de Cáceres gave other examples in which accidents of geography resulted in variable assessments of the same kind or same quality of *quina*. One instance occurred at the port of Payta in the northern part of the Viceroyalty of Peru near the border with the *Audiencia* of Quito. Due to its proximity to regions such as Loja, Guancabama, and Jaen, merchants in Payta developed strong commercial ties with the southern part of Quito. Since it was a shorter trip over land to Payta than Guayaquil, and land transport in the Province of Quito was notoriously expensive, it was more cost effective for merchants to ship their bark to Lima via Payta rather than Guayaquil. Bark shipped through Payta had a reputation for being good quality since much of it came from Loja – the region many regarded as producing the best bark. As a result, the perceived value of bark that did not come from Loja, but was shipped through Payta, was higher than it would have been if it had been shipped through Guayaquil, even though the transport route had no effect on the potency of the *quina. Quina* traders in Piura, an important market town connecting Loja and Jaen to Payta, also benefited from the perception that much of their bark came from Loja and, in turn, they suffered the adverse effects of Loja's cinchona shortage.

These elements form the context for the case of Matias Joseph de Valdivieso, *corregidor* of Piura. According to García de Cáceres, due to the dwindling supplies of bark coming from Loja and Jaen, Matias Valdivieso sent his son-in-law, Juan Antonio Martinez, to collect bark in Cuenca, where the trees were still abundant. Just as in

[45] An alternate explanation would have been that Valdivieso's expertise as a bark collector meant that he selected better quality bark than those merchants who shipped their bark through Guayaquil. García de Cáceres made no mention of this possibility probably because, as we will see later, he intended to argue that there were no distinctions in terms of quality to be made between different kinds of quina.

his story about Valdivieso, García de Cáceres noted, "this accident [that bark from Cuenca happened to travel to Lima via Payta] was sufficient for the bark to be classified as select [i.e. the best quality]."[46] Furthermore, he explained that "the Merchants of Piura" physically manipulated thick bark, by shaving it down "with rocks" to make it thinner and mixing with thin bark, and pulverized "Cascarillas likely to be rejected."[47] These merchants then sent these barks "to Spain with the honors of select *Cascarilla*" and "the Assessors confirmed [their quality] without the least objection."[48] Such examples showed that "the sentences that are pronounced at the examinations [of the bark]" resulted from the "accidents of color, texture, shape, modes [*modos*], and the surface and cracks in the bark" rather than from their "[natural] qualities and virtues."[49] Assessing the bark by such "accidental" criteria was, in García de Cáceres' view, a mistake. Such criteria revealed nothing about the quality and virtue of *quina*. Moreover, with certain "modifications, [bark], which in its natural figure would be considered bad, passes as good [quality] and superfine."[50]

Having provided evidence of how fickle and uncertain was the assessment of different kinds of *quina*, García de Cáceres launched into a direct critique of the "vain science" of European experts. Here, he directed his barbs towards so-called scientific experts including chemists, physicians, and pharmacists. He castigated them for basing their evaluations of the bark on its accidental rather than essential qualities. For García de Cáceres, this was not the result of simple ignorance. Instead, he proposed that European experts purposefully perpetuated a debate over what constituted good quality *quina* and how to identify it. According to García de

[46] García de Cáceres, fols. 184v-185r.
[47] Ibid., fol. 185r.
[48] Ibid.
[49] Ibid.
[50] Ibid.

Cáceres, commercial interests had caused many Europeans to overlook the most obvious conclusion: all *quina*, as long as it is true *quina*, has medical virtue. This was one of the major conclusions of his report to the *Visitador General*.

"Disorder and disarray," he began, in conjunction with "widespread and unencumbered commerce" in *quina* were "the primary origin of all errors and damage [to the bark 's value]."[51] He also suggested that his claims against all previous European criteria for assessing *quina* were so "powerful" and "certain" that they could be confirmed by "experimental physics."[52] In other words, scientific study of *quina* would show the inadequacy of these criteria for assessing the bark, by virtue of revealing the true characteristics whereby the bark should be judged. If the lack of certainty in European evaluations of *quina* was so obvious, why hadn't scientific experts corrected the problem? García de Cáceres blamed chemists. "Inattentive Chemists," he wrote, "insist on undermining [such observations of *quina*] so that the relics of [their] verisimilitudes, which they devised regarding the virtues discovered in this distinguished vegetable, may persist in some form."[53] To understand the critique, let us imagine a hypothetical set of pharmacists at Cádiz charged with the task inspecting *quina* shipments. Since all *quina* had medical virtue, according to García de Cáceres, the pharmacist-inspectors should only try to determine whether the bark was *quina* or not. Differences in the medical efficacy of different kinds of *quina* were either negligible or undetectable. So, the pharmacist-inspectors need not worry about evaluating the quality of the bark as long as it was indeed *quina*. However, "chemists" perpetuated the myths that differences in the medical virtue (quality)

[51] Ibid., fols. 186r-v.
[52] Ibid., fol. 186r.
[53] Ibid.

mattered and were detectable. As a result, the royal pharmacists continued to test for the quality of *quina*.

We might interpret the duplicity of "chemists" as an effort to maintain their authority as experts. After all, if García de Cáceres was right, what could chemists and pharmacists offer the Crown? From the chemists' perspective, the utility of their science and their authority as experts rested on their ability to determine the quality and virtue of things like medicaments from America. García de Cáceres, however, suggested a baser motive. He linked the "naive preoccupations" of chemists – using physical characteristics to assess quality – to the "profit from the bad use which the [Spanish] Nation makes of such an exquisite treasure."[54] Here, he implied that commercial interests also spurred "experts" to continue regarding their assessments of *quina* as indicating the true quality or virtue of the bark. Poking fun at chemists, he added that the difficulty in identifying and agreeing upon "the source," with which to distinguish one type or quality of *quina* form another, derived from the fact that "this procedure [of finding the source of distinction]" was not amenable to "the common rules of reason."[55] In other words, chemists and other experts were unlikely to figure out what distinguished one *quina* from another because such variation in quality and virtue derived from the irrational world of trade rather than the rational world of nature.

Such strong language and serious accusations suggest that there is more to this report than a critique of the learned experts of Europe and their "vain science." What really mattered in García de Cáceres' case and the other instances of South American resistance and contestation of European expertise is the question of authority. Who had the right to make assessments of American nature? And on what

[54] Ibid.
[55] Ibid., fol. 186v.

basis? Ultimately, Garciá de Cáceres' report was as much a polemic in favor of increasing the role of local experts in the *estanco de quina* and decreasing the role of learned experts as it was a treatise on the proper techniques for assessing cinchona bark.

Consider his recommendations on how true knowledge of *quina* could be attained. He stressed that a different method and way of thinking were needed, and he decided that "not following the same system [as chemists and other experts in Europe], would be the easiest [way] to resolve these confusions."[56] He consciously turned away from "the path, which an error, as vulgar as [it is] irrelevant and harmful, has blazed." Instead he relied on the "expertise," which he "acquired in the forests and the collection of *cascarilla*," and confidence, based on the "other successes" he had had "in this mode of thinking."[57] This path led him to the truth that "among the *cascarillas*, which are truly from *Quina* Trees, there is very little variety and substantial distinction regarding their specific virtues."[58] This conclusion meant that the primary task should be "to distinguish that which is *Quina*" from "other barks" so as "to avoid fraud."[59] As a corollary to his conclusion, he added, "neither physicians [*fisicos*], nor Pharmacists, nor those selfsame Merchants, in whose knowledge is invested nothing less than the security of their wealth, have not been able to account for [that diversity], which they have not recognized until recently, with constant and true signs."[60] Just as the knowledge of merchants was biased and could not be trusted, physicians and pharmacists had failed to identify "constant and true signs" that reflected the quality of the bark. All of the examples of the fickleness and

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[56] Ibid.
[57] Ibid.
[58] Ibid., fols. 186v-187r
[59] Ibid., fol. 187r.
[60] Ibid.

ignorance of experts, especially those in Europe, supported this challenge to their expertise and authority.

Who was left, then, to assess *quina*? At several points, García de Cáceres hinted at the kinds of experience and knowledge needed to produce true knowledge of *quina*. We have already seen that García de Cáceres pointed to his own experience in the forests and in the collection of *quina* as a basis for his own authority. He also outlined what constituted "subjects of good judgment" capable of "discerning these differences [in quality] with knowledge of the diversity of classes of this specific."[61] These subjects need to "view the forests not just from the outside, but they must travel deep into the intricate bosom [of the forest] which is often almost impenetrable because of its ruggedness."[62] In addition to such empirical knowledge, such subjects should embrace "the spirit of rational curiosity [which] drives us to overcome the aforementioned obstacles [such as the impenetrability of the forests] in order to gain practical knowledge of the variety that exists [as much] among these trees and their qualities as among the lands that produce them."[63]

García de Cáceres was willing to admit the possibility that variation existed among cinchona trees and their qualities, but maintained his position that the problem had not yet been tackled by the right kind of experts with the right kind of practical knowledge. With his emphasis on studying the forests from the inside as well as the outside, such criteria effectively excluded the work of virtually all the learned experts of Europe, who had not traveled to the forests of South America. Local experts – instead of learned experts – were the only ones that could provide the Crown with knowledge of *quina*. Of course, García de Cáceres does not write in such stark

[61] Ibid., fol. 182r.
[62] Ibid.
[63] Ibid., fols. 182r-v.

terms, but the implications of his conclusions and recommendations were clear. However, one group of learned experts from Europe were well on their way to meeting his challenge. In 1778, Hipólito Ruiz and José Pavón, two botanists from Madrid, arrived in Peru to begin an eleven-year botanical expedition in Peru and Chile – an expedition that included the study of the cinchona tree as one of its primary objectives.[64] These botanists would travel into "the intricate bosom" of the Andean forests. This would negate the claim of García de Cáceres and other local experts in South America that they held unique and superior knowledge of *quina* in comparison to the learned experts of Europe.

What we know about the impending botanical expeditions in South America does not diminish the significance of García de Cáceres' critique of European science. Local experts in South America were, in fact, making the case that science had failed the *estanco de quina*. Vanity and commercial entanglements had led only to knowledge of consumer tastes rather than true knowledge of *quina*. Collectively, García de Cáceres and Carrion also made the case that true knowledge of *quina* ought to come from experts in South America and that this knowledge should be the determinant of the bark's commercial value (rather than consumer demand). Thus, a critique about the structures for the production of knowledge had potential consequences for the structures of exchange and the determination of value in the Atlantic World.

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[64] Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964). There is more on these expeditions in Chapters 4 and 6.

Scarcity: Local Knowledge and the Cinchona Tree in the late 1770s

The officials in the *Audiencia* of Quito developed an intense critique of European criteria for evaluating quina. There are at least two explanations for this; one is that this move was consistent with the emphasis on empiricism that characterized the culture of knowledge production embedded in the imperial bureaucracy. From this perspective, García de Cáceres and others were just realizing the logic of this culture in which most learned experts in Spain had little claim to empirical knowledge of American nature. Another explanation is that such critiques represent a desire on the part of officials and experts in South America for greater influence on imperial policy. It is unlikely that these critiques are symptomatic of a nascent Creole patriotism or desire for independence since the authors of these critiques still subscribed to the production of knowledge under the auspices of the imperial bureaucracy.[65] They simply wanted a larger role in the process. Here, I emphasize that officials in South America deployed their critiques of European expertise as part of a larger strategy to shape imperial policy on the cinchona tree. If local officials in South America could make the case for their expert knowledge of *quina* over and above learned experts in Madrid, they could claim greater authority in imperial governance. As long as they shared the space of expertise with their counterparts in Spain, local experts faced possible resistance to their efforts to realize their own interests.

One important means for experts to exert influence on imperial policy was in the framing of the problems that the empire faced. By the 1770s, bureaucrats and

[65] On Creole patriotism see: Benedict Anderson, *Imagined Communities: Reflections on the Origins and Spread of Nationalism* (London: Verso, 2003 [1983]); Jorge Cañizares-Esguerra, *How to Write the History of the New World: Histories, Epistemologies and Identities in the Eighteenth-Century Atlantic World* (Stanford: Stanford University Press, 2001); D. A. Brading, *The First America: the Spanish America, Creole Patriots, and the Liberal State, 1492-1867* (Cambridge: Cambridge University Press, 1991).

bark collectors in the *quina*-producing regions of New Granada had become fully cognizant of a problem of which officials in Spain were only just beginning to take note – the increasing scarcity of cinchona trees. Pedro de Valdivieso was one of the first to become aware of the impending scarcity of harvestable cinchona bark. When he became Magistrate of the Forests in Loja in 1768, he sent several "explorers" into the forests to take stock.[66] All reported back that over-harvesting had decimated stands of cinchona trees, but several predicted that a small number of immature trees would be ready for harvesting in three to five years. Valdivieso promptly issued a decree prohibiting commerce in *quina* from Loja.[67] It proved ineffective and, in 1774, Valdivieso informed José Diguja, the President of Quito, that he could no longer provide reliable estimates of quantities of bark available for future shipments to the Crown.[68]

Valdivieso and Diguja disagreed on how to rectify the situation. While Valdivieso recommended, "suspending collection [of the bark] for many years," Diguja suggested the establishment of plantations of cinchona trees. Valdivieso rejected this solution as "impracticable" due to the "excessive cost." He further observed that such a plantation "would be a fifty-year project" and, as a result, would be useless in terms

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[66] ANH/Q, Fondo Especial, vol. 67, no. 2858.

[67] As noted in Chapter 1, when Manuel Daza y Fominaya (r. 1766-1770), the *corregidor* in charge of the pharmacy's annual shipments before Valdivieso's appointment in 1768, attempted to enact such measures he was attacked by the residents of Loja.

[68] Pedro de Valdivieso to José Diguja, Loja, 6 December 1774, ANH/Q, Fondo Especial, box 33, vol. 32, no. 3515-43, fols. 270r-v. In reply to Valdivieso's letter, Diguja asked if Loja's forests could sustain yearly shipments of 100 *quintales* (10,000 pounds) for the Royal Pharmacy. The answer was no. Valdiviseo explained to Diguja that his explorers of 1768 "spoke with little reflection" when they suggested, "the plants [i.e. cinchona trees] would be replaced in four to five years." They neglected, he continued, to account for "the many years needed for the bark to achieve any substantial thickness." It is a bit strange that Diguja asked for 100 *quintales* of cinchona bark annually when, at the current time, Valdivieso was on average only able to suppy 80 *quintales*. Pedro de Valdivieso y Torres, "Factura de la cascarilla que se ha hecho para la Real Botica este año 1773," Loja, 6 December 1773, AGI, Quito 239, fols. 192r-193r; Pedro de Valdivieso y Torres, "Factura de la cascarilla que se ha hecho para la Real Botica este año 1774," Loja, 6 December 1774, ANH/Q, Fondo Especial, box 33, vol. 91, fols. 270r-v.

of the Crown's short-term needs.[69] Instead of a plantation, Valdivieso suggested setting aside "a few places where re-grown trees [*retoños*] are found in abundance" and hiring "peasants to cut down the useless trees which block wind and sun with their shade."[70] While it was not worth the investment to purposely plant and organize the land for the production of cinchona, Valdivieso thought that certain measures could be taken to protect and improve wild trees.

This exchange between Valdivieso and Diguja in 1774 and 1775 reflects several key aspects of the discussion of *estanco de quina* at this point in time. First, scarcity emerges forcefully as a problem. Imperial officials often discussed whether cinchona trees were a finite or seemingly infinite resource, but in the 1770s the unsustainable nature of existing modes of extraction became more obvious. Second, just as in the case of fraud, those experts and officials who got to frame the problem of scarcity played a key role in defining its solution. For example, both Diguja and Valdivieso agreed that supplies needed to be increased but they disagreed as to how to accomplish this objective – a more active policy of plantations versus a more passive policy of regulating access to the forests. Perceptions of the problems of scarcity and its causes, thus, were crucial in shaping and implementing policies on *quina*. Yet, both courses of action – royal vs. private extraction – had their supporters and the tensions between these two views continued to propel debate and discussion within the imperial bureaucracy. At the same time that Bourbon reformers were negotiating grand visions for restructuring the Spanish empire that privileged the state or private enterprise, local officials in the *quina*-producing regions also wrestled with the tensions and implications of these two visions of the imperial order.

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[69] "...sería obra de un [medio] siglo," in: Pedro de Valdivieso to José Diguja, Loja, 7 February 1775, ANH/Q, Fondo Especial, box 35, v. 98, no. 3707, fol. 9v.

[70] Pedro de Valdivieso to José Diguja, Loja, 7 February 1775, ANH/Q, Fondo Especial, box 35, v. 98, no. 3707, fol. 9v.

An Emerging Tension: Royal Monopoly vs "Free" Trade

Scarcity was a common concern as well among the replies submitted to the Viceroy of New Granada's *Junta General de Tribunales* convened to investigate the *quina* trade in 1776. The *junta* had asked officials throughout the *Audiencia* of Quito to comment on a list of four specific questions:

- Was *quina* collected from cultivated trees on private *haciendas* or from trees growing in the wild?
- How much bark did the respondent's region produce annually and how long after harvesting did it retain its potency?
- Was their *quina* available to "foreign colonies" and if so, how?
- Would an *estanco de quina* be beneficial or harmful to the public? To commerce?

Responses submitted in 1776 and 1777 provided a profile of the *quina* trade. Much had changed since the previous comprehensive report on the *quina* trade – Miguel de Santisteban's report to the Viceroy of New Granada in 1753. For example, in 1753, Santisteban wrote, "there are few merchants in the Province of Quito and of Upper Peru which are interested in this business" and that "rare are [the merchants] from Lima which have gotten involved in [the quina trade]."[71] By 1776, trade in the bark had spread considerably throughout the *Audiencia* of Quito. Virtually all respondents – except those from the Guayana region whose bark was still unproven – reported a significant amount of commerce in the bark. Marcos de Lamar and Alvaro de Leon, officials from Cuenca, provided a list of merchants, who had requested additional time to liquidate their stores of *quina* before the implementation

[71] Miguel de Santisteban, "Informe" [copy], Santa Fe, 4 June 1776, ANH/Q, Cascarilla, box 1, exp. 11, fols. 3r-v.

of a royal export ban. In total, these merchants (forty five in all) reported being in possession of 52,532 *arrobas* (over one million pounds) of *quina*.[72] Whereas Santisteban reported in 1753 that the business in cinchona bark was confined primarily to Loja and its closest port, Payta, the 1776 reports described a more developed and dispersed enterprise, with multiple regions in New Granada and Peru producing bark and multiple ports exporting it.

Growth of the *quina* trade brought increasing pressure on stands of cinchona trees. In his report to the *junta*, Pedro de Valdivieso reiterated observations he had made previously to the President of Quito. He explained, "in the first years after [quina's] discovery, many corpulent trees were found together [and each tree] yield one to four arrobas."[73] To illustrate how much the situation had changed, he explained that, in his most recent efforts to collect bark for the Royal Pharmacy, "more than 200 men entered these forests and many could not complete one *arroba* [twenty five pounds] in the term of three to four months."[74] Lamar and Leon similarly reported on the increasing scarcity of cinchona trees in Cuenca, Jaen, and Loja especially since the collection of the bark was "disordered and lacked method."[75] Consequently, one of the "advantages to the Public" of the monopoly was "to put the indicated project [the collection of *quina*] in order." Lamar and Leon also suggested

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[72] Alvaro de Leon and Marcos de Lamar, "Manifestación de Quina" [copy], Cuenca, 26 September 1776, ANH/Q, Cascarilla, box 1, exp. 11, fols. 85r-86r. This document was part of a complaint initiated by another Cuencan merchant, Pedro Rivera, claiming that two months was not enough time for him to liquidate his cinchona stock on account of the shortage of mules for overland transport of the bark to Guayaquil, see: Pedro de Rivera Veintemilla, "Pedimiento" [copy], Cuenca, 7 September 1776, ANH/Q, Cascarilla, box 1, exp. 11, fols. 75r-76r; "Vista del Fiscal," Cuenca, 9 September 1776, ANH/Q, Cascarilla, box 1, exp. 11, fols. 76r-80v.

[73] Pedro de Valdivieso to Manuel Antonio Flores, Loja, 7 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 26r.

[74] Ibid.

[75] Marcos de Lamar and Alvaro de Leon, "Informe" [copy], Cuenca, [29] August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 35r.

that “one of the principle objectives” of the monopoly should be “the conservation of the Forests of *Cascarilla*.”[76]

All agreed that scarcity was a problem. Disagreement emerged over the cause of scarcity and, consequently, how to address it. Two possible solutions emerged – one local and one royal. Proponents of the local solution, in general, rejected interference by the Crown in the form of the *estanco de quina*. For example, the Marquis de Villa Orellana favored local government, rather than the imperial bureaucracy, as the locus for managing *quina*. He suggested that “appropriate licenses ought to be given to the town council [of Cuenca] to conserve and increase” their cinchona forests.[77] Another opponent of the royal solution – the *estanco de quina* – was Nicolas Antonio de Carrion y Vaca. In his report, he framed the issue as a local problem: “the residents of Loja,” he observed, “have destroyed the basis of their subsistence [*quina*] on their volition.” As such, it required a local solution: bark collectors in Loja be required to obtain a license and to plant new cinchona trees to replenish the forests. Alternatively, Carrion suggested that prisoners and vagabonds could learn the value of work through forced labor on cinchona plantations.[78] Carrion’s suggestions for plantations were never implemented. However, a system of government licensing of bark collectors did develop in the late 1780s and 1790s throughout the *Audiencia* of Quito.

For Orellana, Carrion, and others like them, the main goal was “free” trade, by which they meant the protection of domestic commerce (trade within and between all the parts of the Spanish Empire) from foreign merchants as well as unnecessary

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[76] Ibid., fol. 36r.
[77] Marquis de Villa Orellana, “Informe” [copy], Quito, 18 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 47r.
[78] Nicolas Antonio de Carrion y Vaca, “Informe” [copy], Quito, 28 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 62r-63v.

government intervention. Orellana even expressed willingness to support some kind of *estanco* but only on the condition that it was implemented without "introducing any innovation to the mode, which has existed always, of collecting [*quina*] from the forests nor [any innovation] in the liberty of the internal commerce of the Province."[79] Carrion took a similar view. There should be "free trade among Our [lands]," he wrote, and a monopoly "with regard to foreign Nations."[80] Yet, Carrion defended the *quina* trade more explicitly. "Many private citizens of these [regions]," he wrote, "have supported and clothed their children and servants by denuding the Trees of *Quina* especially since this Province is in the most extreme poverty such that money is more an object of memory than of the eyes."[81] When asked by the *junta* if a monopoly was harmful to commerce, Carrion's answer was a resounding "Yes." Furthermore, he emphasized the impracticality of government regulation: "it is difficult to put doors on the countryside."[82] "The people who would like [to collect the bark" will do so," he continued.[83] Even supporters of the *estanco* recognized the likelihood of negative effects on the merchants of Guayaquil, Piura, Payta, and Lima.[84] The difference was that they were willing to accept some detriment to merchants in the name of a benefit to the public.

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[79] Marques de Villa Orellana, "Informe" [copy], Quito, 18 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 52r.
[80] Nicolas Antonio de Carrion y Vaca, "Informe" [copy], Quito, 28 August 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 58r.
[81] Ibid., fol. 57r.
[82] Ibid., fol. 54v.
[83] Ibid.
[84] A monopoly of *quina* was detrimental to merchants for two reasons. First, such a monopoly threatened to disrupt the system of collection where merchants supplied bark collectors with goods at inflated prices in exchange for cinchona bark. Second, a monopoly – in theory at least – would reclassify forests held in common as royal forests and, thus, subject to restrictions on the harvesting of goods. The existing system apparently allowed bark collectors to collect bark from private as well as public lands that, effectively, gave merchants access to any *quina* via their contracts with bark collectors. I suspect that supporters of the monopoly had connections to local landowners in quina producing regions, who sought to disrupt this system of collection, but have yet to find evidence of a connection.

Whereas opponents of the monopoly cast the problem of scarcity and its solution as essentially local, supporters of the monopoly portrayed the problem as a structural one requiring royal intervention. The persistent poverty of *quina*-producing regions suggested that commerce was not as beneficial as its supporters claimed. For example, Miguel Sanchez Muñoz, a respondent from Cuenca, who was an agent for Francisco Sanchez Navarrete, a prominent *quina* merchant for the Salazar merchant house in Piura, observed that recently the people of Cuenca "ambitiously decided to harvest [cascarilla]." "It," he continued, "has not resulted in relief but instead in grave prejudice to individual poor people since subjects of quality and wealth have left this work to these unhappy [people]."[85] Loja was the iconic case; here was a region that produced a world-renowned and highly valued product but remained mired in poverty. Indeed, Loja's poverty puzzled many officials on both sides of the Atlantic. In 1753, Miguel de Santisteban blamed the bark collectors. They were the ones that mixed together different kinds of bark and different qualities of *quina* in order to meet demand. Such practices could only result in the degradation and devaluation of Loja's bark, especially in European markets.

Respondents in 1776, in contrast, placed the blame on structural features of regional trade. The main problem was the contracts that merchants made with bark collectors. Marcos de Lamar and Alvaro de Leon, officials from Cuenca, reported, "it is mostly the Poor who only seek to satisfy their necessity [by] accepting credits, rags, and *drogones* which are then changed for money at half the value more or less which [merchants] charged for them." Lamar and Leon further explained that "[when]

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[85] Miguel Sanchez Muñoz, "Informe" [copy], Cuenca, 24 September 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 83v. In Lamar and Leon's "manifest of quina," Sanchez Muñoz is listed as holding 4,216 *arrobas* (105,400 pounds) "for Francisco Sanchez Navarrete," see: Alvaro de Leon and Marcos de Lamar, "Manifestación de Quina," Cuenca, 26 September 1776, ANH/Q, Cascarilla, box 1, exp. 11, fol. 86r.

merchants [do] pay cash [for the bark], they offer meager prices."[86] Here, they describe the system known as the *repartimiento de mercancías*.[87]

Under the *repartimiento*, merchants, who often held local government offices as well, supplemented their income and liquidated excess goods by forcing indigenous people to trade or buy these goods at an inflated price. In the case of *quina*, merchants purchased *quina* from bark collectors with either goods or money, as indicated by Lamar and Leon. Often, merchants made a contract with bark collectors before the harvesting season in which bark collectors agreed to supply a certain amount of bark in exchange for the goods received. As Luz del Alba Moya Torres has pointed out, any discussion of *quina* merchants is somewhat of an abstraction. "In reality," writes Moya Torres, "*cascarilla* merchants were members of families that possessed both economic and political power in the region."[88] Using their political influence to enforce economic arrangements, these elite families of the *quina* trade were able "reproduce and perpetuate their position of privilege."[89] Spanish observers, such Antonio Ulloa and Jorge Juan, as well as Bourbon reformers, condemned the system of *repartimiento* in general.[90] From their perspective, in addition to exploiting indigenous laborers, this system continued the devolution of the central authority of the state, and encouraged corruption.

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[86] Lamar and Leon, "Informe", Cuenca, [29] July 1776, fol. 35r.
[87] For a description of the *repartimiento de mercancías*, see: Ramírez, Susan Elizabeth. *The World Upside Down: Cross-cultural Contact and Conflict in the Sixteenth-Century Peru*. Stanford: Stanford University Press, 1996. On the attempts by the Bourbon Crown and its officials to reform this practice in the late eighteenth century, see: Stanley J. Stein, "Bureaucracy and Business in the Spanish Empire, 1759-1804: Failure of a Bourbon Reform in Mexico and Peru," *The Hispanic American Historical Review* 61 (1981), 2-28; Kenneth Andrien, "The Noticias secretas de America and the Construction of a Governing Ideology for the Spanish American Empire," *Colonial Latin American Review* 7 (1998), 175-192.
[88] Luz del Alba Moya Torres, *La Arbol de la Vida: Auge y Crisis de la Cascarilla en la Audiencia de Quito, Siglo XVIII* (Quito: Facultad Latinoamericana de Ciencias Sociales Sede Ecuador, 1994), 78.
[89] Ibid.
[90] Andrien, "*Noticias secretas*."

Some local officials then found a common interest with Spanish reformers who sought to reduce the power and influence of the Creole merchant elite by eroding their economic support system. Not surprisingly, respondents, who emphasized the hardship of poor bark collectors, endorsed the monopoly project. For example, Ignacio Checa, former *corregidor* of Loja, supported the monopoly project precisely because it would dissolve the *repartimiento* system. In his estimation, since "[residents and natives] would [collect the bark] for cash," they would no longer harvest *quina* "in exchange for overpriced clothing."[91] Meanwhile, Miguel Sanchez Muñoz described a royal monopoly of *quina* as "useful to the community especially to the helpless poor."[92]

The View from Guayaquil Revisited

Clearly, a debate was emerging within the imperial bureaucracy between supporters of the monopoly and supporters of "free trade." This debate was, in fact, just one manifestation of a larger rift throughout the Spanish Atlantic between two different visions of the imperial order. So, who won? To answer this, let us return to García de Cáceres' report and its recommendations on the question of the *estanco de quina*.

In light of the common concern over the scarcity of cinchona trees, García de Cáceres' critique of European experts takes on added significance. Recall that he had faulted the learned experts of Europe – "inattentive chemists" in particular – for ignoring the obvious conclusion that all *quina* had medical virtue. This view had significant implications for imperial policy. Since the 1750s, Spanish officials' main

[91] Ignacio Checa, "Informe" [copy], Quito, 26 July 1776, ANH,Q, Cascarilla, box 1, exp. 11, fol. 70v.
[92] Miguel Sanchez Muñoz, "Informe" [copy], Cuenca, 24 September 1776, fol. 83r.

goal had been the restoration of the value and quality of the bark with only the secondary interest in the restoration and conservation of cinchona forests. Garciá de Cáceres, however, made the second goal – conservation – the priority by casting the question of quality as a non-issue. Thus, European experts were practicing "vain science" by focusing too much on the accidental qualities of the bark and overlooking the real problem. All the knowledge in the world of how to distinguish the quality of different kinds of bark would do nothing to stop the disappearance of cinchona trees. By making scarcity the central issue, García de Cáceres and others showed that the learned experts of Europe were not only wrong, they were irrelevant.

García de Cáceres explained to the *Visitador General* how the restoration of the proper relationship between knowledge and value would save the cinchona tree. Ideally, the true knowledge of local experts in South America – that all *quina* had medical virtue – ought to lead to re-adjustment of the value assigned to the bark in the Atlantic economy. For example, he noted that merchants often required that *quina* be thin and have a dark exterior (*envés*). Neither of these characteristics, according to García de Cáceres, necessarily indicated that bark was of good quality, since they could be achieved by human artifice. Thick bark could be shaved down while exposure to the sun would darken its exterior color. Yet, not everyone was so duplicitous as to manipulate the bark and, as a result, much bark was wasted as bark collectors avoided that which was considered too thin or too light in exterior color. García de Cáceres provided some numbers; he noted that a "robust" cinchona tree "of regular stature" typically produced "five pounds of thin *cascarilla*" and "ten pounds of *cortezon* [thick bark]."[93] Assuming a target quantity of 20,000 *arrobas* of *cascarilla*, he calculated that it would require the "destruction" of 100,000 trees if only thin bark

[93] García de Cáceres, fol. 188bisr.

were harvested, whereas harvesting both thick and thin bark would require only 34,000 trees. "In order to satisfy the caprice of the Merchants of Europe," he wrote, "66,000 [additional] trees are miserably destroyed."[94] He further explained that if the requirement for a dark exterior were disregarded, the destruction of an even fewer number of trees would be required. Readjusting the values of European merchants was only a partial solution to the problem of scarcity.

García de Cáceres reported that for every 1,000 trees harvested only 100 grew back and developed "thick branches," from which to harvest bark, after "many years."[95] The numbers were clear. "If the present system of collection continues," he wrote, "the ruin of *cascarilla* [is] inevitable."[96] Alternatively, he predicted that the price of the bark would have to become "exorbitant" in order to cover the cost of "building roads" in the thick jungle, "escorting peasants [into the jungle] by armed guards," "increasing [number] of day laborers," and transporting from remote locations.[97] This possible future made the current policy of searching increasingly remote forests for patches of cinchona trees untenable as well. The Crown must intervene, García de Cáceres urged, to implement policies for the restoration and conservation of cinchona trees in regions closest to ports such as Loja and Jaen. Thus, the two stated objectives of his "reasoned proposal" for the *estanco de quina* were: "to appropriately perpetuate this trade" and "to conserve its value [*estimación*]."[98]

Ultimately, García de Cáceres concluded that the problem of scarcity required "an executive remedy."[99] He suggested that the President of Quito enact a "general enclosure [*asolamiento*] of all Forests in Provinces that produce [the bark]" and order

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[94] Ibid.
[95] Ibid., fol. 189r.
[96] Ibid.
[97] Ibid.
[98] Ibid.
[99] Ibid., fol. 189v.

that everyone abstain from collecting the bark until further notice.[100] In addition, "the export of *cascarilla*" by "private merchants [*los particulares*]" should be prohibited and two government factories set up – one in Guayaquil and another in Piura.[101] Finally, he recommended that the King declare *cascarilla* a "royal product" and make "the forests that produce it" common lands.[102] Such a move would block the machinations of the "powerful," who purchase forests "with the aid of [government officials] at negligible prices" in order to extract "*cascarilla*" without cultivating cinchona trees as required. Once in private hands, the new owners prohibited "Indians and other individuals" from extracting the bark. In Garciá de Cáceres' view, an "executive remedy" would put an end to such practices that "deceived the King and harmed the Public."[103] Since the current state of affairs was the product of "widespread and unencumbered commerce" in *quina*, which gave rise to erroneous claims about the quality of the bark, the Crown needed to employ a new system (just as García de Cáceres had employed a new system for thinking in order to reach the conclusion that all *quina* had medical virtue).

In some ways, García de Cáceres' recommendation was a foregone conclusion within the imperial bureaucracy. Support for an "executive remedy" already existed in the upper echelons of government in New Granada. We have already seen that José García de Leon y Pizarro, the *Visitador General*, came to Quito with a commitment to royal monopoly as a strategy of imperial governance. In 1777, the *Junta General de Tribunales* in Santa Fe de Bogotá came to endorse the project as well. Francisco Antonio Moreno y Escandón, a *fiscal del crimen* on the *Audiencia* of Santa Fe who had summarized the reports collected by the *Junta*,

[100] Ibid., fols. 188bisv and 189v.
[101] Ibid., fol. 190r.
[102] Ibid., fol. 190v.
[103] Ibid.

presented his own report on the "advantages" of the monopoly solution. He characterized the *estanco* as a means to achieve "good government" and avoid "the grave injuries caused by the disorder deriving from the ambition of those cut, mix, and transport [*quina*] indiscriminately for no other reason than their own profit."[104] Some of the specific benefits included "improving the cultivation [of cinchona trees]" and "establishing a proportionate price, which according to the diversity [of the bark] is correlated not only with distinct classes [of bark] but also to the indigence of those involved in its extraction."[105] Ultimately, Moreno took the position that the greater public good of the monopoly outweighed any harm to the merchant elite. "Free" trade had failed and now government regulation was needed to stop the continued exploitation of bark collectors as well as cinchona trees by merchants. In Moreno's view, the system as it existed at the time had only perpetuated poverty in *quina*-producing regions and threatened to make extinct their main export commodity.

The *Junta* was convinced. "The establishment [of the monopoly]," they wrote in July 1777, "is not only useful but almost necessary to avoid fraud and the harmful consequences which disorder causes [such as] clear cutting the Trees without the discretion and attentiveness which cutting for conservation requires."[106] While impending scarcity was a significant motivator, the *Junta*'s own report made no mention of mitigating the exploitation of bark collectors by merchants. While the *Junta* declined to cite a specific cause of the scarcity, their final decision implied that the status quo – exploitation of the forests by private merchants – was disordered and unsustainable. Moreover, even though the decision is cloaked in the language of the

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[104] Francisco Antonio Moreno y Esandón, "Vista del Fiscal," Santa Fe, 25 June 1777, ANH/Q, Cascarilla, box 1, exp. 11, fol. 114r.
[105] Ibid., fol. 113v.
[106] Junta General de Tribunales, Santa Fe, 3 July 1777, ANH/Q, Cascarilla, box 1, exp. 11, fol. 117v.

late 1770s, members of the *Junta* drew on a decades-old tradition of support for the royal monopoly by the Viceroys of New Granada.[107] Prospects looked good for the *estanco de quina* and the role of local experts in this project.

Conclusion

Miguel de García de Cáceres displayed much prudence in his "reasoned proposal" to the *Visitador General* in 1779, much like the local officials of the *Audiencia* of Quito who were considered in the previous chapters. He used prevailing conditions to his advantage, especially the rising concern over scarcity and reinvigorated interest in the *estanco de quina* on the part of the Crown and officials in South America. He also took advantage of the political aspects of the imperial culture of knowledge production. His critique of the learned experts of Europe alongside that of many of his contemporaries in South America made the claims of European science one of the sources of disorder in the *quina* trade, as European experts offered support for false determinants of the bark's value – a practice which, in turn, fostered wasteful methods of extraction. At the same time, García de Cáceres' report praised and portrayed local experts in South America as the true authorities on *quina* and its value. He not only sought to reform the way in which the bark's value was determined but also sought to re-order the relationship between local and learned experts within the Spanish Atlantic World.

Thus, natural knowledge and imperial governance were intertwined. The production of natural knowledge was political especially because questions of knowledge were so closely linked with questions of imperial policy. This was as true

[107] See Chapter 2; Marcelo Frías Núñez, *Tras El Dorado Vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783-1808)* (Seville: Diputación de Sevilla, 1994).

for a customs official in Guayaquil as for the Crown in Madrid. In this context, García de Cáceres actively sought to assert the authority of direct experience of American nature as a means to achieve greater influence for local American experts in imperial projects like the *estanco de quina*. And it worked to some extent. Although officials in Spain never gave up entirely on their goal of acquiring the best bark for the King, scarcity became more of a concern. In addition, these officials – in spite of their desire to limit the role of American elites in government – had to recognize that local officials and informants in South America played a crucial role in collecting information, understanding the problem in the *quina* trade, and recommending solutions. In such a context, especially with Valdivieso's recent success asserting his authority over the Royal Pharmacy, other officials and experts in the *Audiencia* of Quito felt empowered to speak for American nature to the exclusion of all other expert voices, especially those of the learned experts of Europe. After all, it was a world that they knew much better – through first-hand experience – than any chemist or pharmacists working with de-contextualized objects in Europe. García de Cáceres' report is the culmination of the South American discourse about the vanity and failures of European science in the Spanish empire.

Indeed, for a time, local experts in Quito enjoyed a privileged place as authorities on the cinchona tree, its bark, and the *quina* trade. For example, in 1786, the Crown sent a copy of García de Cáceres' 1779 report to the new President of Quito, now Juan José de Villalengua, and asked for information and opinions on the feasibility of García de Cáceres' proposed *estanco de quina*. It was a powerful endorsement. Yet, even as South American critiques of European expertise were circulating in the imperial bureaucracy, a new group of learned and scientific experts – botanists – had emerged on the scene. These new experts also received a

powerful endorsement form the Crown with its patronage of two royal botanical expeditions for the study of American nature – one to Peru and Chile (1777-1788) and another in New Granada (1783-1810).[108] Eventually, botanists came to the fore within the royal monopoly of *quina*; in the late 1780s, José Celestino Mutis, director of the botanical expedition in New Granada, was put in charge of a new *estanco de quina* established in Santa Fe de Bogotá and, in 1790, the Crown sent a Spanish botanist to Loja to serve as its *Quina* Commissioner. What accounts for the rise of botanists in spite of a rising sense of skepticism toward European science?

[108] Iris Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions* (Seattle: University of Washington Press, 1981).

PART II:

THE RISE OF THE BOTANISTS

Chapter 4

Empire's New Experts:

The Rise of Botanists in the Spanish Empire (1775-1789)

"Among all my projects in the service of humanity, none has deserved my attention more than *quina*, and, at the same time, none of these projects have given me a greater feeling of bitterness."

- José Celestino Mutis to Dr. Francisco Martínez Sobral (1790)[1]

Between scarcity and skepticism, the outlook was grim for both the cinchona tree and learned experts in Europe. Local experts in Quito began to position themselves as the only ones with the authority and experience to understand the problem and solve it. Yet, scarcity affected everyone involved in the *quina* trade not just the *estanco de quina*. While discussion of possible long-term solutions reverberated through the various levels of imperial bureaucracy, *quina* was still in demand. Bark collectors, merchants and bureaucrats pursued a temporary solution to the problem of scarcity by initiating various searches for new sources of the bark. The question remained: who would examine the bark and assess its medical efficacy and commercial utility? García de Cáceres had suggested that Europe's learned experts offered little help, and Pedro de Valdivieso had recently challenged the authority of the royal pharmacy in Madrid. However, the Crown and officials in Spain were not quite as skeptical of the pharmacists and other learned experts as were officials in South America, and rather than give up on learned expertise all together,

[1] José Celestino Mutis to Dr. Francisco Martínez Sobral, Mariquita, 19 December 1790, *Archivo Epistolar del Sabio Naturalista Don José Celestino Mutis*, vol. 1, edited Gonzalo Hernández de Alba (Bogotá: Institution Colombiano de Cultural Hispanica, 1983), 502-507.

royal officials started to look elsewhere – to the medical community and, ultimately, to Spain's botanists.

Much historical scholarship on the relationship between the scientific and imperial enterprises of early modern Europe has tended to focus on the high profile, patronage-intensive activities such as expeditions, the collection of natural objects for state institutions, and the production of visual and textual representations of natural worlds colonized by Europeans.[2] Such activities were undoubtedly important articulations of the nexus between European sciences and empires in the early modern period. However, such work has produced a skewed image of how these two enterprises historically became intertwined. Moreover, little scholarship exists on European attempts prior to the nineteenth century to make natural knowledge a tool in the service of specific political and economic enterprises in colonized territories.[3] This chapter focuses less on European court culture and more on the world of imperial governance. Consequently, this account complements our current

[2] Daniela Bleichmar, "Painting as Exploration: Visualizing Nature in Eighteenth-Century Colonial Science," *Colonial Latin American Review* 15 (2006), 81-104; Daniela Bleichmar, "Visual culture in eighteenth-century natural history. Botanical illustrations and expeditions in the Spanish Atlantic.," Ph.D. Dissertation (Princeton University, 2005); Schiebinger and Swan, eds., *Colonial Botany*; Schiebinger, *Plants and Empire*; Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven: Yale University Press, 2000); Mauricio Nieto Olarte, *Remedios para el imperio: Historia natural y la apropiación del nuevo mundo* (Bogotá: La Imprenta Nacional de Colombia, 2000); N. J. Jardine, A. Secord, and E. C. Spary, eds., *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996); D. P. Miller and P. H. Reill, eds., *Visions of Empire: Voyages, Botany, and Representations of Nature* (Cambridge: Cambridge University Press, 1996); Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992).

[3] Classic works on nineteenth-century imperialism include: Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca: Cornell University Press, 1989); Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981); Lucile Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Garden* (New York: Academic Press, 1979). For a more recent examination, see: Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008).

understanding of imperial science as an activity engaged in the production of exhibits, collections, images, and printed texts.[4]

In some instances, empires not only produced representations of colonized natures, but also applied science to the production of colonial commodities. With regard to the eighteenth-century Spanish Atlantic in particular, this chapter shows how a richer understanding of the integration of botany into the imperial enterprise emerges from examination of the practical needs of imperial governance and the myriad social networks that comprised the imperial state. Furthermore, I argue that the case of *quina* is not just a special example of this process, but rather that botanists' involvement with cinchona bark was the primary means by which botany became the Spanish imperial science *par excellence*. Royal officials needed expert advice on new samples of *quina*, and it was through consultations that the networks connecting botanists and bureaucrats developed.

Between the late seventeenth and mid eighteenth centuries, botany flourished as a discipline in Spain. It gained a stronger institutional base with the founding of the Royal Botanical Garden in 1755 and a greater social presence as a result of royal patronage.[5] The career of Casimiro Gómez Ortega, who became director of the Royal Botanical Garden in 1772, exemplifies the rising fortunes of botany and the

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[4] Neil Safier, *Measuring the New World: Enlightenment Science and South America* (Chicago: University of Chicago Press, 2008).

[5] Daniela Bleichmar, "Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 225-252; Paula De Vos, "Research, Development, and Empire: State Support of Science in the Later Spanish Empire," *Colonial Latin American Review* 15 (2006), 55-79; Juan José Saldaña, ed., *Science in Latin America: A History* (Austin: University of Texas Press, 2006); Daniela Bleichmar, "Visual culture;" Antonio Lafuente and Nuria Valverde, "Linnaean Botany and Spanish Imperial Biopolitics," in: *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005), 134-147; Antonio Lafuente, "Enlightenment in an Imperial Context: Local Science in the Late-Eighteenth-Century Hispanic World," *Osiris* 15 (2000), 155-173; Francisco Javier Puerto Sarmiento, *La Ilusión Quebrada: Botánica, Sanidad y Política Científica en la España Ilustrada* (Madrid: CSIC, 1988); Juan José Saldaña, ed., *Cross Cultural Diffusion of Science: Latin America* (Mexico City: Cuadernos de Quipu, 1987).

natural sciences in general, during the reign of Charles III.[6] Indeed, support for various scientific enterprises was a key element of the Bourbon reform program.[7] However, enlightenment ideals of the utility of the natural sciences to the state espoused by botanists and bureaucrats only give a partial explanation of why and how naturalists got involved with the Spanish colonial enterprise in the late eighteenth century.[8] Practical problems such as the scarcity of cinchona trees, as much as Enlightenment ideals, propelled the intertwining of science and the state in this period. Context was also important. Casimiro Gómez Ortega and others took full advantage of the emerging skepticism toward other forms of learned expertise in order to insert themselves into the space of expertise in Madrid – a social space within the imperial bureaucracy surrounding the Crown and its most prominent ministries such as the Ministry of the Indies. This chapter begins with the Crown's efforts to expand the space of expertise in the late 1770s, and then turns to the ways in which botanists on both sides of the Atlantic capitalized on this phenomenon. Finally, by considering the specific case of the problematic status of *quina de Santa Fe* (bark from northern New Granada near the capital), this chapter examines how the hierarchical nature of the imperial knowledge complex continued to be enforced even among the empire's new experts.

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[6] Antonio González Bueno, *Tres botánicos dela Ilustración: Gómez Ortega, Zea, Cavanilles: la ciencia al servicio del poder* (Nivola: Tres Cantos, 2002); Francisco Javier Puerto Sarmiento, *Ciencia de Cámara: Casimiro Gómez Ortega (1741-1818), El Científico Cortesano* (Madrid: CSIC, 1992).

[7] Manuel Sellés, José Luis Peset, and Antonio Lafuente, eds., *Carlos III y la ciencia de la Ilustración* (Madrid: Alianza Editorial, 1988); Antonio Domínguez Ortiz, *Carlos III y la España de la Ilustración* (Madrid: Alianza Editorial, 1988); Puerto Sarmiento, *La Ilusión Quebrada.*

[8] On eighteenth-century notions of the utility of the natural sciences, see: Margaret Schabas and Neil De Marchi, eds., *Oeconomies in the Age of Newton* (Durham: Duke University Press, 2003); Staffan Müller-Wille, "Nature as Marketplace: The Political Economy of Linnaean Botany," *History of Political Economy* 35 (2003), 154-172; Richard Drayton, *Nature's Government*.

Expansion: The Space of Expertise in Madrid

In the late 1770s, the Crown, royal officials, and even the royal pharmacists began to reach out to other groups of experts for advice and opinions on the *quina* coming into the capital city. Whereas in the 1750s and 1760s the royal pharmacists served as the King's main experts on cinchona bark, they started to share the space of expertise with physicians and other pharmacists of the Court, the royal hospitals, and the army in the 1770s. The pharmacists had always shared the space of expertise with the local experts in Loja – as Pedro de Valdivieso reminded them in 1773. What was new in the 1770s, however, was the increasing connections between the Crown and other groups of learned experts in Madrid and Spain beyond the Royal Pharmacy. In part, this shift was pragmatic. The small staff at the Royal Pharmacy simply could not handle all of the responsibilities associated with the *estanco de quina* between assessing annual shipments and examining samples of new sources of *quina*. Expansion of the space of expertise often occurred in concert with specific consultations or disagreements over the bark. This had two main results: the development of new networks of experts involved with *quina* and new methods for assessing the bark.

Starting in 1773, therapeutic testing of the bark at royal hospitals became a regular feature of examinations of *quina* (Table 4.1).[9] The Royal Pharmacy remained the base of the Crown's operation to assess and distribute *quina* within Spain and throughout Europe. However, the pharmacists now had to share the space of their expertise with the King's chamber physicians (*médicos de cámara*) as well as physicians and pharmacists associated with the Royal Hospitals.

[9] By "therapeutic testing," I mean that physicians used the *quina* in question on a patient as a means to assess its medical efficacy.

José Martínez Toledano, Head Pharmacist at the Royal Pharmacy, was one of the first to ask for the help of medical experts at the hospitals. In March 1773, he solicited a second opinion on the infamous shipment of that year that his assistants had dubbed entirely useless for royal purposes.[10] A similar situation arose with a shipment of 160 boxes of *quina* that arrived at the Royal Pharmacy in 1775. In November, Manuel González Garrido, an assistant pharmacist, examined the shipment and determined that 2,647 pounds of bark were useful as "alms" (*limosnas*) while 9,312 pounds were useless. After González Garrido's examination, José Martínez Toledano, the Head Pharmacist, sent some of this *quina* to the "General Hospital" in Madrid "so that they could experiment [with it] and examine its effects."[11] An unsigned manuscript in the archives of the Royal Pharmacy is testimony of the impetus behind expanding the space of expertise: "an opinion without any experiments is not enough."[12] The anonymous report further noted that the tests at the General Hospital confirmed the "utility of *quina* that had previously been classified as useless."[13] So, the expertise of the royal pharmacists was now in doubt.

Chamber physicians and physicians at the royal hospitals soon began to actively shape the space of expertise. Therapeutic testing of *quina* samples involved

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[10] In March, as his assistants were composing the instructions for bark collectors in Loja, José Martínez Toledano sent samples from the 1773 shipment for testing at Royal Hospitals in Madrid. He received the results of these tests in March and May, see: Josef Salomon y Morales and Vicente Velinchon to José Martínez Toledano, [Madrid], 20 March 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.; Eugenio Escolano, Bartolome de Siles, and Josef Salomon [y] Morales to José Martínez Toledano, Madrid, 14 May 1773, APRM, Reinados, Carlos III, *legajo* 197-1, nn.; José Martínez Toledano to Duque de Losada, Aranjuez, 15 May 1773, APRM, Reinados, Carlos III, *legajo* 197-1.

[11] Duque de Losada to José Martínez Toledano, Aranjuez, 30 April 1776, APRM, Reinados, Carlos III, 197-3. Losada's communiqué provides a summary of these events but provides little detail on how much *quina* was tested and which classes were tested at the general hospital. Additional archival research is needed to find supporting documentation for Losada's account.

[12] APRM, Reinados, Carlos III, 198-3. This document also describes how the Crown instructed the Head Pharmacist to give a portion of the *quina* from the 1774 shipment that the pharmacy had dubbed "useless" to the General Hospital for testing.

[13] APRM, Reinados, Carlos III, 198-3.

administering the bark to a patient.[14] In some cases, physicians refused to conduct such trials because a sample was obviously inferior. For example, in 1774, pharmacists and doctors as "the General Hospital" in Madrid rejected a *quina* sample because it lacked "all qualities, requirements, substance, consistency, color and flavor to be classed as good or medium [quality]."[15] They explained that they would not administer *quina* to their patients without at least some indication that there was "probability of relief."[16] Such a reaction came as a surprise to the Duque de Losada, the Chamberlain of the Royal Household, who noted that the King had given this same *quina* to "many others in the Kingdom without any complaints of bad effects."

The physicians' objection, thus, fueled further investigation of the sample. To resolve the issue, the Duque de Losada sent an *arroba* (approximately twenty-five pounds) of the bark to Joseph Lafarga, a chamber physician, for further "experiments." Lafarga reported that, contrary to the General Hospital, the bark was "good quality" and alleviated the effects of "regular *tercianas*."[17] These contradictory assessments drove royal officials to consult additional experts. At the same time that

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[14] On early modern medical practices of human and animal experimentation, see: Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004), 156-166; Andreas-Holger Maehle, *Drugs on Trial: Experimental Pharmacology and Therapeutic Innovation in the Eighteenth Century* (Rodopi: Amsterdam: 1999), 2, 311-317.

[15] APRM, Reinados, Carlos III, 198-3.

[16] This response by the physicians at the General Hospital derived in part from their perception that the *quina* donated by the King had declined in quality in recent years. In light of the increasing scarcity of bark in Loja and other regions that supplied the Crown and its Royal Pharmacy, the overall quality of *quina* shipments was probably declining. This claim is merely suggestive, however. Since the quality of different kinds of *quina* was under such intense debate and scrutiny at this time, it is difficult to establish definitively whether a particular shipment or kind of *quina* was poor quality or not. For a contemporary account of the complaints from the General Hospital, see: Duque de Losada to Duqe de Hijar, San Ildefonso, 15 September 1780, APRM, Reinados, Carlos III, 198-3. Another anonymous document in this same section of the archival records of the Royal Pharmacy explains that the Crown only had a small portion of *quina* to give as alms since much of the bark was to serve as "gift[s] to Foreign Courts and for the consumption of the Royal Pharmacy in treating the Royal Family." It is further evidence that the Crown was beginning to feel the effects of the *quina* shortages in Loja and other regions.

[17] APRM, Reinados, Carlos III, 198-3.

they became integrated into the space of expertise, physicians at the General Hospital and the Court also helped to re-shape this space and to expand it further to include an even broader community of experts.[18]

In 1779, physicians at the General Hospital began to assert their authority and expertise on *quina* over and above that of the Royal Pharmacy. In August, the Crown ordered the Royal Pharmacy to send sixteen *arrobas* of *quina* to the Conde de Mora, who was to distribute the bark for use in hospitals. *Quina* from de Mora arrived at Madrid's General Hospital just in time for the season of "pernicious and malignant *tercianas*," which occurred annually in late summer and early fall.[19] By September, a *junta* of physicians had determined that the bark was useless against these fevers, describing it as "stale and old and, as a result, inert and devoid of its virtue."[20] The bark was such poor quality that it had to be administered in "increasing quantities" in order to have any effect.[21] Inspection of the boxes in which this *quina* was stored revealed that the word "*inutil*" (useless) had been erased from the markings on two of the boxes. In their report, the *junta* blamed the Royal Pharmacy.

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[18] The same anonymous manuscript on which much of this discussion is based also contains other accounts of contradictory opinions by medical experts on the same samples of *quina*. *Tercianas* is the Spanish term for intermittent fevers in which patients lapse into fever every three days. We now know that the cycles of intermittent fevers are associated with the various stages of the lifecycle of the *plasmodium* that causes malaria, see: Teodoro S. Kaufman and Edmundo A. Rúveda, "The Quest for Quinine: Those Who Won the Battles and Those Who Won the War," *Angewandte Chemie International Edition* 44 (2005), 854-885; Herbert M. Gilles and David A. Warrell, *Bruce-Chwatt's Essential Malariology* (London: Edward Arnold, 1993).

[19] My account of the assessment of this disbursement of *quina* at the General Hospital and elsewhere comes from the description given by the Duque de Hijar, see: Duque de Hijar to the Duque de Losada, Madrid, 4 September 1780, APRM, Reinados, Carlos III, 198-3.

[20] This inspection was conducted under the auspices of the Tribunal of the Royal Protomedicato – the main regulatory and disciplinary board of the medical community in early modern Spain. Nine physicians signed the report including: Man[ue]l Prietto, Josef Solomon, Bartolome de Siles, Juan [Dayde?], [Hipimo?] Ant[oni]o Lorente, Vicente Velinchon, Nicolas Lopez y Valverde, Ygnacion Josef Serrano and Eugenio Escolano. Manuel Prietto, et al. [to el Conde de Mora], Madrid, 6 September 1779, APRM, Reinados, Carlos III, 198-3.

[21] Dosages had to be of such large quantity that the patients started to experience ill effects from the *quina* itself. Duque de Hijar to the Duque de Losada, Madrid, 4 September 1780, APRM, Reinados, Carlos III, 198-3. The effects included: "*parotidas, dolores colicos, itricia*."

After receiving news of the *junta*'s unfavorable assessment of the bark, the Conde de Mora sent additional samples for testing by medical experts ("professors"), who were not connected to or employed by the General Hospital. He assembled an eight-member panel – four physicians and four pharmacists – including Casimiro Gómez Ortega, the Director of the Royal Botanical Garden (Table 4.1).[22] In general, this group concurred with the assessment of the *junta* at the General Hospital. While the some members of the panel gave a more favorable assessment of the bark, they all agreed that it probably had little effect on the tertiary fevers being treated at the General Hospital. The matter was all but decided save one dissenting voice.

At the request of the Duque de Losada, a sample had been sent to another Physician of the Chamber, Alfonso Lope y Torralva. Lope y Torralva conducted "experiments" with the bark and reported that it "happily cured" patients suffering from "*tercianas* and *quartanas* some regular, some irregular and other pernicious."[23] Lope y Torralva's report was sent to the Conde de Mora and the *junta* at the General Hospital. The *junta* rejected these findings on three grounds. First, they argued that Lope y Torralva's *quina* was not the same as the bark that they had been given originally. Second, the *junta* argued that even in a small portion of predominantly useless bark, one could find some efficacious pieces. Finally, the physicians pointed out that Lope y Torralva's patients were not suffering from the same kind of fevers as the ones at the General Hospital in Madrid.[24] In September 1780, the Duque de Hijar recounted this episode in a letter to the Duque de Losada. He noted that the matter

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[22] Duque de Hijar to the Duque de Losada, Madrid, 4 September 1780, APRM, Reinados, Carlos III, 198-3.
[23] Ibid.
[24] These reasons are summarized in the Duque de Hijar's letter of 1780. Hijar recounted the history of this dispute as part his own request to the Duque de Losada in which Hijar explicitly stated that he wanted fresh bark from shipment recently arrived in Lisbon and not bark from the Royal Pharmacy's existing stores.

was decided in the favor of the *junta* at the General Hospital, especially since this episode pitted "the report of one individual [Lope y Torralva] against the judgment of seventeen professors."[25] In February 1780, the Conde de Mora prohibited distribution of this *quina*. The physicians at the General Hospital had trumped the Royal Pharmacy.[26]

The Duque de Losada, however, was not as easily convinced as the Duque de Hijar. Losada enrolled more experts (Table 4.1). During the winter months of 1779 and 1780 the "regular physicians" (*médicos de número*) at the army hospitals were also given samples of the *quina* that the *junta* at the General Hospital had rejected. After using the bark "during the winter, [and] on quaternary fevers [and] complicated illnesses [*dolencias complicadas*]," these physicians found that while this bark was "not of excellent quality or of the most exalted virtue," this *quina* still could be "dispatched" since "its quality [*bondad*] [had been] experienced and assured."[27] In April 1780, Luis Blet, Head Pharmacist of the Royal Armies, reported the favorable results to the Duque de Losada and noted that of 1190 patients in army hospitals "very few die[d];" in other words treatment with the *quina* was a success.[28] When Blet's letter and the reports of the army physicians reached Losada in Madrid, they turned the tables on the Duque de Hijar who had rejected the pharmacy's *quina*

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[25] Duque de Hijar to the Duque de Losada, Madrid, 4 September 1780, APRM, Reinados, Carlos III, 198-3.

[26] The fact that the boxes had the word "useless" written on them suggests that the pharmacists were well aware of the bark's quality. Given the increasing scarcity of the bark, however, the pharmacists may have had little choice but to send it to the General Hospital. I suspect that the Royal Pharmacy experienced not only a decline in the quantity of bark in the shipments but also in the quality of the bark especially since bark collectors had little choice but to take whatever cinchona was available in order to meet the terms of their contracts with merchants and landowners.

[27] Mauricio de Echandi to Luis Blet, San Roque, 16 April 1780, APRM, Reinados, Carlos III, 198-3. Included with this document are the case histories of the use of the *quina* on patients by various army physicians from January to March 1780

[28] Luis Blet to the Duque de Losada, Algeciras, 20 April 1780, APRM, Reinados, Carlos III, 198-3. For Luis Blet's biography, see: Eduardo Valverde Ruiz, *La Real Botica en el Siglo XIX*, PhD Dissertation (Madrid: Universidad Complutense de Madrid, 1999), 6-7.

based on the original fact that seventeen medical experts considered it useless and only one considered it useful.[29]

Assessing the quality of the *quina* currently housed at the Royal Pharmacy was especially important to the Duque de Hijar because he had solicited a disbursement of *quina* from the Duque de Losada. Since he had gotten wind of the poor quality of the *quina* that the Crown had recently dispatched to the hospitals, he specifically requested bark from a recently arrived shipment from America.[30] To this request, Losada replied by outlining the hierarchy of uses to which the King put his cinchona bark. Since Hijar had cited the recent rejection of the Crown's *quina* by the *junta* of the General Hospital, Losada explained that "the *junta* of these Hospitals should recognize and not ignore the fact that the main objective [for this *quina*] is for His Majesty to give it to Foreign Courts and for the consumption of the Royal Pharmacy."[31] Hijar and the hospitals would only receive bark from that which remained after the Crown had fulfilled these commitments. It was an unusually candid admission on the part of a royal official of the priorities for the Crown's *quina* that the King's health and gift giving came before the health of the people. Losada added that a royal order had established that "the most beautiful and colorful pieces [of bark]" were reserved for the Crown and all the rest was to be given as "alms" to hospitals.[32] Losada also mentioned the favorable reports of other medical experts. He noted that many hospitals had used the *quina* donated by the Crown without

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[29] Notably, neither the Duque de Hijar nor the Duque de Losada took account of the number of tests conducted by each physician. It was the number of expert opinions not the number of tests to support these that counted most.
[30] During times of military conflict, Spanish ships occasionally landed at Lisbon as in the case of the *Buen Consejo* which was carrying the Crown's annual supply of *quina* and landed at Lisbon in 1780, see: Miguel de Muzquiz to Duque de Losada, Aranjuez, 19 June 1780, APRM, Reinados, Carlos III, 197-2.
[31] Duque de Losada to Duque de Hijar, San Ildefonso, 15 September 1780, APRM, Reinados, Carlos III, 198-3.
[32] Ibid.

complaint, and informed Hijar of the favorable results observed by physicians serving in the "Field Army of San Roque."[33]

This episode of the General Hospital's rejection of the Crown's donated *quina* reflects two important aspects of the growing community of medical experts in Spain. It provides a glimpse into how disputes over the quality of *quina* were adjudicated and decided in Spain. In this case, networks of patronage were crucial. Consider that the two protagonists – the Duque de Losada and the Duque de Hijar – each relied on a different group of medical experts. While the Duque de Hijar founded his case for the poor quality of the bark on the assessments made by the *junta* of physicians in Madrid and the Conde de Mora's informal eight-member review board, the Duque de Losada drew on the collective expertise of army physicians as well as the report of Alfonso Lope y Torralva, Physician of the Chamber.[34] This episode also shows that the community of experts in Spain who were called to examine and assess *quina* had expanded greatly since 1750. Even in Madrid and Spain, the authority of the Royal Pharmacy – as embodied in the samples it distributed – did not go unchallenged. Like Pedro de Valdivieso in Loja, physicians at the General Hospital disputed the quality of the pharmacy's bark. Finally, the consistent use of therapeutic trials reflects a new emphasis on "experiments" among the learned experts in Madrid.[35]

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[33] Ibid.

[34] In a surprising reversal, the Duque de Hijar reported to the Duque de Losada that the *junta* of Hospitals had agreed to re-examine the disputed *quina* based on reports of the latest results from Alfonso Lope y Torralba's examinations in September and October that suggested the disputed *quina* was good quality, see: Duque de Hijar to Duque de Losada, Madrid, 9 November 1780, APRM, Reinados, Carlos III, 198-3.

[35] I would like to thank Dr. Judith Farquhar for suggesting this terminology of therapeutic trials and therapeutic testing.

Table 4.1: Examinations of samples of *quina* from the Royal Pharmacy circa 1779

Year	Date	Event	Location
1773 to 1775		The Royal Pharmacy begins to solicit additional opinions on the quality of bark in the monopoly's annual shipments from other medical experts, mostly royal physicians and physicians at royal hospitals.	Madrid
1779	August	The Royal Pharmacy sends sixteen *arrobas* of *quina* to the Conda de Mora for disbursement to hospitals.	Madrid
1779	September	A *junta* of physicians at the General Hospital deems the bark useless and rejects it.	Madrid
1779	September?	The Conde de Mora solicits a second opinion of this *quina* from an eight-member panel of pharmacists and physicians not associated with the hospitals. This group, which included Casimiro Gómez Ortega, concurs with the hospital's assessment that the bark is useless.	Madrid
		The Duque de Losada asks that another sample of the same bark be sent to Alfonso Lope y Torralva, Chamber Physician. Lope y Torralva gives the bark a favorable review. The *junta* of physicians at the General Hospital rejects Lope y Torralva's assessment.	Madrid
c. November 1779 to c. February 1780		Duque de Losada sends samples of the same bark to the "regular physicians" at the army hospitals for additional opinions on the quality of this bark.	(Various)
1780	April	Luis Blet, Head Pharmacist of the Royal Armies, reports success in using this *quina* in the army hospitals.	Algeciras
1780	September 4	The Duque de Hijar writes to the Duque de Losada summarizing the results of tests at the hospitals and by the Conde de Mora's eight-member commission in order to support his claim that the *quina* is useless.	Madrid
1780	September 15	The Duque de Losada responds to the Duque de Hijar's report. Losada ultimately asserts that the *quina* is efficacious.	Madrid
1785	July	Several officials offer proposals for the sale of surplus *quina* from the Royal Pharmacy.	Madrid

Emergence: The Early Career of Casimiro Gómez Ortega

In the context of skepticism about learned experts of Europe and the challenges to the expertise of the Royal Pharmacists, the Crown and its officials expanded the space of expertise. Botanists benefited from and took advantage of this situation as they inserted themselves into the expanding expert community for

the examination and assessment of *quina* (as well as other medicaments and products from the New World). Casimiro Gómez Ortega, Director of the Royal Botanical Garden, was especially adept at exploiting these circumstances to establish a place for botanists as expert advisors to the Crown. His career exemplifies the rise of botany in the Spanish imperial enterprise, as his consultations on *quina*, more so than his appeals to Enlightenment notions of the utility of natural history to the state, furthered the emergence of botany as an imperial science in the Spanish Atlantic.

Many factors contributed to Gómez Ortega's individual success as a botanist and client of the Crown. He had strong connections to the pharmaceutical community in Madrid through his uncle, José Ortega, who owned and operated an important pharmacy in Madrid. Since botany was not yet a formal university discipline in eighteenth-century Europe, Gómez Ortega studied medicine and pharmacy as a student at Montpellier. Later, in his capacity as Director of the Royal Botanical Garden, Gómez Ortega served as "examiner in Pharmacy" on the *Protomedicato*, the main regulatory and disciplinary board of medical practitioners in Spain.[36] In 1784, Casimiro Gómez Ortega was appointed "honorary Head Pharmacist" (*Boticario Mayor*) at the Royal Pharmacy. More than just an honorary title, it provided another opportunity for greater involvement with *quina* and the affairs at the Court requiring learned expertise.

[36] Pascual Iborra, *Historia del protomedicato en España (1477-1822)* (Valladolid: Universidad, Secretario de Publicaciones, 1987); John Tate Lanning, *The Royal Protomedicato: the Regulation of the Medical Professions in the Spanish Empire*, ed. John Jay Te-Paske (Durham: Duke University Press, 1985).

Table 4.2: The Rise of a Botanist:
Casimiro Gómez Ortega's Career in the 1770s and 1780s

Year	Date	Event	Location
1772	July 29	Casimiro Gómez Ortega becomes the Director of the Royal Botanical Garden. Later that year, he is named "Examiner of Pharmacy" in the Royal Tribunal of the *Protomedicato*.	Madrid
1777		José de Gálvez selects Casimiro Gómez Ortega to oversee Spain's scientific expeditions to Spanish America.	Madrid
1777	January	The Duque de Losada, at the request of the Minister of the Indies, asks Casimiro Gómez Ortega and Juan Díaz to examine samples of cinnamon and clove from Quito.	Madrid
1777	April	Casimiro Gómez Ortega reports the results of examination of *quina* from Santa Fe de Bogotá to José de Gálvez, Minister of the Indies.	Madrid
1779		Casimiro Gómez Ortega publishes his *Instrucción sobre el modo más seguro y económico de transportar plantas vivas*.	Madrid
1785		José de Gálvez asks Casimiro Gómez Ortega to examine samples of *quina* from Cuenca sent by Miguel de San Andres	Madrid
1785	April	Gómez Ortega reports to Gálvez that *quina* from Cuenca is poor quality.	Madrid
1785	May	Gálvez orders the President of Quito to cease the collection of *quina* from Cuenca for the Royal Pharmacy.	Madrid

Officials at the court in Madrid tended to treat Gómez Ortega as an outside advisor. In 1779 the Conde de Mora had selected Gómez Ortega to examine the *quina* rejected by physicians at the General Hospital precisely because Gómez Ortega was affiliated with neither the hospital nor the Royal Pharmacy. This was not the first occasion on which Gómez Ortega worked with other experts in service to the state. For example, in 1777, the Duque de Losada asked Gómez Ortega to assess some samples of cinnamon and clove from Quito. It was José de Gálvez, Minister of the Indies, who had instructed Losada to arrange for experts to assess the "quality" of

these samples and determine "if they will lose their sharp [flavor] if cultivated."[37] Losada asked Gómez Ortega and José Martínez Toledano, the Head Pharmacist, to conduct the examination.

Gómez Ortega took every opportunity to promote the utility of his science so as to insure future patronage from the Crown and powerful elites at the court.[38] One example is the way he treated his report on the samples of cinnamon and clove. He explained that "in order to ascertain the truth and proceed with certainty" regarding the effects of cultivating cinnamon or clove in the colonies, "a Botanical examination of a live Plant" would be "indispensable." He also praised the King and his "protection...in favor of the natural science" as evident in the imminent departure of the botanical expedition of Joseph Dombey, Hipólito Ruiz, and José Pavón to Peru.[39] Unlike pharmacists, botanists often traveled in order to study plants in the field. Gómez Ortega closed his report with a revisionist history of "the discovery of the wonderful regions of the spice trade" – a discovery which he attributed solely to the "risk-taking and daring" of "the Spaniards."[40] In addition, he proposed that through the production of "oil distilled from this Cinnamon in the Royal Chemical Laboratory," Spain would break the Dutch monopoly on the cinnamon trade. In addition, the

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[37] José de Gálvez to Duque de Losada, El Pardo, 9 January 1780, APRM, Reinados, Carlos III, 197-3.

[38] For similar accounts of botanists and botanical institutions in other European states, see: Patricia Fara, *Sex, Botany, and Empire: The Story of Carl Linnaeus and Joseph Banks* (New York: Columbia University Press, 2004); Emma C. Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000); John Gascoigne, *Science in the Service of Empire: Joseph Banks, the British State and the Uses of Science in the Age of Revolution* (Cambridge: Cambridge University Press, 1998); Alice Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth-Century Parisian Royal Academy of Science* (Berkeley: University of California Press, 1990).

[39] Casimiro Gómez Ortega to Duque de Losada, 15 January 1777, APRM, Reindos, Carlos III, 197-3.

[40] Ibid. I call his history "revisionist" because it was written to sound as if Spaniards alone had discovered certain key species and medicaments. As noted by Henry Kamen, this kind of Spanish-centric or Castilian-centric was commonly deployed by Spanish and Castilian imperialists in the early modern period, see: Henry Kamen, *Empire: How Spain Became a World Power, 1492-1763* (New York: Perennial, 2004).

"providence of Charles III" and "the zeal of [the Duque de Losada]" would "restore...this important commerce to Spain by means of cultivating Cinnamon and Clove Trees from Quito."[41] Thus, Gómez Ortega made good use of his audience with the Chamberlain of the Royal Household to emphasize the utility of botany and to link it to a vision of the Spanish empire rooted in commerce and scientific knowledge.

The Crown also turned to Gómez Ortega and other botanists for assistance with the different aspects of the *quina* monopoly from Madrid to South America. In January 1776, the Crown had issued an order for officials in the colonies to reconsider the question of establishing a broad-ranging royal monopoly of *quina*. This prompted Sebástian López Ruiz, a Panamanian physician in Santa Fe de Bogotá, to submit two samples of cinchona bark that he claimed to discover in forests near Santa Fe.[42] His report of April 1777 was addressed directly to José de Gálvez, Minister of the Indies. Gálvez had provided Gómez Ortega with four boxes of *quina* – two labeled "A" and two labeled "B." In the opening of his report, Gómez Ortega offered his "most respectful and sincere congratulations" for the "the discovery of the true *Quina* Tree in the Kingdom of Santa Fe [i.e. the Viceroyalty of New Granada]."[43] He further noted that *quina* was "an object very much deserving of the attention of His Catholic Majesty." Here, he made an explicit reference to Charles Marie de la

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[41] Casimiro Gómez Ortega to Duque de Losada, 15 January 1777, APRM, Reindos, Carlos III, 197-3.

[42] Sebastian José Lopez Ruiz, "Cronología del descubrimiento de la Quina de Santa Fe de Bogotá," Santa Fe, 20 May 1784, AGI, Santa Fe 757, fols. 1216-135. This submission by López Ruiz was just beginning of decades long dispute between López Ruiz and José Celestino Mutis over who first discovered cinchona trees in New Granada near Santa Fe de Bogotá, see: Gonzalo Hernández de Alba, *Quinas Amargas: El sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Tercer Mundo Editores, 1991); Marcelo Frías Núñez, *Tras El Dorado Vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783-1808)* (Seville: Diputación de Sevilla, 1994); Daniela Bleichmar, "Visual culture."

[43] Casimiro Gómez Ortega to José de Gálvez, Madrid, 24 April 1777, AGI, Santa Fe 757, fol. 58r.

Condamine's article on the cinchona tree published in Paris in 1738 in which La Condamine had recommended royal intervention in the *quina* trade.[44] Gómez Ortega did not specifically mention a monopoly of *quina* but he supported intervention of the King to insure "good faith in the unique trade in *quina*."[45] In these instances, he hinted that his scientific expertise gave him authority to make policy recommendations

Gómez Ortega recommended that *quina* A be burned. *Quina* B, however, had potential. He noted that the bark had a "strange flavor and a bright orange color [*el color encendido*] as well as a stronger *Quina* flavor than [sample A] but not as intense as good *quina* from the Kingdom of Peru."[46] He proposed that the shortcomings of *quina* B were the result of the bark's degradation while in transit, and requested more bark for additional testing. Gómez Ortega further suggested to Gálvez that one of the boxes of *quina* B be sent to "the *Junta* of the Hospitals" so that the physicians there could report on "the effects" of this *quina* when used on patients.[47] The other box was to be sent to "various individual Physicians who are the most experienced and accredited" for additional observations of *quina* B's performance when administered to patients. The reports from these physicians could be compared with those of the "Professors of Santa Fe," whom the Viceroy of Santa Fe had asked to examine López

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[44] See copy of La Condamine's report in: Charles Marie de la Condamine, *Viaje a la America Meridional por el Rio Amazonas. Estudio sobre la Quina*, edited by A. Lafuente and E. Estrella (Quito: Abya-Yala, 1993).

[45] Casimiro Gómez Ortega to José de Gálvez, Madrid, 24 April 1777, AGI, Santa Fe 757, fol. 58r.

[46] Ibid., fol. 58v. Although *quina* from Loja was technically from the same Viceroyalty as *quina* from Santa Fe, many European authors did not make this distinction. *Quina* came to be identified with the port through which it was shipped. Since most of it was shipped to Cádiz from Lima, most *quina* from Loja and other parts of the *Audiencia* of Quito came to be known as *quina* from Peru. This misunderstanding remained an important factor throughout the eighteenth century.

[47] Casimiro Gómez Ortega to José de Gálvez, Madrid, 24 April 1777, AGI, Santa Fe 757, fol. 58v.

Ruiz's *quina* samples. Finally, he asked that the Viceroy be ordered to send more samples of these two *quina*s, as well as *quina* from the "Guarani Missions." In addition to bark, Gómez Ortega asked not only for sample of the "leaves, flowers, and fruits" of each kind of *quina* but also "a few small trees" of each.[48]

Gómez Ortega apparently was not content with simply providing his knowledge and expertise to the Ministry of the Indies or the Crown. Instead, he took an active role in organizing and coordinating the existing community of experts for the assessment of different kinds of *quina*. As discussed above, in some cases, royal officials (the Duke of Losada) and other members of the Court (the Duke of Hijar and the Count of Mora) continued to distribute samples and organize a community of medical experts in Madrid and throughout Spain. At the same time, however, Gómez Ortega used his connections to the Ministry of the Indies and the Crown to assume a similar role in organizing the efforts of the broader community of experts. Through his recommendations of greater intervention by the King, and his suggestions on where to distribute samples for testing, Gómez Ortega sought to expand his role by developing networks that fused science and imperial statecraft. Finally, this report shows how *quina* was an object around which the techniques and interests of science and the state became intertwined.

Integration: Gómez Ortega's *Instrucción*

In the conclusion to his 1777 report on the *quina* from Santa Fe, Gómez Ortega suggested that he write and print "an *instrucción* of four to six pages" similar to another government *instrucción* "published on the order of the King so that Viceroys, Governors, *Corregidores* and *Alcaldes mayores* could [know how to]

[48] Ibid., fol. 59r.

choose, prepare and send to Madrid products for the Cabinet of Natural History."[49] Gómez Ortega suggested that his *instrucción* could be sent to these same colonial officials in order to provide information on how to send live plants to Madrid. He pointed to the published works of other European naturalists, such as John Ellis in England and Henri-Louis Duhamel du Monceau in France, noting in particular that Ellis' work had facilitated the successful transplantation of coffee, tea and other important plants to London and other parts of the British Empire.[50] Gálvez and the Crown accepted Gómez Ortega's proposal. In 1779, he published his *Instruction on the safest and most economical method for transporting live plants from distant lands by sea or land*.[51]

As the title suggests, this short treatise was a practical guide on how to transport live plants. Gómez Ortega intended the work for naturalists as well as non-scientific agents – merchants, soldiers, missionaries, and colonial officials – on which the Royal Botanical Garden depended for the collection of botanical specimens from around the globe.[52] Whereas other accounts of botany in Enlightenment Spain and the career of Casimiro Gómez Ortega give this document little attention, here I treat

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[49] Ibid.
[50] Ibid., fols. 59r-v.
[51] Casimiro Gómez Ortega *Instrucción sobre el modo más seguro y económico de transportar plantas vivas* [1779], introduction by Francisco Javier Puerto Sarmiento (Madrid: Fundación de Ciencias de la Salud, 1992).
[52] Puerto Sarmiento suggests that the instructions were intended for "botanical correspondents, those on expeditions and high functionaries overseas," see: Francisco Javier Puerto Sarmiento, *Ciencia de Cámara: Casimiro Gómez Ortega (1741-1818) El Científico Cortesano* (Madrid: CSIC, 1992), 166. Elsewhere, Puerto Sarmiento has noted that the instructions were also sent to colonial officials including the Viceroys of New Spain, New Granada and Peru, the Governors of Puerto Rico, Santo Domingo, Yucatán and Louisiana as well as the Intendants of Caracas and Habana, see: Francisco Puerto Sarmiento, "Introduction," in: *Instrucción sobre el mode más seguor y* económico, xvi. Archival records show that Gómez Ortega's instructions were also sent to colonial officials, who had been asked in 1786 to send natural historical objects to the Crown, see: ANH/Q, Fondo Especial, box 99, vol. 240, no. 6090; see also: Paula De Vos, "Research, Development, and Empire: State Support of Science in the Later Spanish Empire," *Colonial Latin American Review* 15 (2006), 55-79.

his *Instruction* as representative of the intertwining of botany and the Spanish empire.[53] This text will be read against two important contexts – the rise of botany, already mentioned, and also the growing skepticism of European expert knowledge of *quina* as expressed in the Miguel García de Cáceres 1779 report.

Both the form and content of Gómez Ortega's *Instruction* reflect the interconnections between botany and empire. In form, the pamphlet emulated the genre of the *instrucción* that was common in imperial bureaucracy. Indeed, Gómez Ortega had experience writing such documents for the state as in the *instrucción* he prepared for Hipólito Ruiz and José Pavón in order to outline the scientific objectives of their botanical expedition to Peru and Chile.[54] In content, the pamphlet characterized the transplantation of plants as the work of empires, and provided examples from both ancient and modern empires. The *Instruction* included three main "articles" and an appendix followed this introduction. The first and second "articles" of the instructions explained how to dig up, package, and protect plants. The third gave a list of those plants most desired by the Crown and the Royal Botanical Garden.[55] Finally, the appendix offered instructions on how to create herbaria of plant specimens.

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[53] Antonio González Bueno, *Tres botánicos dela Ilustración: Gómez Ortega, Zea, Cavanilles: la ciencia al servicio del poder* (Nivola: Tres Cantos, 2002); Francisco Javier Puerto Sarmiento, *Ciencia de Cámara: Casimiro Gómez Ortega (1741-1818), El Científico Cortesano* (Madrid: CSIC, 1992).

[54] *Instrucciónes* were already in use in the Crown's *estanco de quina* as evidenced by the *instrucción* on the collection of cinchona bark written by the royal pharmacists for bark collectors in Loja in 1773.

[55] According to Francisco Javier Puerto Sarmiento, Gómez Ortega solicited 172 plants in this section. His proposed uses of these plants, Sarmiento suggests, reflect the Crown and Gómez Ortega's priorities in terms of the type of botanical commodities to develop. Uses included dyeing (4% of plants requested), miscellaneous (mining, cosmetics, industrial, etc...) (6.5% of plants requested), construction materials (13% of plants requested), foodstuffs (23% of plants requested), and medicine (53.5% of plants requested).

The *Instructions* introduced readers in Gómez Ortega's vision of botany as an imperial science. He noted that royal support of "Botany" secured Spain's "possession of all the vegetable riches of the vast dominions of the King and the other countries of the world, especially those of Spanish America."[56] He also explained that "if our ancestors had not been so diligent in acquiring and propagating the useful plants of other countries in their country," then Spain would be lacking in "the most delicious fruits and most valuable plants."[57] As for models, Spain was to emulate "other nations" and the "Romans." Such references to the Romans, which appear throughout Ortega's introduction, subtly supported the notion that botanical activities, such as the transplantation and cultivation of plants from abroad, was a natural and appropriate, if not essential, activity to an imperial enterprise. Other prominent groups that practiced transplantation included the "Saracens," who occupied the Iberian Peninsula during the middle Ages, as well as the "Conquistadors of the East and West Indies."[58] Ortega thus linked the circulation and cultivation of plants not only with the Roman Empire, but also with the imperial glory of sixteenth-century Spain and contemporary colonial enterprises of England and France.[59]

Gómez Ortega had expressed a similar vision in a letter to José de Gálvez, Minister of the Indies:

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[56] Gómez Ortega, *Instrucción* [1779], 10-11.
[57] Ibid., 1.
[58] Ibid., 1-3.
[59] Notably, Gómez Ortega makes no reference in his introduction to Francisco Hernández, royal physician to Philip II, who was sent to New Spain to conduct a survey of its *flora*, see: Simon Varey, et. al., eds., *Searching for the Secrets of Nature: The Life and Works of Dr. Francisco Hernández* (Stanford: Stanford University Press, 2000); José María López Piñero and José Pardo Tomás, *La influencia de Francisco Hernández (1515-1587) en la constitución de la botánica y la materia médica moderna* (Valencia: Universidad de Valencia-CSIC, 1996); Simon Varey and Rafael Chabrán, "Medical Natural History in the Renaissance: The Strange Case of Francisco Hernández," *The Huntington Library Quarterly* 57 (1994), 124-151.

> I am of the firm persuasion that if the King, peaceful and wise, with the influence of his learned or educated Ministers, [were to] order the examination of the natural products of the Peninsula and his vast overseas Dominions, twelve naturalists with as many Chemists and Mineralogists dispersed through his States, will produce, by way of their wanderings, a utility incomparably greater than one hundred thousand men fighting to add some Provinces to the Spanish Empire.[60]

Here, Gómez Ortega introduced many of the same elements that he would reiterate in his 1779 *Instruction*. He cast science as a new mode and better means of Spanish imperialism. He also emphasized the utility of science to the state as well as the fact that entire enterprise would emulate from the King. His 1779 *Instruction* was a continuation of the vision of science and empire that he had already been formulating and espousing in his correspondence with government officials.

Since the 1779 *Instruction* was printed and distributed broadly, Gómez Ortega was able to publicize his vision of science and empire beyond the narrow confines of the imperial bureaucracy. This pamphlet broadcasted his vision as much to bureaucrats and bark collectors as to botanists. With this work, Gómez Ortega strengthened his role as an organizer of the other experts with which the Crown consulted. And Gómez Ortega was well placed institutionally to realize this role. He became an advisor to the Crown in the 1770s at the same time that he assumed a more prominent role in the Spanish botanical community. On July 29, 1772, he replaced Miguel Barnades as Director (*catedrático primer*) of the Royal Botanical Garden and, in the same year, the Crown named him "Examiner of Pharmacy" in the Royal Tribunal of the *Protomedicato*. This appointment gave him experience with the regulatory functions that science and the state could perform together. As director of the Royal Botanical Garden, Gómez Ortega was not only the head of one of the most

[60] Casimiro Gómez Ortega to José de Gálvez, Madrid, 23 February 1777, Indiferente 1544, nn. 3r, AGI, Sevilla, Spain.

important scientific institutions of Enlightenment Spain, but also occupied an important node in the botanical networks of the Spanish Atlantic World. In 1777 the Secretary of the Indies, José de Gálvez, put him in charge of Spain's botanical expeditions to the Americas. In this capacity, he performed a review of the progress of the botanical expeditions in 1784 and participated in the organization of the botanical expedition to New Spain in 1787.[61]

In 1785, José de Gálvez, Minister of the Indies, again asked Gómez Ortega to assess a sample of *quina*. Gálvez had recently received samples from Manuel Perfecto de San Andres, a citizen of Cuenca and merchant in the *quina* trade, who had recently received the contract to supply the Royal Pharmacy. In particular, the President of Quito hoped that *quina* from Cuenca could be used to supply the Royal Pharmacy while the forests in Loja were given a few years to recover.[62] There is no evidence that the royal pharmacists were asked to examine the bark; Gómez Ortega alone was given the authority to accept or reject it. In April 1785, he reported to Gálvez that *quina* from Cuenca was poor quality. Gálvez took action almost immediately.[63] On May 10, 1785, he sent an order to the President of Quito prohibiting any further collection of this bark for the Royal Pharmacy.[64] Gómez Ortega remained eager to learn more about the varieties of *quina* from Quito and asked that

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[61] Much of this information is extracted from the useful chronology at the end of Puerto Sarmiento's biography of Casimiro Gómez Ortega entitled *Ciencia de Cámara*.

[62] This move would effectively shift the center of gravity of the Crown's *estanco de quina* in Quito from Loja to Cuenca. Before he stepped down from his position as *corregidor* of Loja and Commissioner of the Forests, Pedro de Valdivieso was asked to write instructions for officials in Cuenca on how to collect, prepare, and package *quina* for the Royal Pharmacy, see: Pedro de Valdivieso to Royal Officials of Cuenca, Loja, 7 February 1783, ANH/Q, Fondo Especial, box 95, vol. 232, no. 54b; Pedro de Valdivieso to Royal Officials of Cuenca, Loja, 7 March 1783, ANH/Q, Fondo Especial, box 95, vol. 232, no. 54c.

[63] Casimiro Gómez Ortega to José de Gálvez, Madrid, 25 April 1785, ANH/Q, Fondo Especial, box 93, vol. 227, no. 5879, fols. 125r-127v.

[64] José de Gálvez to Juan Josef de Villalengua, Aranjuez, 10 May 1785, ANH/Q, Fondo Especial, box 93, vol. 227, no. 5879, fols. 128r-129r.

the President of Quito proceed with his plan to collect samples of different varieties from throughout the region. Gálvez accepted the proposal and instructed the President of Quito to supply "a flowering branch and the fruit of the trees dried between sheets of paper with exact and specific information on the quality of the climate and terrain" in which sampled trees grew.[65]

So Casimiro Gómez Ortega and the Royal Botanical Garden began to displace the Royal Pharmacy in assessing new kinds of *quina*. Since the establishment of the *estanco de quina* in 1751, the Royal Pharmacy had played a central role in assessing the bark.[66] In the 1780s, after the Royal Pharmacy's failure to establish reliable methods for distinguishing different kinds of *quina* and their medical efficacy, the Crown turned to botanists. By 1785, Gómez Ortega and the Royal Botanical Garden constituted a new center in the Atlantic network of officials and experts submitting and circulating samples of cinchona bark. This shift reflects a number of processes: the slow erosion of the authority of the Royal Pharmacy, the rising status of botanists as learned experts in Spain, and a pragmatic division of labor between Royal Pharmacy and Royal Botanical Garden as the Royal Pharmacy became more involved and burdened by its responsibility with the annual shipments.

New Methods in the Royal Pharmacy

While Casimiro Gómez Ortega was testing *quina* from Cuenca, the royal pharmacists were examining a shipment of 20 boxes of *quina* from Santa Fe. The pharmacists gave it a favorable review and experienced a renewed abundance of *quina* by the middle of the 1780s. Between the regular annual shipments of *quina*

[65] Ibid., fols. 128v.
[66] This policy was first stated in the royal order of 27 August 1751 that first solicited information and opinions on establishing a royal monopoly of *quina*.

from Quito and the bark received from Santa Fe, one observer in 1785 recommended that the Royal Pharmacy consider selling its excess bark to pharmacies in Madrid and throughout Spain.[67] Officials even entertained a plan to establish warehouses in several Italian cities from which to sell the excess cinchona bark.[68] In this way, the pharmacy retained its position as the distributor of the Crown's *quina* – if not the chief judge of it.

The pharmacists also developed strategies for retaining their authority relative ot other experts in Madrid. One was to introduce new techniques for examining the bark. With new techniques came new standards as evidenced by their 1785 examination of *quina* from Santa Fe.[69] Recall that in the dispute with Valdivieso in 1773, the Royal Pharmacy had based its assessment primarily on the physical characteristics of the bark.[70] In 1785, the pharmacists now dubbed the "color, thickness and configuration" (*el más o menos color, su grueso, y configuracion*) of the bark to be "accidental" and not indicative of "any essence."[71] In place of inspecting physical characteristics, the pharmacists employed three new techniques of

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[67] This report from July 1785 was discussed in a document summarizing other recent government correspondence on what to do with the excess *quina*, see: AGS, Hacienda 961-2, carpeta 95. See also: [Pedro de Lerena] to Marques de Valdecarzana, Madrid, 15 July 1785, AGS, Hacienda, 961-2, carpeta 119; Marques de Valdecarzana, "Informe del Sumiller, con el parecer del Boticario mayor sobre el modo de despachar y vender la Quina sobrante despues de surtido el oficio de la necesaria y atendidas las demas obligaciones del destino que S[u] M[ajestad] la tiene dada," San Ildefonso, 3 August 1785, AGS, Hacienda, 961-2, carpeta 120.

[68] "Proyecto sobre establecim[ien]to de Almacenes de cuenca de la Real Hacienda en Venecia, Genova, y Roma para la venta de Quina, Tabaco, Paños q[u]e no tubo efecto aunq[u]e estaba en buena disposicion el asiento," 1785, AGS, Hacienda 961-2, carpetas 122-133

[69] The Royal Pharmacy was asked to review "eighteen boxes and two sacks" of *quina* sent from Santa Fe by Sebastian López Ruiz. These samples were those requested by Gómez Ortega in his 1777 report on the first sent of samples sent to Madrid by López Ruiz, see: Sebastian José López Ruiz, "Relacion de las muestras de Quina contenidas en los diez y ocho cajones y dos churlas numerados," Santa Fe, 19 October 1782, AGS, Hacienda, 961-2, carpeta 101.

[70] See chapter 2.

[71] AGS, Hacienda, 961-2, carpeta 99, fol. 3r. The text of this summary of the Head Pharmacist's report is identical to the original, see: Juan Díaz to Marques de Valdecarzana, El Pardo, 24 January 1785, AGS, Hacienda, 961-2, carpeta 112.

examination. One technique was "analysis and separation of the principle components of this *Quina*" at a "Laboratory with the method prescribed by Chemistry."[72] Another technique was a review of existing literature on the bark. In order to identify the species of the bark, the pharmacists consulted "all [works] by travelers and the most classic naturalists which discuss [*quina*]."[73] The results led them to conclude, "the species of this new *Quina* is equal to that of Quito."[74] Their final technique was to distribute samples of this *quina* in powdered form to "twenty-two Medical Professors so that they could administer it to patients, examine its virtues and report on their results."[75] In a bid to maintain their status as learned experts, the royal pharmacists now employed the laboratory, the hospital, and the library in their work. Pressure from botanists pushed the pharmacists to expand their tool box.

The physicians reported variable results. Twelve of the physicians claimed that the *quina* from Santa Fe was as good as that from Quito or Peru, another nine physicians deemed the *quina* effective as a febrifuge but not quite as good as *quina* from Quito or Peru, and only one respondent reported that the bark had no effect.[76] With these results and those from his assistants, Juan Díaz, Head Pharmacist at the Royal Pharmacy, declared all varieties of *quina* from Santa Fe – white, red, and yellow – to be "equal to those from Quito."[77] His decision was, ultimately, based on "the authority and experience" of the "[Medical] Professors" who tested the bark on

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[72] Ibid., fol. 2v. Unfortunately, this document, which merely summarizes the tests conducted by the pharmacists and their results, does not explain what the "method prescribed in chemistry" was.
[73] Ibid. This document does not state specifically which works of "travelers" and "naturalists" were consulted.
[74] Ibid., fol. 3r.
[75] Ibid.
[76] Ibid., fols. 3v-7v. I used the phrase "Quito or Peru" to indicate that some physicians compared their samples explicitly to *quina* from Quito while others compared their sample to *quina* from Peru. At this point, most Europeans would have considered the two categories – *quina* from Quito and *quina* from Peru – as synonymous.
[77] Ibid., fol. 8r.

patients.[78] Both therapeutic trials and chemical analysis in the laboratory reflect a significant shift in the pharmacy's practices away from simple inspection of the immediately sensible or "accidental" qualities to techniques aimed at revealing the essence of a sample. Disciplinary competition effectively produced a shift in practice *and* epistemic outlook.

Royal officials, too, were influenced by the new techniques and criteria employed by the Crown's learned experts. Consider the reaction of the Marques de Valdecarzana, Chamberlain of the Royal Household, to Juan Díaz's assessment of the bark. He noted that, while recent shipments of *quina*, including those from Santa Fe, appeared useless at first glance, subsequent testing demonstrated the medical efficacy of this bark. He noted, "two-thirds [of each shipment is comprised of] *cortezones, cañas duras* and some splinters from the trunk of the tree."[79] The dreadful state of the bark suggested that the "instructions given by the Ministry [of the Indies]" for collecting, examining, and transporting the bark were not being followed. This turned out to be inconsequential, especially since the pharmacists and physicians found the bark to be useful, "even though [such *quina*] lack the good [and] accidental [characteristics] of color, odor, and flavor," in Valdecarzana's words. Echoing the conclusion offered by Miguel García de Cáceres in his report on the *quina* monopoly to the President of Quito in 1779, the Chamberlain yielded to the "facts" of the new techniques and criteria, and concluded: "there is no bad *Quina* as long as it is true *Quina*."[80]

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[78] The anonymous author of the summary wrote, "este es su parecer, en el que, no obstante, lo expuesto, deja al Publico el derecho de juzgar, y decidir este assunto más adelante con el tiempo," see: AGS, Hacienda, 961-2, carpeta 99, fol. 9r.

[79] Marques de Valdecarzana to Pedro de Lerena, San Ildefonso, 3 August 1785, AGS, Hacienda, 961-2, carpeta 120.

[80] Ibid. There is a good chance that Valdecarzana may have read García de Cáceres' report since his report circulated widely in the Spanish imperial bureaucracy. In 1786, the Ministry of

Expansion of the space of expertise also resulted in an expanded range of techniques and criteria for assessing the bark. Bureaucrats, as well as pharmacists, now regularly included the results of experimental methods such as therapeutic trials and laboratory analysis, in making decisions about a certain kind of *quina*. Some officials, such as Valdecarzana, still operated within the context of the royal gift economy. The Chamberlain reminded his associates, "the [original] objective of the shipments of *Quina* to the Royal Pharmacy was so that His Majesty would have the best *Quina* from America in order to give [it] to various European Courts and to provide for the entire consumption of the Royal Pharmacy."[81] Consequently, a incongruity emerged. Physical characteristics remained determinants of the bark's value in the royal gift economy even as officials and experts rejected these characteristics as a means for assessing the bark's quality and efficacy as a medicament. Nonetheless, this change represented a major shift away from the pharmacy's approach to the bark in the 1770s. Ultimately, this shift away from relying on physical characteristics along reflected not only an expanded community of expertise but also an expanded range of techniques – notably chemical techniques – used to examine and assess medicaments and other botanical products.[82]

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the Indies sent a printed copy of García de Cáceres report back to Quito to Juan José Villalengua, the successor to President José García de Leon y Pizarro. Officials in Spain wanted Villalengua to supply an opinion on the feasibility of García de Cáceres proposal, see: ANH/Q, Cascarilla, box 3, expediente 7.

[81] Marques de Valdecarzana to Pedro de Lerena, San Ildefonso, 3 August 1785, AGS, Hacienda, 961-2, carpeta 120.

[82] On the rise of chemical medicine and use of chemical techniques in pharmacy, see: Paula De Vos, "From Herbs to Alchemy: The Introduction of Chemical Medicine to Mexican Pharmacies in the Seventeenth and Eighteenth Centuries," *Journal of Spanish Cultural Studies* 8 (2007), 135-168; Ursula Klein, "Experimental History and Herman Boerhaave's Chemistry of Plants," *Studies in History and Philosophy of Biological and Biomedical Sciences* 34 (2003), 533-567; Paula De Vos, "The Art of Pharmacy in Seventeenth- and Eighteenth-Century México," University of California, Berkeley, 2001; Jonathan Simon, "Analysis and the hierarchy of nature in eighteenth-century chemistry," *British Journal of the History of Science* 35 (2002), 1-16; Paula De Vos, "The Art of Pharmacy in Seventeenth- and Eighteenth-Century México," University of California, Berkeley, 2001; Frederic Lawrence Holmes, *Eighteenth-*

Counterpoint: José Celestino Mutis in New Granada

A similar expansion of the space of expertise was underway in New Granada as the region's most important naturalist – José Celetino Mutis – achieved a prominent position advising the Viceroy and other officials on all matters scientific (Table 4.3). Since his arrival in Santa Fe de Bogotá in 1761, Mutis, resident physician and naturalist at the Viceroy's court, had been petitioning the Crown and the Viceroy for support of his scientific interests and activities – mainly in natural history.[83] Mutis' efforts came to fruition in the 1780s when he was appointed director of both the Royal Botanical Expedition in New Granada (in 1783) and of an *estanco de quina* based in Santa Fe (in 1785). Most historical accounts of Mutis give primacy to the former, but the latter shows that quotidian concerns as much as, if not more than, high profile expeditions, brought about an intertwining of science and empire in the late eighteenth-century Spanish Atlantic.

Experts and officials in Spain had been interested in *quina* from Santa Fe since 1776 when Sebastian López Ruiz, a physician in Santa Fe, sent samples to the Viceroy and to Spain. In 1778, the Crown put López Ruiz in charge of development of the cinchona trade in areas near Santa Fe de Bogotá. A few years later, in 1783, the Crown sent Juan Francisco Gutiérrez de Piñeres to conduct a *visita general* of

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Century Chemistry as an Investigative Enterprise (Berkeley: Office for History of Science and Technology, University of California, Berkeley, 1989).

[83] Mutis has been the subject of a number of biographies and other studies over the years. Some of the most prominent works to mention Mutis and especially his involvement with *quina* include: José Antonio Amaya, *Mutis, Apóstol de Linneo: Historia de la Botánica en el Virreinato de la Nueva Granada (1760-1783)* (Bogotá: Instituto Colombiano de Antropología e Historia, 2005); Mauricio Nieto Olarte, *Remedios para el imperio: Historia natural y la apropiación del nuevo mundo* (Bogotá: La Imprenta Nacional de Colombia, 2000); Marcelo Frías Núñez, *Tras El Dorado Vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783-1808)* (Seville: Diputación de Sevilla, 1994); Gonzalo Hernández de Alba, *Quinas Amargas: El sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Tercer Mundo Editores, 1991); John F. Wilhite, "The Disciples of Mutis and the Enlightenment in New Granada: Education, History and Literature," *The Americas* 37 (1980), 179-192; A. Federico Gredilla, *Biografia de Jose Celestino Mutis y Sus Observaciones sobre al Vigilias y Sueños de Algunas Plantas* (Bogotá: Plaza & Janes, 1982 [1911]).

New Granada. Gutiérrez de Piñeres was explicitly directed to collect information on *quina* in regard to a plan to establish an *estanco de quina* in Santa Fe.[84] In the year of Piñeres' arrival, López Ruiz was stripped of his position as director of *quina* operations in Santa Fe. When the *Visitador General* inquired about another expert on the cinchona tree, Antonio Caballero y Góngora, the Archbishop-Viceroy of New Granada, suggested José Celestino Mutis.

Mutis was eventually appointed *"*el comisionado de las quinas," and he impressed upon the Viceroy the necessity of studying the natural history of the cinchona tree in order to produce a "complete treatise" on it.[85] Marcelo Frías Núñez, one of Mutis' most recent biographers, characterizes him as having a "propensity to hoard competence relevant to *quina*."[86] Rather than framing his efforts as an act of hoarding, Mutis' actions as the *Quina* commissioner can be best understood as an effort to organize a network of knowledge production, in which he would be at the center. In this way, his approach was similar to that of Casimiro Gómez Ortega in Madrid. Just as Gómez Ortega actively sought to serve the Crown and the Ministry of the Indies, so did Mutis seek to make his expertise and the Royal Botanical Expedition a crucial part of the realization of the Viceroy's and the Crown's practical programs in New Granada.

To bolster his authority and expertise, Mutis launched a campaign to discredit his local rival, Sebastian López Ruiz, especially since López Ruiz presented himself the discoverer of *quina* of Santa Fe.[87] With the help of the Viceroy, he also solicited

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[84] Frias Nuñez, 173.
[85] Ibid. 177.
[86] Ibid., 181.
[87] This debate between Mutis and López Ruiz has been covered in detail elsewhere, see: Hernández de Alba, 161-184. Indeed, most of the archival documents at the *Archivo General de Indias* relating to *quina* from Santa Fe are the product of this dispute, see especially: AGI, Santa Fe 757A.

samples of *quina* from all regions of the Viceroyalty of New Granada. Here, the Royal Pharmacy and Royal Botanical Garden served as models, since the Crown had previously requested that officials in South America send *quina* samples to both these institutions. Bruno Latour has called such central locations, where natural objects are collected and compared to produce new knowledge, "centers of calculation."[88] Mutis could bolster his power and authority by making the botanical expedition in Sante Fe a "center of calculation," with a unique knowledge of cinchona derived from the possession of a range of samples that could be examined and compared in ways not possible in the field. Finally, Mutis worked to co-opt or eliminate any other rival experts in the region. He tried both techniques in the case of López Ruiz. After initially discrediting him, Mutis later recommended that López Ruiz be appointed director of the preparation of *quina* shipments for the Crown.[89] Mutis had already established amiable relations with Miguel de Santisteban – the other expert on *quina* in Santa Fe, who probably taught Mutis much of what he knew about the cinchona tree.[90]

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[88] Bruno Latour, *Science in Action: How to follow scientists and engineers through society* (Milton Keynes: Open University Press, 1987), 215-257.

[89] Mutis made this recommendation in a 1784 letter to Eloy Valenzuela, see: Frías Núñez, 180.

[90] On the relationship between Mutis and Santisteban, see: Bleichmar, "Visual Culture," 88-89 and David J. Robinson's introduction to: Miguel de Santisteban, *Mil leguas por América: De Lima a Caracas 1740-1741, Diario de don Miguel de Santisteban*, ed. David J. Robinson (Bogotá: Banco de la República, 1992).

Table 4.3 *Quina* and Expertise in Santa Fe de Bogotá:
The Experience of José Celestino Mutis

Year	Date	Event	Location
1761		José Celestino Mutis arrives in Santa Fe de Bogotá.	
1783		Mutis appointed director of the Royal Botanical Expedition in New Granada.	New Granada
1783		Juan Francisco Guitiérrez de Piñeres begins his *visita general* of the Viceroyalty of New Granada.	Santa Fe de Bogotá
1783	August?	Manuel Perfecto de San Andres, a *quina* merchant in Cuenca, is approved to supply the Royal Pharmacy.	Cuenca
1783	October	Antonio Caballero y Góngora, Viceroy-Archbishop of New Granada, requests *quina* samples from Quito.	Santa Fe de Bogotá
1783	November	Manuel Perfecto de San Andres reports the results of his experiments with *quina* from Cuenca to the President of Quito	Cuenca
1784	May	Perfecto de San Andres sends dried samples of cinchona trees to the Viceroy of New Granada.	Cuenca
1784	June	Perfecto de San Andres proposes further studies of the cinchona tree and its bark to the President of Quito.	Cuenca
1785		Mutis appointed director of the newly established *estanco de quina* based in Santa Fe de Bogotá	Santa Fe de Bogotá
1785	March	José de Gálvez reports to the Viceroy of New Granada that experts in Madrid found *quina* from Santa Fe to be useful.	Madrid
1785	April	Casimiro Gómez Ortega gives Perfecto de San Andres' *quina* an unfavorable review.	Madrid
1786 to 1787		Mutis sends three shipments of *quina* from Santa Fe to the Royal Pharmacy.	Santa Fe de Bogotá
1787	November	The Marques de Valdecarzana, Chamberlain of the Royal Household, reports to the Minister of the Indies that testing by medical experts in Madrid found the bark in the shipments from Santa Fe to be useless.	Madrid
1787	December	The Crown requests further testing of *quina* from Santa Fe from the Marques de Valdecarzana.	Madrid
1788	May	Antonio Porlier, Minister of the Indies, informs José Celestino Mutis of the poor quality of the bark in the shipments from Santa Fe.	Madrid
1789	February	Crown halts all shipments of *quina* from Santa Fe for the Royal Monopoly.	Madrid
1790	September	Crown officially dissolves the *estanco de quina* in Santa Fe de Bogotá.	Santa Fe de Bogotá

In October 1783, Viceroy Antonio Caballero y Góngora gave Mutis' efforts a boost when he wrote to the President of Quito asking for samples of cinchona trees from throughout the *Audiencia* of Quito. Caballero y Góngora emphasized that compliance with his request was "crucial to the formation of regulations on the cutting and sending of *Quina*."[91] It is notable that the Viceroy did not solicit reports or information on the *quina* from local officials – not even from Pedro de Valdivieso, a veritable czar of *quina* by this point. Mutis and the Viceroy apparently had no interest in the knowledge of local experts in the *quina*-producing regions of New Granada. Rather, botanists in Santa Fe would create knowledge of *quina* anew by examination and comparison of a variety of samples.

This move did not go unnoticed by officials and other local experts in the region. In November 1783, after receiving the Viceroy's request for samples, Pedro de Valdivieso expressed reservations to the President of Quito. "I do not doubt the expertise of the Botanists of this Kingdom," he explained while pointing out that the botanists lacked experience in the "actual comparison" of cinchona bark.[92] Valdivieso thus expressed concern about the Viceroy's enterprise not because botanists lacked learned expertise, but because they lacked local experience. After all, neither Mutis nor any of his associates – with the exception of Miguel de Santisteban – had actually visited Loja or any of the other southern provinces to directly observe the cinchona

[91] Antonio Caballero y Góngora to [José García de Leon y Pizarro], Santa Fe de Bógota, 2 October 1783, ANH/Q, Fondo Especial, box 80, vol. 203, n. 5294, fols. 36r-v. Caballero y Góngora described the collection of sample as "tan importante p[ar]a la formación de los reglamentos sobre los Cortes y remisiones de la Quina."

[92] "No dudo de la Ynteligencia de los Botánicos de ese Reyno, pero sí, del actual cotejo, por no haverlo practicado," see: Pedro Valdiviso to José García de Leon y Pizarro, Loja, 22 November 1783, ANH/Q, Fondo Especial, box 80, vol. 203, no. 5294, fols. 47r-v.

tree. It was similar to the critique that Miguel de García de Cáceres made of European experts' lack of direct experience of the cinchona tree and its bark.[93]

Manuel Perfecto de Sán Andres, a prospective *quina* supplier to the Royal Pharmacy from Cuenca, had a more direct encounter with Mutis, who was anxious to receive *quina* samples. Mutis needed the samples in order to perform his duties as *Quina* commissioner in Santa Fe, and also wanted the samples in order to further his research on the natural history of the cinchona tree. In July 1784, Mutis wrote to the Viceroy to complain about Perfecto de San Andres, who apparently had offered to conduct a study of cinchona trees when he submitted his samples to Mutis. The botanist was indignant. In his letter to the Viceroy, he explained that "knowing a science of detailed knowledge" (i.e botany) was "beyond [Perfecto de San Andres'] charge" as a *quina* supplier to the Royal Pharmacy. "It would be a mistake," Mutis continued, "to hope that he could contribute to the scientific examination [of *quina*] on his own."[94] He reminded the Viceroy that the scientific study of the bark was the sole province of the botanists on the Royal Expedition.

Mutis thus took Perfecto de San Andres' offer as a direct challenge to his authority as a botanist. At the same time, Perfecto de San Andres had an interest in establishing his expertise on *quina*, especially since he was still in the process of negotiating the contract to supply the Royal Pharmacy.[95] Officials in Spain wanted to be sure that the person in charge of supplying the bark knew how to distinguish good *quina* from bad. Perfecto de San Andres started locally; as early as November 1783,

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[93] Miguel García de Cáceres, [Informe – copy], Guayaquil, 16 March 1779, AGI, Quito 240, N. 36a.

[94] José Celestino to Antonio Caballero y Góngora, Mariquita, 10 July 1784, in: *Archivo Epistolar del Sabio Naturalist José Celestino Mutis*, edited by Gonzalo Hernández de Alba, vol. 1, 85.

[95] San Andres was further motivated to win the contract because the José Gacía de Leon, the new President of Quito, had recently issued a moratorium on all collection and commerce in *quina* bark in the entire *Audiencia* of Quito.

he sent the President of Quito information on experiments that he had conducted with the "salts and extracts" of *quina*, and promised further results from studies he intended to conduct in the summer of 1784.[96] He even proposed that the extract might be convenient for "the supply of the Royal Pharmacies."[97] In May 1784, Perfecto de San Andres sent "skeletons of the Tree of *Quina*" to the Viceroy in Santa Fe.[98] Mutis would have had little to complain about, except that a month later Perfecto de San Andres announced his intention to conduct his own examination to determine "if the Trees of *Quina* discovered in the Northern Forests [i.e. the forests of Santa Fe] are of the same Nature as those that grow in the Southern [Forests of the *Audiencia* of Quito]."[99]

To aggravate the situation further, Perfecto de San Andres offered to "go to these Regions [the Northern Forests] to conduct a visual examination and other operations pursuant of the resolution of such an important matter."[100] He then issued a direct challenge to the authority of Mutis and the other botanists in Santa Fe, showing that he, in fact, doubt their expertise. "With my experience," he explained, "I am able to distinguish the qualities of *Quina* with more clarity than that which could be seen in [the examination] of Skeletons [of the cinchona tree (dried plant specimens)]."[101] Like Valdivieso in Loja and García de Cáceres in Guayaquil, Perfecto de San Andres prioritized his practical experience over the expertise of the botanists. Moreover, he suggested that such experience offered "more clarity" than

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[96] Manuel Perfecto de San Andres to José García de Leon y Perfecto, Cuenca, 11 November 1783, ANH/Q, Fondo Especial, box 82, vol. 207, no. 142, fol. 167r.
[97] Ibid..
[98] Manuel Perfecto de San Andres to Juan José Villalengua, Cuenca, 26 May 1784, ANH/Q, Fondo Especial, box 87, vol. 217, no. 136, fol. 152r-v.
[99] Manuel Perfecto de San Andres to Juan José de Villalengua, Cuenca, 26 June 1784, fols. 183r-v.
[100] Ibid..
[101] Ibid.

could ever be gleaned by studying "skeletons." Since circulation and examination of "skeletons" was a bedrock practice for many botanists, especially those like Mutis who could not visit distant regions in person, such Perfect de San Andres' claim was a direct attack on the botanical enterprise.[102] Even though the Crown, the Viceroy, and *visitador general* Piñeres were looking to him for expertise and advice, Mutis still had to defuse these attacks on the authority of botany by presumptuous local experts. Thus Mutis, like Gómez Ortega, had to work to maintain his preeminence as a learned expert over other experts.

Much to Mutis' chagrin, in 1783, the President of Quito had appointed Perfecto de San Andres to be the chief supplier of the Royal Pharmacy in Madrid.[103] Perfecto de San Andres' downfall however was his own bark samples.[104] They received an

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[102] On the circulation of live and dried specimens in early modern natural history, see: Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008); Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006); Emma C. Spary, "Of Nutmegs and Botanists: The Colonial Cultivation of Botanical Identity," in *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, edited by Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), 187-203; Emma C. Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000); Nicholas J. Jardine, Anne Secord, and Emma C. Spary, eds., *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996); Agnes Arber, *Herbals, their Origin and Evolution. A Chapter in the History of Botany, 1470-1650* (Cambridge: Cambridge University Press, 1986). Puerto Sarmiento, in his *Ciencia de Cámara*, provides a schematic map of Gómez Ortega's various correspondents who sent dried and live specimens to the Royal Botanical Garden.

[103] In August of this year, *visitador general* García de Leon implemented a royal order of March 21 that ordered the enclosure of the cinchona forests of Cuenca and Loja which effectively prohibited all collection and commerce in *quina* except for that bark destined for the Royal Pharmacy, see: Luis de Cifuentes, "Testimonio en relacion del expediente formade acerca de los Montes de Cascarilla de esta Provincia de Quito," Quito, 1 December 1784, AGI, Quito 242, N. 136a.

[104] Two samples of Perfect de San Andres' *quina* had previously been examined by a group of three "physicians" in Quito in 1783. This group found one of the samples to be "superior" and the other to be "inferior," see: Juan Josef Villalengua, "Auto," Quito, 16 October 1784, AGI, Quito 242, N. 124a, nn. 1r-2r; Joseph del Rosario, "Reconocimiento," Quito, 30 October 1784, AGI, Quito 242, N. 124a, nn. 2r-2v; Bernardo Delgado, "Reconocimiento," Quito, 30 October 1784, AGI, Quito 242, N. 124a, nn. 2v-3r; Francisco Eugenio Santa Cruz y Espejo, "Reconocimiento," Quito, 30 October 1784, AGI, Quito 242, N. 124a, nn. 3r-4r. In a follow up letter to José de Gálvez, Minister of the Indies, Juan Villalengua, President of Quito, said that he did not trust the assessments of the local experts in Quito and would arrange to submit a

unfavorable review in 1785 by none other than Casimiro Gómez Ortega. It was a lucky break for Mutis. In addition, this outcome underlined how Madrid and its scientific institutions, over and above Santa Fe and its scientific expertise, remained the absolute authority on the cinchona tree and its bark. While Santa Fe and its botanical expedition emerged as a new center for expertise and knowledge on the cinchona tree in New Granada, the Royal Pharmacy and Royal Botanical Garden in Madrid still retained their preeminent place as arbiters of what constituted true and good *quina* within the greater Spanish Atlantic World.[105] It was neither the first nor the last time that an implicit hierarchy of centers of natural knowledge production would be revealed. Indeed, in 1787 and 1788, Mutis' own samples of *quina* came under the critical gaze of the community of experts in Madrid.

With the royal pharmacy's rejection of *quina* from Cuenca and a continuing moratorium on the collection of *quina* from the forests of Loja, the King and his pharmacists were running out of options. *Quina* from Santa Fe in the mid 1780s thus represented their best hope. All parties, from the Crown and its pharmacists to the Viceroy of New Granada and his botanists, were eager to make the project work. And Mutis, after years of trying to attract the patronage of the Crown, was at the center of it all.

In March 1785, José de Gálvez reported the positive results to the Viceroy of New Granada. Gálvez also requested additional samples of red, yellow and white *quina* for further testing.[106] The Crown wanted to subject *quina* from Santa Fe to

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sample of *quina* from Cuenca to Spain for further testing by "intelligent physicians and botanists," see: Juan José Villalengua to José de Gálvez, Quito, 18 November 1784, AGI, Quito 242, N. 124.

[105] Recall that both the Head Pharmacist and the Director of the Royal Botanical Garden examined samples from Cuenca in 1785.

[106] José de Gálvez to Viceroy of New Granada [Draft], El Pardo, 2 March 1785, AGI, Indiferente 1554, fols. 690r-691v; Frías Núñez, 186.

additional "analysis, chemical experiments and medical observation in order to have a certain assessment of this specific."[107] In 1786 and 1787, the Royal Pharmacy in Madrid received three shipments of *quina* from America.[108] Although the specific origins of each shipment are unclear, archival documents indicate that some of the bark came from Santa Fe. For example, in a report on his examination of one of the shipments, royal physician Francisco Martínez Sobral reported that the "new *quina* [i.e. from Santa Fe] is not comparable with *quina* commonly from Peru and the Provinces of Loja."[109] In November 1787, Chamberlain Valdecarzana relayed these results to Pedro de Lerena and Antonio Valdes, the Minister of the Indies.[110] For all three shipments, Valdecarzana reported that the "Head Pharmacists" as well as the "Physicians of the Chamber and [Royal] Family" found that "the aforementioned *quina* is not useful as a medicament."[111] He further suggested that the King consider using this bark for "dyestuffs" (*para tintes*) taking "precautions that it not be sold anywhere

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[107] Gálvez to the Viceroy of New Granada, quoted in: Frías Núñez, 186.

[108] One shipment of 160 boxes containing 557 *arrobas* and 3 pounds (13,928 pounds total) arrived from America on October 2, 1786. A second shipment of 46 boxes arrived on September 7, 1787 followed by another shipment of 45 boxes on October 8, 1787. I have not yet found the invoices for these shipments. The earliest documents from the Royal Pharmacy give no indication of the geographical origin of these shipments, see: Juan Díaz to Marques de Valdecarzana, San Ildefonso, 10 September 1787, APRM, Reinados, Carlos III, 197-3; Mathias Ros, "Razon del peso en brutoo, que han tenido las 46 caxas de *Quina*, que se han recivido en esta R[ea]l Botica en el dia 7 de Septiembre de 1787," Madrid, 12 September 1787, APRM, Reindaos, Carlos III, 197-1; Juan Díaz to Marques de Valdecarzana, San Ildefonso, 18 September 1787, Reinados, Carlos III, 197-1.

[109] Dr. Francisco Martinez Sobral, "Observaciones sobre la Quina de la remesa de 7 Septiembre de 1787," San Ildefonso, 24 September 1787, APRM, Reinados, Carlos III, 197-1. The two other reports on *quina* from the 1786 and 1787 shipments gave no indication of whether the bark was from Peru or Santa Fe. It could be that the physicians were not given this information in the first place, see: Dr. Pedro de Guemes, "Observaciones de la Quina de la remesa de 2 de Octubre de 1786 de la primera clase delgada," San Ildefonso, 30 August 1787, APRM, Reinados, Carlos III, 197-1; Dr. Antonio Maria Prieto, "Observaciones de la Quina de la remesa 2 de Octubre de la de primera clase delgada," San Ildefonso, 3 October 1787, APRM, Reinados, Carlos III, 197-1.

[110] Only Valdecarzana's letter to Lerena remains but the letters to both Lerena and Valdes probably contained the same information, see: Marques de Valdecarzana to Pedro Lerena [copy], San Lorenzo, 10 November 1787, APRM, Reinados, Carlos III, 197-1.

[111] Marques de Valdecarzana to Pedro Lerena [copy], San Lorenzo, 10 November 1787, APRM, Reinados, Carlos III, 197-1.

as a medicine."[112] All told, the Crown now found itself with 1,457 *arrobas* (36,425 pounds) of useless bark.

In December 1787, the Crown asked Valdecarzana to arrange another round of testing by the "same experts," who conducted the original examination, and by "other experts" at the same time.[113] Valdecarzana gave the task to Juan Díaz, the Head Pharmacist.[114] In a letter to Valdecarzana, Antonio Valdés, Minister of the Indies, indicated that this bark was from "the Forests of Santa Fe."[115] Valdés also supplied Valdecarzana with a copy of Pedro de Lerena's 1785 letter which summarized the previous examinations of *quina* from Santa Fe that characterized the bark was equivalent to that from Loja and Peru.[116] A manuscript letter by Francisco Gómez de Quevedo from the pharmacy's archives gives some insight into the motivations for re-testing *quina* from Santa Fe. "It is important to the service of His Majesty," wrote Gómez de Quevedo, "to know with certainty [and] avoiding all doubt if *Quina* from the Forests of the Kingdom of Santa Fe in Tierra Firme is good or not and of the same quality as that which comes from Peru from the Forests of Loja and Zamora."[117]

Many of the same experts who approved the bark in 1785 participated in the new round of tests.[118] In the end, these experts concurred with the results from 1786

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[112] Ibid.
[113] Ibid.
[114] [Marques de Valdecarzana] to Juan Díaz, Madrid, 28 December 1787, APRM, Reinados, Carlos III, 197-1.
[115] Antonio Valdés to Marques de Valdecarzana, Madrid, 29 December 1787, APRM, Reinados, Carlos III, 197-3.
[116] Pedro de Lerena to José de Gálvez [copy], El Pardo, 26 February 1785, APRM, Reindos, Carlos III, 197-3.
[117] Francisco Gómez de Quevedo to Pedro de Arascot [draft], El Pardo, January 1788, APRM, Reinados, Carlos III, 197-3.
[118] Additional research in the Royal Pharmacy archives in Madrid is required to provide a fuller account of precisely the kinds of tests and examinations that ultimately convinced royal officials to entirely reject *quina* from Santa Fe. A report by chemist Pedro Gutierrez Bueno

and 1787 that *quina* from Santa Fe was not efficacious. This position quickly became official policy. In May 1788, Antonio Porlier reported to José Celestino Mutis "large portions of the *Quina* from the Kingdom [of New Granada] have been found, on examination by the professors at the Royal Pharmacy, not to have as much medicinal virtue as previously believed."[119] At first, the Crown and its Minister of the Indies took a conservative approach in asking Mutis to seek out, cultivate, and send better quality *quina*.[120] Porlier had confidence in Mutis' ability and described him as well versed in the various branches of Natural History with a zeal for the public good and [possessing] knowledge which he has acquired of all places which produce the best *quina* and of the method of establishing and propagating plantations of the best quality *quina*."[121] The Crown's cautious policy, however, was short lived. In February 1789, the Crown halted all shipments of *quina* from Santa Fe to the Royal Pharmacy and, in September 1790, the *estanco de quina* in Santa Fe was decommissioned permanently.[122] Mutis was out of luck.

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illustrates the increasingly influential role of chemical testing in these matters, see: Pedro Gutierrez Bueno, Madrid, 20 October 1788, APRM, Reinados, Carlos III, 197-1.

[119] Antonio Porlier to José Celestino Mutis, Aranjuez, 12 May 1788, ANH/Q, Fondo Especial, box 108, vol. 258, no. 6402, fol. 23r.

[120] A similar approach was taken with regard to the *quina* from Peru in the shipments of 1786 and 1787 that was found to be useless. In September 1787, Antonio Valdés, Minister of the Indies, sent another copy of the royal pharmacy's 1773 instructions to the President of Quito, see: Antonio Valdéz to Juan José Villalengua, San Lorenzo, 24 September 1787, ANH/Q, Fondo Especial, box 105, vol. 251, no. 6295. The Marques de Valdecarzana had suggested this course of action in his original reports to Valdés and Lerena, see: Marques de Valdecarzana to Pedro de Lerena, San Lorenzo, 10 November 1787, APRM, Reinados, Carlos III, 197-1; Antonio Valdéz to Marques de Valdecarzana, San Lorenzo, 24 November 1787, APRM, Reinados, Carlos III, 197-1.

[121] Antonio Porlier to José Celestino Mutis, Aranjuez, 12 May 1788, ANH/Q, Fondo Especial, box 108, vol. 258, no. 6402, fol. 23r.

[122] Hernández del Alba, 197 and 213, see also: Antonio Porlier to the Viceroy of Peru, San Ildefonso, 7 September 1790, AGI, Indiferente 1555, fols. 477r-478r.

Conclusion

Many explanations have been offered for the sudden reversal in the Crown's policy on *quina* from Santa Fe. One explanation is to take the participants at their word: *quina* from Santa Fe was no good. Yet, such an explanation assumes that there was a consensus on the medical utility of this bark, and there was not. Even as experts in Madrid were deciding that *quina* from Santa Fe was useless, physicians and pharmacists in England, France, and Italy reported just the opposite. In the case of the British, it was partly in their interest to do so, since *quina* illegally imported from the northern regions of New Granada was their primary source of the bark.[123] Disagreement continued within the Spanish Empire as well. Throughout the 1790s, Mutis and his disciples continued to claim that *quina* from Santa Fe was just as good as that from Loja or Peru. In the early 1800s, this lack of consensus escalated into a full-blown debate among botanists (see Chapter 6).

Thus, changes in the Crown's policy cannot be explained by the bark's alleged poor quality alone. Even an expanded community of learned experts offered no definitive guide to imperial policy on *quina*, a situation that left much room for ideology and interests shape policies. While contextual changes did not necessarily determine the production of knowledge, they did provide favorable conditions in which a new political regime was able to exert powerful influence in resolving matters of natural knowledge (in this instance against *quina* from Santa Fe) – or not. Even as Mutis became the preeminent botanist and learned expert in the Viceroyalty of New Granada, the authority of learned experts in Madrid still trumped all.

In 1787, Mutis lost a powerful political ally with the death of José de Gálvez, Minister of the Indies, right around the time that the *quina* from Santa Fe was being

[123] Maehle, *Drugs on Trial*, 275-284.

re-examined in Madrid. In a 1789 letter to an associate in Madrid, José Celestino Mutis cryptically remarked: "Upon his death, [Gálvez, Marques] de Sonora took to the grave confidential ideas in which we had agreed to make public the progress of the Royal Administration [of *quina*] in order to avoid the unjust complaints of the public and those interested in this commerce, who often bristle at the word Monopoly."[124] He also noted that the *estanco de quina* in Santa Fe suffered the "disgrace that three Viceroys would change in one year and the most important issue of *Quina* would sleep under the most profound lethargy" (Appendix A).[125] Mutis' letter also hinted at the influence of commercial interests in Peru that sought to undermine *quina* from Santa Fe that competed with their own *quina* exports.

Ultimately, Mutis placed much more emphasis on the effects of the changes in the Spanish imperial bureaucracy as key allies and architects of the monopoly either died or were replaced. As botanists became integrated into the imperial state, they also became integrated into the culture of knowledge production embedded in the imperial bureaucracy. In the 1780s, the hierarchical and political characteristics of this culture were especially evident. Initially, botanists, like Gómez Ortega and Mutis, sought to reshape the space of expertise to their own advantage. Yet, entering into this social space meant becoming a part of the various networks of patrons and

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[124] José Celestino Mutis to Francisco Martínez de Sobral, Mariquita, 19 December 1789, *Archivo Epistolar del Sabio Naturalist José Celestino Mutis*, edited by Gonzalo Hernández de Alba, vol. 1, 505. Mutis also mentioned a "confidential correspondence" in a letter to José de Ezpeleta, Viceroy of New Granada, see: José Celestino Mutis to José de Ezpeleta, Mariquita, 24 February 1790, *Archivo Epistolar del Sabio Naturalist José Celestino Mutis*, edited by Gonzalo Hernández de Alba, vol. 2, 19.

[125] Ibid. The full passage from Mutis' letter is: "La muerte de Sonora sepultó las ideas confide[n]ciales en que habíamos convenido hasta publicar el progreso de la Real Administración, por evitar los clamores, aunque injustos, de los interesados en este comercio, y del público, tal vez sobresaltado a la voz de Estanco. Y ya que se volvió a proporcionar enderazar el asunto por la Real Orden que me remitió el Excelentísimo señor Porlier, quiso la desgracia que se cambiasen tres Virreyes en un año y duerma el importantísimo asunto de la *Quina* en el más profundo letargo."

experts that influenced the production of natural knowledge as much as the development and implementation of imperial policies. Many Bourbon reformers and Spanish botanists hailed the utility of botany and natural sciences to the state, but the practical and quotidian challenges of producing a colonial commodity, rather than enlightened ideologies, account more fully for the rise of botanists in the late eighteenth-century Spanish empire.

Chapter 5

Commerce and Control:

Reform, Ideology, and the Limits of Botany in the *Estanco de Quina circa* 1790

In the late 1780s, the situation with *quina* continued to decline. Officials in South America had been reporting on the increasing scarcity of cinchona trees in Quito since the mid 1770s and the amount of bark in the annual shipments for the Royal Pharmacy was decreasing. To make matters worse, in 1786 Spain suffered a fever epidemic that severely depleted the Crown's existing supply of *quina*.[1] Royal officials made science part of the solution. In 1789, Sancho de Miranda y Telles, the Marques de Valdecarzana, an advisor to the King and Chamberlain of the Royal Household (*Sumiller de Corps*), recommended reforms of *quina* production in Loja, suggesting that a "botanist-chemist" (*botánico quimico*) oversee their implementation.

Valdecarzana's plan further intertwined science and the state in the Spanish imperial enterprise. Yet even with a botanist-chemist in Loja, the efficacy of botany to solve the problem of scarcity faced many obstacles. In this case, the ideology of royal officials as represented by Valdecarzana, the promises and precedents offered by botanists themselves, and the local conditions in Loja all defined the limits and possibilities for the monopoly's botanist-chemist. Previous accounts have cast the relationship between early modern European science and empire as mutually beneficial, yet somewhat superficial. Imperial connections provided science with access to new natural worlds; scientific experts helped to realize, reinforce and

[1] In October 1786, the Crown sent an order to the President of Quito requiring him to send all available *quina* to Spain via Lima immediately, see: Juan José Villalengua to Marques de Sonora, Quito, 17 February 1787, AGI, Quito 245, no. 23. On disease and population in eighteenth-century Spain, see: Jordi Nadal, *La Población Española (Siglos XVI a XX)* (Barcelona: Editorial Ariel, 1976), 84-142.

represent European hegemony abroad. Contrary to existing historical scholarship, the case of *quina* shows not only that the relationship between science and the state was not always efficacious, but also that the intertwining of science and the state could nevertheless be quite strong. It also shows how relations between science and empire were more profound in the Spanish Atlantic than in the other Atlantic empires of the eighteenth century. Moreover, this chapter argues that botanists failed the problem of the increasing scarcity of cinchona trees precisely because they were so *closely* integrated into the imperial culture of knowledge production. In this instance, bureaucrats and bark collectors had as much influence over the implementation and role of science in the Spanish imperial context as botanists did. Thus, while previous work has emphasized the benefits to science achieved by its relationship with empire, this case highlights the negative consequences of this relationship as exemplified by a case in which science and the state, botanists and bureaucrats became entangled in the pursuit of Spanish imperial governance of American nature.[2] Ultimately, botanists' relationship with Spanish imperial officials defined the limits and conditions of scientific inquiry as much as it created possibilities for new areas into which Spanish botany could intervene.

Commerce: Trade, Liberal Reform, and the Limits of Botany

In July 1789, Antonio Porlier, Minister of the Indies, sent a letter and a large packet of documents to the Marques de Valdecarzana, the Chamberlain of the Royal Household.[3] The letter asked Valdecarzana to propose a systematic policy for the

[2] On the mutual benefits of science to empire and vice versa, see several of the essays in: Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005),
[3] Antonio Porlier to Marques de Valdecarzana [Draft], Madrid, 27 July 1789, AGI, Indiferente 1555, fols. 285r-286r.

Crown's dealings with *quina*. Porlier posed the same questions that had plagued the Crown since administrators first proposed an *estanco de quina* in 1751. Should the Crown monopolize *quina* or not? If so, which kind?

Answering these questions was no easy task. Valdecarzana knew that any plan would have to strike a balance between the two main policy objectives of the reformers of the Bourbon period: commerce (increased liberalization of trade *within* the empire) and control (greater centralization of the structure of Spanish imperial governance). Royal policy on the cinchona tree stood at the intersection of these two competing imperatives of Spanish imperial statecraft in the Atlantic World.

These imperatives, as well as the actions of various interest groups involved in imperial governance, had produced several decades of bureaucratic morass. Nonetheless decisions had been made. As a result, the Crown's previous policies on *quina* were often inconsistent and at times incoherent. The Ministry of the Indies expected Valdecarzana to put an end to the deadlock and confusion. In a royal order, the Crown pressed him to provide "the most certain regulations that might serve the government for the establishment of a system under which this important branch [of commerce] could be managed."[4] To this end, Porlier arranged for all government documents from the 1770s and 1780s relating to policy on *quina* and its trade to be sent to Valdecarzana. Officials extracted these documents from the archives of the Royal Treasury and the Ministry of the Indies. The resulting dossiers represented a significant portion of what the Spanish state knew about the cinchona tree and its bark.

[4] [Antonio Porlier] to Marques de Valdecarzana, Madrid, 6 September 1789, AGI, Indiferente 1555, fols. 361r-365v.

Several factors gave the task an air of immediacy. First, officials in Madrid in the preceding years had become increasingly aware of the impending *quina* shortage. Scarcity of *quina* was hardly a new idea in 1789. As early as 1763, José Celestino Mutis, who was then serving as physician to the Viceroy of New Granada, had warned of a possible shortage resulting from mismanagement of private extraction of the bark.[5] By the late 1760s, Mutis' prophecies seemed to be coming true, at least in Loja. In 1768, Pedro de Valdivieso, Magistrate of the Forests, issued his first decree prohibiting the extraction of *quina*, as he informed the President of Quito that Loja's stands of cinchona trees were in a dreadful state.[6]

Royal pharmacists in Madrid also noticed the declining quantities of *quina* in their annual shipments from Loja. Shipments reached a high of 18,000 pounds in 1785. Just four years later, in 1789, the pharmacy received slightly less than 5,000 pounds.[7] In 1785, officials in Spain thought that they had solved the problem of scarcity when the Royal Pharmacy approved of the quality of samples of cinchona bark from the forests near Santa Fe de Bogotá.[8] However, in February 1789, experts in Madrid reclassified this bark as useless for royal purposes and the Crown

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[5] José Celestino Mutis, "Representación hecha al Rey soliticitando la formación de la Historia Natural de América, remitida desde Cartagena en el mes de Mayo de 1763, esforzada y repetidad en Junio en 1764, con el adjunto informe que hizo de oficio á S.M. el Virrey de este Reino el Excmo. Sr. D. Fray Pedro Mesía de la Cerda," Santa Fe de Bogotá, 20 June 1764 in: A. Federico Gredilla, *Biografia de Jose Celestino Mutis y sus observaciones sobre las vigilias y sueños de algunas plantas* (Bogotá: Plaza & Janes, 1982 [1911]), 21-31; A copy of Mutis' 1763 letter is at: AGI, Indiferente 1554, fols. 899r-904v.

[6] Pedro de Valdivieso, "Decree," Loja, 3 December 1768, ANH/Q, Fondo Especial, box 24, vol. 67, no. 2858, fols. 105r-106r. Valdivieso's decree was just the first of many that tried to curb extraction of the bark by merchants and *hacenderos*, see Chapters 2 and 3.

[7] María Luisa de Andrés Turrión, "Quina del Peru para la Real Hacienda Española (1768-1807): Notas sobre su <<Estanco>>," in: *La Expedición Botánica al Virreinto del Perú (1777-1788)*, edited by Antonio González Bueno (Barcelona: Lunwerg Editores, 1988), 71-84.

[8] Daniela Bleichmar, "Visual culture in eighteenth-century natural history. Botanical illustrations and expeditions in the Spanish Atlantic," Ph.D. Dissertation, Princeton University, 2005, 90; Daniela Bleichmar, "Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 225-252.

permanently suspended shipments of *quina* from Santa Fe in 1790. At the same time, royal pharmacists and other experts considered alternative types of *quina* to no avail.[9] Finally, the 1786 fever epidemic in Spain further depleted the Royal Pharmacy's already diminished stores of the medicament.[10] In this context, royal officials turned their attention to the *estanco de quina* in Loja.

Valdecarzana, in the end, wrote two reports on *quina* for the Crown – one in August and another in September 1789.[11] While the Crown had requested a "system" for regulating the bark, Valdecarzana refused, citing two main reasons. First, he argued such a system would require limiting free trade within the empire. Second, he argued that the government simply did not possess enough of the right kind information to plan such a system of regulation. Both of these arguments against the Crown's request highlight Valdecarzana's understanding of "system" as a comprehensive and institutionalized set of rules and regulations to govern the production and distribution of *quina*. Scarcity could be understood as a problem of both production and distribution. One response to scarcity was to increase production through seeking out new stands of trees, improving the yield of extraction techniques, or creating plantations of cinchona trees. Another response that could be used in concert with the first was to regulate distribution to discourage hoarding and achieve an equitable allocation of a scarce commodity.

The most radical policy would have been for the Crown to take control of both production and distribution. Valdecarzana rejected this course of action. In terms of the distribution of *quina* through trade, he saw little that needed reform. Like many

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[9] See chapters 3 and 4.
[10] Nadal, *La Población Española*, 84-142.
[11] Marques de Valdecarzana to Antonio Porlier, Madrid, 15 August 1789, AGI, Indiferente 1555, fols. 336r-358r; Marques de Valdecarzana to Antonio Porlier, Madrid, 30 September 1789, AGI, Indiferente 1555, 368r-391r.

Spanish reformers and others in Enlightenment Europe, Valdecarzana unequivocally endorsed the virtues of free trade as a system of incentive and distribution.[12] Rather than total control by the Crown, a vision which the term 'monopoly' called to mind, Valdecarzana explained that the ultimate goal for the "State of [Spain's] *Quina*" should be that, "the greatest part be in the hands of the locals [*naturales*], aided by Commerce with the goods that they need and [by] their own abilities, such that the Merchant acquires and sends their boxes of *Quina* via Guayaquil and Callao to the Ports of Spain from which [these boxes] would achieve distribution."[13] From his perspective, the Crown should interfere as little as possible and leave the *quina* trade to private individuals.

Limiting government regulation was especially important, Valdecarzana argued, since exchanging cinchona bark was one of the only means that the majority of residents in Loja had to acquire the things they needed.[14] Whereas the enclosure of the cinchona forests led to the "privation of Commerce with those Provinces [Loja, Cuenca and Jaen]," which, in turn, meant that the "locals" would not be able to acquire necessities through trade, Valdecarzana argued that the "locals" would find "much benefit" in being paid in cash (*plata*) by the Crown since "it would be much easier and fairer to acquire the goods, that they need, with money (than without it)

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[12] Albert O. Hirschman, *The Passions and the Interests: Political Arguments for Capitalism Before its Triumph* (Princeton: Princeton University Press, 1997); J.G.A. Pocock, *Virtue, Commerce, and History. Essays on Political Thought and History, Chiefly in the Eighteenth Century* (Cambridge: Cambridge University Press, 1986); John H. R. Polt, "Jovellanos and His English Sources: Economic, Philosophical, and Political Writings," *Transactions of the American Philosophical Society* 54 (1964), 1-74.

[13] Valdecarzana to Porlier, 15 August 1789, fol. 340v. Here, Valdecarzana endorses a fairly standard enlightened view of the virtues of trade, see: David J. Weber, *Bárbaros: Spaniards and their Savages in the Age of Enlightenment* (New Haven: Yale University Press, 2005), chapter 5; Hirschman, *The Passions and the Interests*.

[14] Valdecarzana's observation was, in part, accurate for places like Loja where the shortage of money meant that cinchona bark became a *de facto* currency.

and with total dependency on Commerce."[15] He further described the "reciprocal convenience" of trade as one of the "rules" of "mercantile relations and the collection of necessities for a Nation."[16] Not surprisingly, Valdecarzana expressed his sympathy for the views of Jorge Escobedo, *Visitador General* to the Viceroyalty of Peru from 1782 to 1785, who, in Valdecarzana's words, argued, "His Majesty has no reason to get involved with the Royal Monopoly of *Quina* in America."[17]

Trade also produced incentives. Here, Valdecarzana diverged from previous writers in his suggestions that even contraband trade had at least one positive effect: it increased knowledge of *quina*. Earlier reports on the *estanco de quina*, such as Miguel de Santisteban's report of 1753 and José Celestino Mutis' reports of 1763 and 1764, praised government regulation as means to curb illicit trade in the bark by foreign merchants. Valdecarzana agreed with them to the extent that such trade represented lost revenue for the Crown.[18] He also observed, "it is possible that, without such encouragement [from the commerce of foreign merchants], *Quina* would be almost forgotten."[19] He added: "without the exquisite experiments and analysis from the North and East [of Europe], the use [of *quina*] would be very limited today."[20]

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[15] Valdecarzan to Porlier, 30 September 1789, fol. 380v-381r. I have used "locals" as a translation for Valdecarzana's term *nativos*, which does not refer to native peoples, in the sense of indigenous people, but rather the residents of a particular town or region.
[16] Ibid., fol. 384v.
[17] Valdecarzana to Porlier, 15 August 1789, fol. 344v.
[18] As described by John Fisher, foreign merchants' entrance into Spanish colonial markets was in some cases sanctioned by the Crown as the merchants of France and Britain were given access to colonial markets in the concessions and agreements that ended the War of Spanish Succession in the early eighteenth-century Atlantic World, see: John Fisher, *Commercial Relations Between Spain and Spanish America in the Era of Free Trade, 1778-1796* (Liverpool: Centre for Latin-American Studies, University of Liverpool, 1985), 12-13; David Ringrose, *Spain, Europe, and the "Spanish Miracle," 1700-1900* (Cambridge: Cambridge University Press, 1996), 83-105. The classic work on Spanish trade in the Atlantic is: Antonio García-Baquero González, *Cádiz y el Atlántico (1717-1778): el comercio colonial español bajo el monopolio gaditano* (Sevilla: Escuela de Estudios Hispano-Americanos, CSIC, 1976).
[19] Valdecarzana to Porlier, 15 August 1789, fols. 339r-v.
[20] Ibid.

Quina traded illegally and supplied to other European countries had done much, in Valdecarzana's eyes, to increase its reputation and improve knowledge of its use. Conversely, Valdecarzana castigated the ineffectual study of the bark in Spain that had failed to contribute to the "physical and civil progress" of *quina*.[21]

Valdecarzana's position on contraband trade is crucial to my argument that ideological commitments shaped his recommendations for reform the *estanco de quina* and, in turn, the role defined for botanists in the *estanco*. On the one hand, Valdecarzana praised the knowledge produced by Northern Europeans as part of his broader claim that the Spanish government lacked sufficient knowledge to impose a "system" on the *quina* trade. On the other hand, Valdecarzana rejected the findings of Northern Europeans on the quality of *quina* from Santa Fe. Again, his desire to maintain the status quo in imperial trade, which was being liberalized (within the Spanish empire) but was not yet entirely free, conditioned his decision about *quina* from Santa Fe.

In order to make sense of his endorsement of the findings of Northern Europeans in on case and rejection of them in another, we need to know what Valdecarzana meant by "free trade." For many reformers, the main idea behind policies of *comercio libre* was to create a trade system *within* in the Spanish Empire that was primarily advantageous to Spain and Spanish merchants. A complimentary objective was to realize a system in which American raw materials were exchanged for Spanish manufactured goods. Not surprisingly, the endorsement and implementation of *comercio libre* tended to occur in service of particular interests, especially Spanish ones. While Valdecarzana endorsed the knowledge of Northern Europeans when it served his argument that the Crown should not limit free trade

[21] Ibid.

within the empire, he rejected Northern Europeans' claims of the utility of *quina* of Santa Fe because this finding threatened to undercut the monopoly on the *quina* trade that Spanish merchant groups in Lima sought to maintain.[22]

The segue from incentive to information provided a convenient transition to Valdecarzana's second reason for refusing to provide the Crown with a "system" for the *quina* trade – insufficient knowledge of the thing as well as lack of consensus among learned experts (i.e. physicians, pharmacists, and botanists). He observed, "any opinion regarding [such] a system, ought to be supported with perfect knowledge of the thing, with local dispositions, with Political talents, and very good instruction in order to understand [how] to compare and combine the objects with economic judgment which would point toward the stable system that I desire."[23] Valdecarzana could not recommend a system because neither he nor the documents sent to him by Porlier provided "perfect knowledge of the thing." Existing government records, he noted, lacked "geographical and physical information on the enclosure and status of the *Quina* forests of Loja and Zamora."[24] As for the knowledge produced by pharmacists, physicians and botanists, he informed Porlier that "experiments [or experiences] with *Quina* are entirely superfluous to achieving the final goal of a system."[25] If by "experiments" he was referring to medical testing of the bark to assess quality and medical efficacy, he was right. Such experiments offered government officials little in the way of pragmatic solutions to the problems associated the *quina* trade such as scarcity.

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[22] *Quina* from Santa Fe would have been shipped through Cartagena, on the northern coast of South America. Cartagena was a rival port to Callao, the main port near Lima, which was a key bottleneck in the *quina* trade since government regulations required all *quina* to pass through Callao on its way to Europe. This gave merchants in Lima a *de facto* monopoly, which the approval of *quina* from Santa Fe threatened to undermine.
[23] Valdecarzana to Porlier, 30 September 1789, fols. 370r-v.
[24] Valdecarzana to Porlier, 15 August 1789, fol. 348r.
[25] Valdecarzana to Porlier, 30 September 1789, fol. 371r.

Lack of consensus among experts, according to Valdecarzana, also stymied effective government intervention. He asked rhetorically: "what have we gotten from so many examinations of *Quina* from different places?"[26] While some tests showed that certain types of *quina* were a "disappointment" and that the "quality" of the "true Tree" depends on its "situation, climate, and essence," the Ministry of the Indies ultimately was not able to do anything other than "clamor for good *Quina* from Loja, Santa Fe and Peru, ordering that fraud be avoided and indicating the locations which produced the best [bark]."[27] Since experiments focused only on the product itself and not the processes that produced it, previous tests and examinations of the bark did not provide the kind of information that could inform government policies on the *estanco de quina*.

Valdecarzana provided an additional argument for this disconnection between scientific analysis in Madrid and imperial policy in South America. Most "regulations" (*providencias*) from the Ministry of the Indies, according to Valdecarzana, simply requested that officials in Quito supply "good *quina*" without giving specific instructions on how to do so.[28] In Valdecarzana's ideal world, the Crown and the Ministry of the Indies needed "perfect knowledge" to produce a working "system." In this way, presumably, the Crown's monopoly could be directed entirely from Madrid without having to rely on (and share power with) local officials and experts in the *Audiencia* of Quito. Since he did not have "perfect knowledge" of *quina*, he refused the Crown's request for him to propose a system.[29]

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[26] Ibid., fol. 377v
[27] Ibid., fols. 378r.
[28] Valdecarzana to Porlier, 30 September 1789, fol. 378r.
[29] Since he was given documents primarily from the 1770s and 1780s, Valdecarzana was either unaware of (or ignored) the reforms of José Diguja, the President of Quito, in 1768. Yet Diguja's reforms illustrate Valdecarzana's point nicely. In 1768, when the Crown wanted to improve the quality of its *quina* and safeguard it from fraud, officials in Spain ordered that José

In contrast to his refusal to make a recommendation about reforming the *estanco de quina* due to lack of knowledge, Valdecarzana played a direct role in deciding on the utility of *quina* from Santa Fe. As we saw in the previous chapter, the community of experts in Madrid had difficulty achieving consensus on whether *quina* from Santa Fe could be used for royal purposes or not.[30] Officials in Santa Fe de Bogotá, the capital of the Viceroyalty of New Granada, had first encountered cinchona trees near the city in the early 1770s.[31] In the early 1780s, royal pharmacists and other medical experts approved of "*quina* from Santa Fe" for use by the Crown. By 1785, José Celestino Mutis had initiated full-scale production of *quina* for the Crown. Bark in shipments from Santa Fe in subsequent examinations by experts in Madrid did not appear to be of the same quality as earlier samples. In January 1788, the Crown suspended all shipments of *quina* from Santa Fe to the Royal Pharmacy.[32] The reversals of opinion and disagreements over this bark were probably the root of Valdecarzana's comment on the uncertain and contradictory results of experiments with the bark. "All *Quina*," he wrote, "from one location or even from the same Tree has suffered a thousand contrasting [opinions] among the *Juntas*

Diguja achieve these ends without specifying the means. In turn, Diguja set about collecting information to implement a system for the production and transportation of *quina* within the *Audiencia* of Quito. Essentially, Valdecarzana wanted the Crown to replicate Diguja's feat at the level of the whole empire but recognized that the lack of knowledge placed limitations on the establishment of such a system, see chapter 2.

[30] See chapter 4.

[31] The question of who first discovered the cinchona tree in this region became a point of contention between Sebastián López Ruiz, a physician, and José Celestino Mutis, physician to the Viceroy of New Granada and, later, Director of the Royal Botanical Expedition. Mutis and López Ruiz disputed their claim to discovery throughout much of their career, see: Bleichmar, "Visual Culture," 49; Marcelo Frías Núñez, *Tras El Dorado Vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783-1808)* (Seville: Diputación de Sevilla, 1994), 165-169.

[32] This action left a large quantity of bark at the royal warehouse in Cádiz with an uncertain fate since it was no longer useful to the Crown. The powerful merchant guild in Lima likely had a hand in this re-evaluation of bark from Santa Fe since this bark threatened Peruvian merchants' virtual monopoly on cinchona bark of the best quality. I hope to pursue this connection further in future research.

of Physicians and Pharmacists of Madrid, [who do not give] one [good] reason for their differences."[33]

As for the utility of *quina* from Santa Fe, it remained an open question. Antonio Porlier, in 1789, asked Valdecarzana to resolve the matter. With one group praising a particular kind of *quina* and another group rejecting it – as happened in this case – the community of learned experts had failed to provide the Crown with a clear basis for action. For lack of a mechanism within the expert community to resolve such debates, the task fell to a bureaucrat.[34] Valdecarzana's decision provided *de facto* resolution since the demands of imperial governance could not wait for expert consensus. Consequently, Valdecarzana's free trade ideology, in place of expert consensus, directly shaped not only his policy recommendations but also the production of knowledge about this American botanical commodity.[35]

The case of *quina* from Santa Fe is a good example of the profundity of the intertwining of science and Spanish imperial governance, as a bureaucrat became the ultimate authority on knowledge about the natural world. For want of consensus among experts, the Crown turned to Valdecarzana, Chamberlain of the Royal Household, to assess the credibility and veracity of expert natural knowledge, and recommend a course of action. In his first report, submitted in August 1789, Valdecarzana concurred with the Crown's current policy and observed, "experience in

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[33] Valdecarzana to Porlier, 30 September 1789, fol. 374v.
[34] On the resolution of controversies in the production of knowledge, see: Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).
[35] I am not claiming that consensus among experts would have necessarily translated into a concrete policy. Rather, the point is that the lack of expert consensus gave Spanish officials a considerable amount of latitude in their own policies and recommendations.

this Court, in the entire Kingdom, and in the most formal examinations and analyses has discredited this *Quina* [from Santa Fe] and its value."[36]

Porlier was not convinced. Along with his reply to Valdecarzana's August report, Porlier sent articles published by physicians and naturalists in England, France, and Italy that praised *quina* from Santa Fe.[37] Valdecarzana, in spite of his former praise for all that northern Europeans had done to study and expand knowledge of the use of *quina*, did not budge from his previous position. "[Santa Fe]," wrote Valdecarzana, "is generally not a Land of *Quina*."[38] He offered little explanation. In spite of his general view that examinations by experts had actually *increased* uncertainty about the bark, Valdecarzana maintained that *quina* from Santa Fe was useless for royal purposes. This case thus illustrates the central role that a bureaucrat could play in deciding which knowledge of the natural world to accept and which to reject, which to act on and which to ignore.

On what basis did Valdecarzana decide? Ideological commitments and social connections were crucial. On the one hand, Valdecarzana explicitly identified the Viceroy of New Granada, who was based in Santa Fe, as the leader of Spanish colonial officials pushing for a government monopoly. To this end, Valdecarzana included in his first report a "substantial history" of the Crown's involvement with *quina* as extracted from a dossier sent to him by Porlier.[39] He characterized the Viceroys of New Granada as having "endorsed since 1753 the Project of the Royal

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[36] Valdecarzana to Porlier, 15 August 1789, fol. 346v.
[37] Antonio Porlier to the Marques de Valdecarzana, Madrid, 6 September 1789, AGI, Indiferente 1555, fols. 361r-365v. Both Porlier and Valdecarzana mention these reports in their correspondence but do not give specific bibliographic details. Lists of the documents sent to Valdecarzana make no mention of such reports, see: "Nota de los Expedientes que con esta f[ec]ha se pasan al S[eño]r Sumiller de Corps Marques de Valdecarzana," Madrid, 27 July 1789, AGI, Indiferente 1555, 289r-290v.
[38] Valdecarzana to Porlier, 30 September 1789, fol. 377r.
[39] Valdecarzana to Porlier, 15 August 1789, fol. 348r.

Monopoly of *Quina* that Miguel de Santisteban presented," and further explained that the Viceroys "constantly encouraged this Idea."[40] In contrast, Valdecarzana, as we have seen, was committed to free trade in the bark. Consequently, discrediting or ignoring claims about the medical efficacy and commercial utility of *quina* of Santa Fe was a powerful means to make the Viceroy's calls for monopoly seem irrelevant. After all, there was no point in monopolizing ineffective and useless bark.

Alternatively, Valdecarzana may have wanted to avoid giving any credibility to the claim that *quina* from Santa Fe was good quality. Denying the quality of bark from Santa Fe also neutralized the commercial viability of a possible competitor bark to that produced in Loja and Peru. As a result, merchants in Lima were "free" to dominate the cinchona trade as they had done in the preceding decades. Powerful interests were at stake. Cinchona bark was one of the key exports from Guayaquil, the main port for the Kingdom of Quito, and from Callao, the main port for Lima and the rest of the Viceroyalty of Peru. Valdecarzana's insistence on the poor quality of *quina* from Santa Fe, which he explicitly compares to *quina* from "Loja and the Andes of Peru," suggests that he was an ally to powerful merchants of Lima.[41] Moreover, Hipólito Ruiz, who had just returned from his eleven-year botanical expedition in Peru, may have been advocating for the interests of Peruvian merchants in Madrid.[42] Policies of free trade – in spite of an appearance of fostering general competition – often served specific interests.

Valdecarzana's commitment to the policy of free trade within the empire had consequences for his policy recommendations. While he rejected total government

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[40] Ibid., fol. 341v.
[41] Ibid., fol. 346r. Since *quina* from Loja was considered the gold standard in the *quina* trade and had been for over a century, the comparison may have been more innocuous than I suggest here. Future research in Lima and Madrid should give some indication of the connections between officials in Spain and the *limeño* merchant community.
[42] These claims are more suggestive than conclusive at this point.

regulation, Valdecarzana was not opposed to the Crown monopolizing the right to purchase (at a fair price) the best quality bark from Loja and other regions. He explained that if the Crown paid bark collectors in cash, they could use the money to purchase necessary goods from merchants. Cash from the Crown would become a substitute for cinchona bark, which served as a *de facto* currency in the economy of Loja and neighboring provinces.[43] The royal decree, which the Minister of the Indies issued to officials in New Granada, Quito, and Peru on September 7, 1790, developed from Valdecarzana's reports, reflected this approach. While claiming the right to monopolize the best *quina* from Loja and other regions in the *Audiencia* of Quito, the Crown prohibited any action detrimental to the cinchona trade, especially that of Peru. The decree informed officials in South America that the King had resolved "not to establish the monopoly of *Quina* but had made the decision that all [*quina*], which the Forests of Loja, Calisaya[44] produce, and [from] other [places] that produce [bark] considered to be of equal and superior quality, be sent [to Spain] on the account of His Majesty."[45] The King was not establishing a monopoly on distribution but invoking his right to collect (and pay a fair price for) "superior quality" bark – a right of first refusal.

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[43] Valdecarzana described his proposed plan as a way to break that "other kind of *Estanco* which currently exists among the powerful vendor [*tenedor*] of goods, the Commerce of Lima, and the foreign [merchant]," see: Valdecarzana to Porlier, 30 September 1789, fol. 382r. This passage may be an oblique reference to the notorious system of the *repartimiento de mercáncias* in which *corregidores* forced indigenous laborers to purchase goods at inflated prices, see: John Fisher, *Bourbon Peru, 1750-1824* (Liverpool: Liverpool University Press, 2003), 33-34, 43-45, 58-59; Luz del Alba Moya Torres, *La Arbol de la Vida: Auge y Crisis de la Cascarilla en la Audiencia de Quito, Siglo XVIII* (Quito: Facultad Latinoamericana de Ciencias Sociales Sede Ecuador, 1994), 94-104; Mark A. Burkholder and Lyman L. Johnson, *Colonial Latin America* (Oxford: Oxford University Press, 2004), 131-132.

[44] Here, the author of the decree mistakes a kind of *quina* – *calisaya* – with a place where it grows.

[45] Antonio Porlier to the President of Quito et. al., San Ildefonso, 7 September 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 251r. Porlier wrote: "no se trate de el estanco de Quina, sino q[u]e solo se tome el arbitrio de remitir toda la q[u]e [b]rindan los Montes de Loja, Calisaya, y otros q[u]e la producen igual y aprobada p[o]r de superior calidad de cuenta de S[u] M[ajestad]."

Valdecarzana's recommendations also had implications for the instructions given to the botanist-chemist and *corregidor* appointed in 1790 to oversee the *quina* monopoly in Loja.[46] In particular, his emphasis on the Crown's agents acting as buyers of superior quality bark resulted in a redefinition of the jurisdiction for the officers of the *estanco de quina* in Loja. In its instructions, the Crown defined the power and purview of its agents in Loja according to the quality of *quina* rather than a specific location. Bark was to come from Loja as well as "other [places]" which produce bark of equal quality. Whereas Pedro de Valdivieso was Magistrate of the Forests in Loja only, the new regulations of the 1790 defined the positions of *corregidor* of Loja and botanist-chemist such that they had jurisdiction over all *quina* "of the highest quality" regardless of its geographical location.[47] Natural knowledge of *quina* became a basis for government intervention, but in a limited way, since the *corregidor* and botanist-chemist were only to act as buyers for the Crown and not to impede production or collection of *quina.* The instructions explicitly stated that bark should be collected from the "enclosed [forests] of Loja, Cuenca, and Jaen" and that merchants were to retain "the liberty to trade in all [*quina*] from Peru on their [own] account[s] and risk and by way of business."[48] Such measures most likely were concessions to the powerful merchant guild (*consulado*) in Lima, which included

[46] The authorship of these instructions remains unclear though there is good reason to suspect that Valdecarzana wrote these instructions himself.
[47] This shift also reflects, I think, a significant hardening of Spanish officials' view that the quality of the bark was *not* determined by geographical location. This was a further assault on the local view that, as Chapter 2 showed, where the bark was from was the key to determining its quality.
[48] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 247r, 251v. The original text for the second quote reads, "dejando al Comercio la libertad de hacer de su Cuenta y riesgo y p[o]r via de negociacion toda la [quina] de el Peru."

many American and Spanish merchants who made their fortune in the *quina* trade and disliked the Crown meddling in their affairs.[49]

Botanists' Definition of Scarcity as a Problem of Production

While safeguarding the status quo in the *quina* trade, Valdecarzana also sought to serve the Crown's objective to assert more direct control over society and nature in Spain's American territories. From his recommendation that the Crown appoint two "botanical chemical Professors" as buyers in Loja and Lima, Valdecarzana made these scientific experts into agents for exerting greater royal control. Yet, if he was so critical of the knowledge of *quina* produced by experts, why did Valdecarzana recommend sending botanist-chemists to Loja and Lima over bureaucrats? One reason is that botanists (and chemists) were not the targets of questions raised about the authority of other learned experts in Madrid, especially since it was largely pharmacists and physicians who failed to achieve consensus on *quina* from Santa Fe.[50] Botanists themselves also influenced Valdecarzana's recommendation – not only in terms of the choice to send "botanist-chemists" but also

[49] This claim raises the question of why the Crown bothered to test *quina* from Santa Fe in the first place. As noted in earlier, the Royal Pharmacy in Madrid was, at the time, facing a shortage of bark and an epidemic of fevers at virtually the same time. So, there was incentive to try to find additional sources of the bark. Patricia H. Marks, "Confronting a Mercantile Elite: Bourbon Reformers and the Merchants of Lima, 1765-1796," *The Americas* 60 (2004), 519-558; John Fisher, *Bourbon Peru, 1750-1824* (Liverpool: Liverpool University Press, 2003); Cristina Ana Mazzeo, *El Comercio Libre en el Perú: Las estrategias de un comerciante criollo: José Antonio de Lavalle y Cortés, conde de Premio Real, 1775-1815* (Lima: Pontifica Universidad Católica del Perú, 1995); John T.S. Melzer, *Bastion of Commerce in the City of Kings: the Consulado de Comercio de Lima, 1593-1887* (Lima: Consejo Nacional de Ciencia y Technología, 1991); John P. Moore, *The Cabildo in Peru under the Bourbons* (Durham: Duke University Press, 1966).

[50] One notable exception is Casimiro Gómez Ortega. In Chapter 4, I characterized him as playing a central role in coordinating the community of experts testing different kinds of *quina*. Except for Gómez Ortega, botanists played no role as a group in the assessment of *quina* from Santa Fe at least, as we will see in Chapter 6, not until the late 1790s. Furthermore, government documents that speak of Gómez Ortega's participation in the testing of *quina* from Santa Fe describe him as a pharmacist rather than a botanist.

in terms of how to employ these experts in the service of imperial goals, in part through their persistent utilitarian propaganda.[51]

In the previous chapter, the career of Casimiro Gómez Ortega served as an example of the rise of botany in the early 1780s. His success was, in part, due to the efforts of his predecessors. Around 1750, several Spanish naturalists began to emphasize the utility of their science to the state and Spanish society. For example, in the dedicatory letter to Charles III attached to his *Flora Española*, José Quer (1694-1764), the Royal Botanical Garden's first director, emphasized the various "benefits" of plants as food, medicaments, dyes, and fuel.[52] "Most of these benefits," he wrote, "will never be obtained, if we know nothing about plants."[53] Miguel Barnades (1708-1771), Quer's successor as director of the Royal Botanical Garden, offered a similar vision in his *Principios del Botánico* (1767). "The common prosperity of any Country," wrote Barnades, "depends to a large extent on the knowledge of its Vegetable [or Botanical] products, which nature never makes scarce, especially those necessary to daily life and the curing of the ills of every Country; and these can only be discovered with application to Botany."[54]

After 1772, when Casimiro Gómez Ortega became director of the Royal Botanical Garden, this utilitarian rhetoric became reality. In particular, Gómez Ortega offered his expertise and advice directly to the Crown, as well as to José de Gálvez, Minister of the Indies, while promoting specific botanical projects such as the

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[51] This development was covered in the Chapter 4 so I only give a brief summary here.
[52] José Quer, "Dedicatoria," in: *Flora Española, o Historia de Plantas, que se creian en España* (Madrid: Joachin Ibarra, 1762), nn. 8; Francisco Javier Puerto Sarmiento, *La Ilusión Quebrada: Botánica, Sanidad y Política Científica en la España Ilustrada* (Madrid: CSIC, 1988); Carmen Añon Feliu, *Real Jardína Botánico de Madrid: Sus Origines, 1755-1781* (Madrid: Real Jardín Botánico, CSIC, 1987).
[53] Quer, "Dedicatoria," nn. 9.
[54] Miguel de Barnades, *Principios del Botánico* (Madrid: En la Imprenta de Antonio Perez de Soto, 1767), nn. 3r

botanical expeditions to Peru, New Granada, New Spain and other parts of Spain's American territories. Gómez Ortega also consulted on the commercial utility of American botanical products. For example, in a 1777 letter to Gálvez, Gómez Ortega discussed the role botanists could play in developing the possibilities of a new product *pimienta de Tabasco* (allspice) from New Spain. "Before all other things," he wrote, "it is necessary to give notice in Spain of the use of the product which is to be introduced; because Consumers will not ask for that which they do not know, nor [that which] they do not know the name of. To this end, a concise statement could be contributed which we will publish on the Natural History, discovery, virtues and use of *Pimienta de Tabasco*."[55]

Valdecarzana was also witness to a recent example of the successful cooperation of between botany and empire. In the fall of 1788, just before Valdecarzana was asked to provide his recommendations on the *estanco*, Hipólito Ruiz and José Pavón returned to Madrid after an eleven-year botanical expedition to Peru and Chile.[56] Most accounts of Ruiz and Pavón's expedition emphasize their scientific achievement as represented by their multi-volume *Flora Peruviana et Chilensis*, but their expedition can also be seen as an important strategic and imperial achievement. The Crown and Ministry of the Indies had specifically instructed Ruiz and Pavón to study the cinchona tree and the *quina* trade. Their information on this one plant was perhaps more useful in terms of imperial governance, at the time, than the thousands of new plant species described in their massive *Flora*.

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[55] Casimiro Gómez Ortega to José de Gálvez, 23 February 1777, Madrid, AGI, Indiferente 1544, nn. 3r.

[56] The expedition did continue after Ruiz and Pavón's departure under the direction of Juan Tafalla and Francisco Pulgar, see: Bleichmar, "Visual culture," 22.

The Crown's general instructions to all of the botanical expeditions may have served as model to Valdecarzana for the role that science could play in realizing imperial goals. These general instructions listed the expeditions' main objectives as:

> the methodical examination and identification of the products of nature of my American dominions, not only to promote the progress of the physical sciences, but also to banish doubts and falsifications which exist in medicine, painting, and other important arts, and to foster commerce, and to form herbaria and collections of the products of nature, describing and making drawings of the plants found in these, my fertile dominions, in order to enrich my Museum of Natural History and the Botanical Garden of the Court.[57]

The Crown had four main expectations of this botanical expedition: knowledge (progress in the science), certainty (elimination of doubts and falsifications), economic development (fostering commerce), and prestige (objects and images for the King's scientific institutions in Madrid). Further instructions to Ruiz and Pavón reveal that Spanish officials hoped to fulfill some of these objectives through the examination of specific plants.

The cinchona tree was one of these plants. Shortly before their departure from Madrid in September 1777, Casimiro Gómez Ortega gave Ruiz and Pavón a supplementary set of instructions indicating plants of special interest to the Crown and the Royal Botanical Garden. He advised Ruiz and Pavón to apply themselves:

> with care to the knowledge of rare American trees and their fruits, seeds, gums, oils and balsams. Among the trees and shrubs, Cinnamon from *Quijos* in Peru, *Quina* or *cascarilla*, in particular that from the province of Loja, [and] *Icho* which is abundant in Peru and serves among other uses to melt cinnabar and extract mercury, will deserve special attention [as well as] other various trees and shrubs which are abundant in those lands and whose dried fruits, resins and balsams, which are not well known in Europe, could be most useful in

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[57] Quoted in: Patricia Aceves Pastrana, "Las políticas botánicas metrpolitanas en los Virreinatos de la Nueva España y Peru," in *Mundialización de la ciencia y cultura nacional* , edited by Antonio Lafuente, A. Elena, and M. L. Ortega (Madrid: Doce Calles, 1993), 288. My translation is based on that of Arthur Steele in *Flowers for the King* except that I substituted "adulterations" for "falsifications" in his translation, see: Steele, *Flowers for the King*, 58.

medicine [or] for dyes and manufacturing.[58]

Quina kept distinguished company with other key botanical products. Cultivation of cinnamon was an important import-substitution project to replace cinnamon from the East to break the Dutch monopoly of this valuable spice.[59] *Icho* was useful for Spain's mining operations in which mercury was used to more efficiently extract silver from poor quality ore.[60] Later in his instructions, Gómez Ortega reminded his protégés, "do not forget the tree of *Quina* and to arrange for the collection and transportation [*reposición*] of its precious bark."[61] In addition to studying the tree as an object of scientific interest, these two Spanish botanists were also expected to intervene in its production of the bark.

However, the case of Ruiz and Pavón signals an important shift in two ways. First, unlike their predecessors who had to rely on printed accounts of the tree or the reports of colonial officials, Ruiz and Pavón were able to observe the cinchona tree *in situ*. Second, as implied in Gómez Ortega's instructions, Ruiz and Pavón were expected to be directly involved in the reform of the collection and distribution of *quina*. It was another means by which Spanish botany and imperial statecraft became more closely intertwined than ever before. In the end, however, Ruiz and Pavón did not make any significant changes themselves to production and distribution of cinchona bark. Indeed, they were not even able to visit Loja – the most

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[58] Hipólito Ruiz, *Relacion del viaje hecho a los Reinos del Perú y Chile*. Madrid: Real Academia de Ciencias Exactas, Físicas y Naturales, 1931, Apendices, 370, quoted in: Gonzalo Hernández de Alba, *Quinas Amargas: El sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Tercer Mundo Editores, 1991), 130. The translation is mine.
[59] Bleichmar, "Visual culture" and "Atlantic Competitions."
[60] *Icho* was a Spanish transliteration of the Quechua word *ichu* a name for a type of grass found in the Andean regions of Peru. I have not yet found a specific study of *icho*. On mercury in the mining of silver in America, see: Shawn William Miller, *An Environmental History of Latin America* (Cambridge: Cambridge University Press, 2007), 87-91.
[61] Hipólito Ruiz, *Relacion del viaje hecho a los Reinos del Perú y Chile*. Madrid: Real Academia de Ciencias Exactas, Físicas y Naturales, 1931, Apendices, 375, quoted in: Hernadnez del Alba, *Quinas Amargas*, 131. The translation is mine.

famous *quina*-producing province – during their eleven-year stay in South America because of the difficulty of travel not to mention recent political turmoil in Peru.[62] Nonetheless, they returned to Madrid, with their experiences and information from Peru, just in time for the Crown's renewed interest in reforming the *estanco de quina*.

Ruiz and Pavón's expedition was not simply a model for Valdecarzana to emulate. Rather, I am suggesting that Ruiz and Pavón's input – in addition to Valdecarzana's ideological orientation – helped to shape the function that Valdecarzana' proposed for new botanist-chemist to be appointed to the *estanco de quina* in Loja. We have already seen how Valdecarzana's commitment to maintaining the status quo in the *quina* trade conditioned his recommendations to the Crown. In particular, he relied on the goal of promoting commerce as justification for limiting royal intervention in the "free" trade in *quina*. This commitment, in turn, resulted in certain limits on the role of the botanist-chemist as an agent of empire. While the botanist-chemist could act as the Crown's buyer and invoke a right of first refusal, the botanist-chemist (or his bureaucratic counterpart, the *corregidor* of Loja) did not have the authority to impinge on trade by private individuals. The botanist-chemist was in essence a buyer for the Crown.

While his ability to intervene in the system of distribution (trade) was limited (if not nonexistent), the botanist-chemist, according to Valdecarzana's scheme, was given extensive authority to alter and intervene in the mode of production. According to the instructions written for the position in 1790, the botanist-chemist was free to intervene in the production of *quina* in a number of ways, including searching out new sources of bark, improving existing methods of production, and introducing cinchona

[62] According to Arthur Steele, Ruiz and Pavón had originally planned to travel to the *Audiencia* of Quito and, presumably, to Loja, but changed their plans once they realized the riches of the flora of Peru, see: Steele, 58 and 87.

plantations. Hipólito Ruiz and his writings on *quina* were probably the main source for this idea for limiting the botanist-chemist's sphere of influence to production of the bark rather than its distribution.

There is no direct evidence of a meeting between Ruiz and Valdecarzana. However, given that Ruiz and Pavón had just returned from Peru with unique experience and knowledge of the cinchona tree, it is likely that Valdecarzana consulted them when preparing his reports for the Crown. In addition, several of the recommendations from Valdecarzana's 1789 reports mirror those found in Ruiz's journals and printed works on the cinchona tree. For example, Valdecarzana's program for reform – based on minimal Crown intervention and, later, a state-sponsored program of private plantations of cinchona trees – bears a striking resemblance to Ruiz's recommendations for reform in his *Quinología* (1792).[63] In addition, the 1790 instructions that defined the roles and responsibilities of Vicente Olmedo and Tomás Ruiz de Quevedo, the botanist-chemist and *corregidor* respectively appointed to oversee *quina* production in Loja, which Valdecarzana probably wrote, also draw on many ideas similar to those of Ruiz.

Consider that the Crown instructed the botanist-chemist to make several interventions in the structures and methods for collecting and producing the cinchona tree. Ruiz explicitly discusses such structures and methods in many of his writings. The journals of his expedition to Peru and Chile give a particularly vivid description of the system employed in Peru to produce *quina* from the hiring of laborers to the packaging of the bark in sacks. Furthermore, Ruiz's primary conclusion was that the "exploitation" of indigenous laborers had "retarded the agricultural pursuits of these

[63] HipólitoRuiz, *Quinología o Tratado del Arbol de la Quina* (Madrid: En la oficina de la Viuda é hijo de Marin, 1792), 14-16.

frontier villages" and presaged the disappearance of cinchona trees from the region. Thus, Ruiz's observations from Peru, as much as the ideology of reform, helped to define the problems and possibilities of for the botanist-chemist to reform the production of *quina*.

Had they met in person, Ruiz certainly would have provided Valdecarzana with an account of his two separate visits to the Peruvian province of Huánuco, one of the few locations where he and José Pavón observed live cinchona trees. They first visited Huánuco's cinchona forests in May of 1780 just a few years after the establishment of full-scale extraction of *quina*, which locals, like many in South America, called *cascarilla*. According to Ruiz, Don Francisco Renquifo first identified "*cascarilla* trees" in the region in 1776. Renquifo, who may have been a merchant or bark collector, "had previously seen and known this kind of tree in the forests of Loja."[64] He further informed the residents of Huánuco that the *lojanos* had "considerable business in this bark" which suggested that residents of Huánuco "might make large sums of money" from *quina*.[65]

Renquifo's initial discovery was not the only instance of the transfer of knowledge and skill from Loja to Huánuco. Shortly after the discovery, Don Manuel Alcaraz, presumably another resident of Huánuco, gathered "various samples of [cinchona] bark" and took them to José Antonio de Lavalle y Córtes, the Conde de

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[64] Hipólito Ruiz, *The Journals of Hipólito Ruiz, Spanish Botanist in Peru and Chile 1777-1788*, translated by Richard Evans Schultes and María José Nemry von Thenen de Jaramillo – Arango (Portland: Timber Press), 144. Ruiz's account of the development of cinchona extraction in Huánuco is short on details such as biographical information about the individuals mentioned. Future archival research in Huánuco on the historical development of cinchona extraction will, hopefully, yield additional information on those involved in this process.
[65] Ibid., 144.

Premio Real, in Lima.[66] Lavalle, whom Ruiz described as "a dealer in [cinchona] bark," confirmed the quality of the bark and promptly provided capital and tools for Alcaraz and others "to gather as much bark as they could."[67] Ruiz further noted that "trained peasants from Loxa were sent" – presumably under the auspices of Lavalle – "to teach the people of Huánuco how they had collected in their own region."[68] The people of Huánuco soon developed skill in the "harvesting and drying" of cinchona bark and extraction operations popped up in the forests of Cuchero, Casape, Casapillo, and Cayumba. According to Ruiz, by 1779, residents of the region were exporting 50,000-75,000 pounds of *quina* to Lavalle annually and, by 1782, "all sorts of people trafficked in [cinchona] bark in Huánuco."[69] With this account, Ruiz offered Valdecarzana an overview of how skill and experience from Loja combined with merchant capital from Lima resulted in a wide-ranging extractive enterprise. This account also established the crucial link between Huánuco and Loja, which, in turn, reinforced the relevance of Ruiz's experience to Valdecarzana's predicament.

On his second visit to Huánuco in August of 1787, Ruiz witnessed and described a much matured cinchona enterprise. This time new problems became apparent. The main one was that collection of the bark was inefficient and wasteful. Ruiz explained that the "exploitation [of cinchona bark] was carried out in disorder, resulting in serious destruction of the *quina* groves."[70] A second problem was that Indians received little compensation for their work in a system that was largely corrupt. In a section of his journal entitled, "Economic Condition of the Indian Bark

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[66] Cristina Ana Mazzeo, *El Comercio Libre en el Perú: Las estrategias de un comerciante criollo: José Antonio de Lavalle y Cortés, conde de Premio Real, 1775-1815* (Lima: Pontifica Universidad Católica del Perú, 1995).
[67] Ruiz, *Journals*, 144. According to Cristina Mazzeo, Lavalle was a prominent dealer in cinchona as well as many other goods from Peru including cacao and copper.
[68] Ibid., 144.
[69] Ibid.
[70] Ibid.

Gatherers and Its Repercussion in the Destruction of the Stands of Quinine Trees," he observed:

> Indians in the villages of Acomayo and Panao, and especially those in Pillao, have harvested many thousands of bushels of [cinchona] bark every year, yet they are penniless and practically always in debt for one or two hundred bushels. The intrinsic value of this amount of bark is much greater than the worth of the Indians' huts, plantings, and cattle.[71]

Anyone shocked by this "obvious truth," according to Ruiz, clearly was not aware that "the buyers get back the money that the Indians receive for the bark, usually in advance, by strange and not always honest methods."[72] By Ruiz's reckoning, merchants, local officials, and clergy colluded to ensnare "Indians" – the primary laborers for collecting bark – into a system of debt peonage. Some description of this system is needed before turning to how Ruiz cast it as producing disorder in the harvest.

Indigenous debt kept the *quina* trade running. First, merchants advanced "merchandise, such as light cloth, baize, clothing, and other effects, to the Indian in addition to money." Ruiz wrote that merchants "try" to advance this merchandise but historical records show that Indians, in fact, were required, often by force, to purchase or accept these goods, as part of a system known as the *repartimiento de mercancias*, so that local officials and *encomenderos* could extract labor and commodities from indigenous communities.[73] To make the transaction more advantageous to merchants, such goods were "scandalously [over]priced, so that

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[71] Ibid., 306.
[72] Ibid.
[73] There is a vast literature on the *repartimiento de mercancias* system, especially since it was a key element in the relations between colonizer and colonized in the Andean regions throughout the history of the Spanish empire in South America, see: Susan Elizabeth Ramírez, *The World Upside Down: Cross-cultural Contact and Conflict in Sixteenth-Century Peru* (Stanford: Stanford University Press, 1996).

natives [were] constantly in debt for them."[74] Both "judges and priests" aided merchants in the collecting these so-called debts from indigenous laborers. Ruiz added, "when merchants are not of the priest's kin, they stand little chance of receiving their payments in full."[75] Ruiz's account is consistent with historian Luz del Alba Moya Torres' description of how merchants with well-placed familial relations exploited both the cinchona trees and indigenous labor in the *Audiencia* of Quito, especially in the provinces of Cuenca and Loja.[76]

Ruiz underlined the importance for merchants to have familial connection to the clergy by observing, "the function of the church enables the clergy to monopolize everything."[77] The clergy aided merchants by manipulating "church pageantry" such that, in order to enjoy church functions and festivals, "the faithful must first present the bushels that they need to pay their debts to various merchants."[78] In addition to making participation in church pageantry contingent upon delivery of cinchona bark, the clergy "or their intermediaries" were central to the operation because they kept the accounts of who owed what to whom. This system had two results. First, the only way for a merchant to get paid was to inform the clergy "about outstanding debts."[79] Second, the clergy were free to abuse the system by keeping "the accounts according to their own whims and never settl[ing] debts even though they may have been paid thrice over [or the debtor has died]."[80] In other instances, indigenous bark collectors "were sentenced and punished under orders from the judges and priests if

[74] Ruiz, *Journals*, 306.
[75] Ibid., 306.
[76] Alba Moya Torres, *La Arbol de la Vida*.
[77] Ruiz, *Journals*, 306.
[78] Ibid.
[79] Ibid.
[80] Ibid.

they do not pay their debts promptly."[81] If they had the right connections, merchants could count on agents of the church and the state to perpetuate this system of exploitation. Descriptions of similar arrangements in other *quina*-producing regions (and many other extractive enterprises in colonial Latin America) confirm Ruiz's observations.[82] His account seems particularly credible as his observations on "the Indians" – that they "celebrate church pageantry only as a pretext for putting on drunken festivals" and that they are "lazy and poor workers by nature" - reveal that he was no partisan of the indigenous laborers.[83]

Ruiz's main conclusions were that "this method of exploitation has retarded agricultural pursuits of these frontier villages" and that, if the system remained unchanged, cinchona trees were likely to disappear from the region. He also emphasized the necessity of Crown intervention since bark collectors had little choice but to extract the bark ineffectively. Ruiz pointed to the incongruity between the value of the product harvested and the standard of living for indigenous laborers. "In 1784, 55 Indians of Pillao" he wrote,"harvested 25,000 pounds of [cinchona] bark in only 8 days; were we to appraise the value of the buildings of the whole village, we would not find it equal to that of 2,500 pounds of bark."[84] Imminent punishment from church and state for unpaid debts provided the incentive for indigenous laborers to "gather as much bark as they could in a short time."[85] As a result, bark collectors, according to

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[81] Ibid.
[82] Brian R. Hamnett, *Politics and Trade in Southern Mexico, 1750-1821* (Cambridge: Cambridge University Press, 1971). For an re-interpretation of the *repartimiento* as a system of credit rather than coercion, see: Jeremy Baskes, "Coerced or Voluntary? The Repartimiento and Market Participation of Peasants in Late Colonial Oaxaca," *Journal of Latin American Studies* 28 (1996), 1-28; Jeremy Baskes, *Indians, Merchants, and Markets: A Reinterpretation of the Repartimiento and the Spanish-Indian Economic Relations in Colonial Oaxaca, 1750-1821* (Stanford: Stanford University Press, 2000);
[83] Ruiz, *Journals*, 306.
[84] Ibid.
[85] Ibid.

Ruiz, took a two-stage approach. First, they chopped down as many cinchona trees as possible. After a few days, they returned to the cut trees to remove their bark. This method resulted in much wasted bark since most trees dried up, making the bark difficult if not impossible to remove, before bark collectors could harvest it. "Being unable to peel off the bark easily," Ruiz observed, "[the Indians] take only a portion of the bark from some of the trunks and leave a large number, completely untouched, to rot away."[86] Furthermore, "indiscriminate felling of both old and young trees" magnified the destructive impact of this approach. The overall outlook was grim:

> The same wasteful exploitation of the [cinchona] tree is going on in Cuchero, Sapán, Cayumba, Muña, and Panao, and in the provinces of Huamalíes, Tarma, and Xauxa. According to a conservative estimate, the forests of these provinces have yielded more than 3.5 million pounds of [*quina*] in 8 years. Moreover, this calculation does not include the many pounds of fresh bark from which the extract [of *quina*] was made and the even greater amounts of dried, stale, and destroyed bark.[87]

Ruiz also faulted merchants for their handling of the bark. In October 1788, he "observ[ed] again the harmful method used by the bark buyers cramming bark into rough burlap bags" while it was "still wet and somewhat moldy on the inner surface" as they prepared to transport a shipment of 3,000 pounds of bark from Pillao to Huánuco.[88] Despite the European preference for large unbroken pieces, merchants still tried to squeeze as much bark as possible into one bag. In addition, placing wet bark in bags with little protection from the rain and mist of the Peruvian highlands was a sure recipe for the bark rotting while in transit. Since the Crown and the Royal Pharmacy had been involved with *quina* for decades by this point, Ruiz's observations only confirmed the common assumption in Madrid that merchants mishandled the bark.

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[86] Ibid.
[87] Ruiz, *Journals*, 307.
[88] Ibid.

Exploitation of indigenous laborers, wasteful and inefficient bark harvesting, mishandling by merchants – these were the causes of scarcity that Ruiz offered Valdecarzana.[89] Some of these problems were matters of technique that could be remedied by training. Indeed, the instructions given to the botanist-chemist did require him to offer instruction to merchants and bark collectors. However, the system of *repartimiento de mercancías*, which was a system critiqued by virtually every Spanish and European observer beginning with Antonio Ulloa and Jorge Juan, the Spanish naval officers that traveled with the joint French-Spanish expedition to Quito in the 1730s, required a change to the broader relations between capital and labor.[90] Nonetheless, such approaches did not violate Valdecarzana's injunction for the Crown and its agents to keep their hands off commerce in *quina*. More important, both botanist and bureaucrat endorsed these visions and framed scarcity as a problem of production and not a problem of distribution. From this perspective, Valdecarzana worked out a solution that embraced the two main objectives of the Bourbon Reforms – commerce and control.

Control: **Government Centralization and the *Estanco de Quina***

Control, in the form of a more centralized and hierarchical colonial government, was another objective of the Bourbon Reforms, and was the main ideological imperative that Valdecarzana used to define the role of the botanist-chemist in the monopoly. Valdecarzana recognized that the Crown needed a capable

[89] This scenario is still within my rhetorical device of a hypothetical meeting between Ruiz and Valdecarzana.
[90] For a recent account of Ulloa and Juan's *Noticias Secretas de América* as an articulation of the predominant discourses of hispanized Andean elites, colonial reforms, and officials in Madrid, see: Kenneth Andrien, "The *Noticias secretas de America* and the Construction of a Governing Ideology for the Spanish American Empire," *Colonial Latin American Review* 7 (1998): 175-192.

and competent agent to implement the reforms in the production of *quina* in Loja and to serve as an expert buyer acquiring the best bark for the Crown. In his first report to the Minister of the Indies, Valdecarzana recommended that the Crown send two "Botanical and Chemical Professor[s]" – one to Loja, the other to Lima – to oversee the collection and preparation of the annual shipments to Spain.[91] In a 1790 royal decree, the Crown appointed a "botanist-chemist," Vicente Olmedo, to oversee operations in Loja but, for reasons unknown, ignored the suggestion to send another botanist-chemist to Lima. Nonetheless, this move was a significant departure from the existing structure of the *estanco de quina* in Loja.[92] Whereas the operation previously relied on local expertise alone as in the case of Pedro de Valdivieso, Magistrate of the Forests from 1768 to 1784, the Crown in 1790 elected to send a learned expert directly from Spain to oversee the operation.[93]

Valdecarzana's recommendation to send a botanist-chemist is best understood in the context of previous attempts to reform *quina* production in Loja. In the government dossiers sent by Antonio Porlier, Valdecarzana would have learned how, in 1773, Pedro de Valdivieso with help of local bark collectors successfully undermined the authority of the Royal Pharmacy. In addition, Valdivieso challenged the royal pharmacists' expertise by rejecting their instructions and bark sample and

[91] Valdecarzana to Porlier, 15 August 1789, fol. 351r.
[92] Antonio Porlier to the President of Quito et. al., San Ildefonso, 7 September 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 251v.
[93] Recall that the President of Quito had arranged Valdivieso's appointment in 1768 largely as a way to placate the complaints of officials in Cuenca and Loja that the *corregidores* of Loja, especially Manuel Daza y Fominaya (r. 1766-1770), whom the Crown appointed and sent from Spain, lacked sufficient local knowledge and experience to oversee the collection of *quina*. Note that Daza y Fominaya continued his post as *corregidor* of Loja for two years after the responsibility for the *quina* shipments had been designated to Valdivieso in 1768. In 1773, Valdivieso became *corregidor* of Loja and the office, once again, became that which oversaw the production and production of the *quina* shipments.

by confidently asserting his own authority and expertise on *quina*.[94] With this episode in mind, Valdecarzana recommended that these two "Botanical and Chemical Professors" ought to be "dependents of Your Excellency [the Minister of the Indies] and arrange their purchasing of *quina* according to the orders that they receive from your Ministry."[95] While a departure from the common practice of the monopoly of *quina* until then, Valdecarzana's recommendation was consistent with the general spirit of the reforms of the Bourbon Crown of the late eighteenth century, in which the Crown sought to replace colonial *creoles* with *peninsulares* and to make the structure of imperial government more centralized and hierarchical.[96]

Vicente Olmedo, whom the Crown appointed to the post of "botanist-chemist" in 1790, was an ideal candidate for putting science in the service of imperial control. His previous training at the Royal Botanical Garden and the Royal Pharmacy meant that he was already a product of the emerging nexus of science and empire in Enlightenment Spain; he was already familiar with what it meant to be a scientific expert in the service of the state. Yet, royal interests and objectives did not discourage Casimiro Gómez Ortega, the Director of the Royal Botanical Garden, from trying to cast Olmedo as a botanist first and an imperial agent second. Gómez Ortega suggested to the new Minister of the Indies, the Marques de Baxamar, that Olmedo's commission should include duties of general scientific interest beyond those associated with the *quina* monopoly. "My zeal for serving the King and for the wise decisions of the Ministry of Your Excellency," wrote Gómez Ortega:

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[94] See Chapter 2.
[95] Valdecarzana to Porlier, 15 August 1789, fol. 351v.
[96] On the Bourbon reforms, see: Gabriel B. Paquette, *Enlightenment, Governance, and Reform in Spain and its Empire, 1759-1808* (New York: Palgrave Macmillan, 2008); John Fisher, *Bourbon Peru, 1750-1824* (Liverpool: Liverpool University Press, 2003); John Lynch, *Bourbon Spain, 1700-1808* (Oxford: Basil Blackwell, 1989); D. A. Brading, "Bourbon Spain and its American Empire," in *The Cambridge History of Latin America*, vol. 1, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984).

> obliges me to put it to your consideration that, although neither the order of appointment of Olmedo nor the Instructions [to Olmedo] expressly state the extension of his Commission to matters other than those relating to *Quina*, it will be advisable to declare that [Olmedo's commission] extends to other matters in Botany in general and in Mineralogy, ..., especially since the natural productions of those Provinces have not yet been studied by a true expert.[97]

As the 1790 instructions made clear, however, Vicente Olmedo's primary function lay in the implementation of imperial power, not the expansion of scientific knowledge. The response to the corrupted shipment of 1773 provided an example. Consider those items in the 1790 instructions that specified how Olmedo was to be trained for the post. Before leaving Madrid, Olmedo was required to examine "*Quinas*" from Loja, Cuenca, and Jaen at the "warehouse of the Royal Pharmacy."[98] He was also instructed to bring "copies of the instructions communicated by the Royal Pharmacy in 1773 to the Presidency of Quito and to the *corregimiento* of Loja for improved knowledge of *Quina* [and] the times and method of its cutting, drying, and good packaging [*reposicion*]."[99] After almost two decades, the Royal Pharmacy would finally achieve victory over Pedro de Valdivieso and impose its standards for *quina* in Loja.[100]

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[97] Casimiro Gómez Ortega to Marques de Baxamar, Madrid, 26 May 1791, AGI, Indiferente 1555, fols. 623v-624r. Gómez Ortega wrote: "Mi zelo por el servicio del Rey y por los aciertos del Ministerio de V[uestra] Ex[celenci]a me obliga a poner en su consideracion q[u]e aunq[u]e ni de la cedula del nombram[ien]to de Olmedo ni de las Ynstrucciones consta expresam[en]te la extencion de su Comision de mas asuntos q[u]e los relativos a la Quina, covendrá declarar q[u]e se extienda a los demas de Botánico en g[ene]ral y de Minerologia .... mediante no haber sido observadas hasta ahora por verdaderos Ynteligentes las producciones naturales de aquellas Provincias."

[98] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 249v.

[99] "bid., fol. 249r.

[100] See Chapter 2.

Olmedo was also directed to bring a "new [set of] instruction[s]" from the Royal Pharmacy containing information on "all classes of *Quina* that come from Loja, Cuenca, and Jaen and their effects."[101] These instructions ordered Olmedo to bring:

> samples of all [the different kinds of *quina* in the Royal Pharmacy] with notes [*nota*] on their greater or lesser estimation so that [the botanist] may proceed in the selection and development of the best [*quina*] with [the best] possible security, separating in his shipments, even if the *quina* is from the same tree, that which is most bathed in the rays of the sun [*nacimiento del sol*], and always making his learned observations by way of the new enlightenment which can be acquired from this material.[102]

Here, Valdecarzana and the Crown relied on the established technique of sending instructions and samples to South America. This time, however, the Crown sent an agent – Vicente Olmedo – to carry out the instructions and implement the standards of the Royal Pharmacy to the exclusion of all other (local) standards and techniques for judging the bark. In this sense, Olmedo – and, of course, Ruiz de Quevedo, the new *corregidor* – functioned as an "agent of empire."[103]

By giving the botanist-chemist jurisdiction over the collection, preparation, and packaging of bark for the annual shipments, the 1790 instructions also gave Olmedo the authority to implement royal standards. Olmedo was to be present "especially for the initial cuttings and preparations" of the bark to insure that all "precautions" were taken to safeguard its "virtue and good quality."[104] He was also oversee the

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[101] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 249r.
[102] Ibid. The instructions read: "muestras de todas ellas con nota de su más y menos estimación p[ar]a que con la posible seguridad proceda en la eleccion y fomento de la mejor, separando en sus remesas, aun en la quina del propio arbol, la que esté más bañada del nacimiento del sol, haciendo s[iem]pre sus observaciones facultativas por las nuebas luces q[u]e puedan adquirirse en la materia."
[103] David Mackay, "Agents of empire: the Banksian collectors and evaluation of new lands," in *Visions of Empire: Voyages, Botany, and Representations of Nature*, edited by D. P. Miller and P. H. Reill (Cambridge: Cambridge University Press, 1996), 38-57.
[104] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 248v.

"packaging of every box and stamping [them] with the firebrand" and conduct a "detailed and exact examination of the *Quina* that is brought to the warehouses."[105] The botanist-chemist came to occupy a central role in production – a position from which to implement Valdecarzana's reforms and the Crown's standards for the bark. In addition, the instructions explicitly stated that the new *corregidor,* Tómas Ruiz de Quevedo, "should not get involved with the government, direction, and economy of [this] industry [which is] left to the expertise of the Professor Botanist."[106] Undoubtedly, an echo of the earlier decision to make oversight of the *estanco de quina* separate from the *corregidor* position after the problems with *corregidor* Daza y Fominaya in the late 1760s.

The *corregidor* was directed, however, to accept the advice of the botanist-chemist. As directed by Ruiz de Quevedo, Olmedo was to conduct "examinations of the forests" of Loja, Cuenca, and Jaen to identify new stands of cinchona trees and assess the quality of their bark, and to make his expertise in these matters available to the *corregidor* for implementing new regulations and policy.[107] For example, in the case of the "Forests of Cuenca and Jaen," Tomás Ruiz de Quevedo was instructed to obtain from Olmedo, "established and certain information" (*unas fundadas y ciertas noticias*) with the goal of establishing "a system, according to the needs and preferences [of the *corregidor*], for acquiring true [and] good *quina* and paying the locals [*naturales*] according to its original and fair value."[108] The *corregidor* was to use this "solid and certain knowledge" to propose a site for a "factory or warehouse"

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[105] Ibid.
[106] "...y en todo cuanto [el Juez comisionado, el corregidor] no toque al govierno, direecion, y economia del ramo, y se lim[ite] a la pericia del Profesor Botanico.," in: "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 248v.
[107] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 248v.
[108] Ibid., fol. 247v.

for “receiving, examining, weighing, boxing and sending *Quina* with the stamp [of the Crown].”[109] Finally, Ruiz de Quevedo was instructed to develop an “arrangement” (*un arreglo*) to improve the acquisition of good *quina* for the Crown drawing on “the report of the Botanist in matters [requiring] expertise and learning” (*dictamen del Botánico en las partes peritas y facultativas*).[110] The bureaucrat depended on the expertise of the botanist.

Valdecarzana and the Crown also instructed Ruiz de Quevedo to use the information from Olmedo to promote private exploitation of cinchona bark. One main of objective for Olmedo’s examinations of the forests was to indicate to the “locals of the Towns” possible sites for bark extraction including “all settlements of Indians or Savages.”[111] Here, the distinction between “locals” (*naturales*) and “Indians or Savages” was key. The former term referred to non-Indian residents of the towns, which, in practice, meant local Spanish or Creole elites, many of whom were already involved in the commercial extraction of *quina*. The fifth instruction was even more explicit that the *corregidor* should indicate possible “districts” for the extraction of cinchona bark “to able persons with the resources to develop and conserve them.”[112] As a result, the botanist’s information on stands of cinchona trees throughout Loja, Cuenca, and Jaen was to be used to facilitate private development and extraction of the bark even if such stands were on indigenous lands. In this way, Valdecarzana’s instructions achieved a synthesis in which natural knowledge and learned expertise simultaneously served the interests of the imperial state and local merchants while ignoring and excluding indigenous knowledge and local interests.

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[109] “Ibid., fol. 248r.
[110] Ibid., fol. 247v.
[111] Ibid., fol. 247r.
[112] Ibid., fol. 247v-248r.

The botanist-chemist also facilitated this arrangement and private exploitation of the forests by instructing local merchants and elites how to exploit the forests more effectively. The Crown ordered Olmedo to provide the "locals of the Towns" with "a formal instruction regarding the increase, improvement, and conservation of the trees of *Quina*."[113] This "formal instruction" was also to include information on "the conditions under which to strip [the bark] without destroying [the trees]" and on "the best method for the desiccation of the bark, the packaging and transporting [of the bark] to the designated places for examination of this specific [by the botanist]."[114] In addition, the Crown directed Olmedo to provide Ruiz de Quevedo with "reports" on the "most appropriate places" for establishing a "plantation of *Quina* trees in order to see and to know by experience if cultivated *quina* has more or less virtue than that from the forest."[115]

This experimental plantation was a prototype for the "locals." In fact, the instructions explained that Ruiz de Quevedo "will develop these plantations among the same [plantations of] those interested in *Quina* and without cost to the Treasury."[116] The Crown not only expected local merchants and elites to establish plantations but also expected them to assume the financial risks associated cultivated *quina*. For example, the main risk was that consumers might have deemed cultivated bark not as commercially valuable as bark from wild cinchona trees.[117] Ultimately, the plantations faltered and, in 1796, Valdecarzana and the Crown issued a supplementary set of instructions to Ruiz de Quevedo and Olmedo offering a series of cash prizes as incentives for merchants and *hacienda* owners to set up cinchona

[113] Ibid., fol. 247r.
[114] Ibid., fol. 247r-v.
[115] Ibid., fol. 249r.
[116] Ibid., fol. 249r.
[117] This suggests that the Crown was either reluctant or did not have the resources to support such a plantation project.

plantations.[118] By attempting to introduce the cultivation of *quina* to the Loja region, botanist-chemist and *corregidor* worked together to realize the goal of Valdecarzana and other Bourbon reformers of greater royal control over Spanish imperial governance. This objective of control operated in concert with the objective of commerce to define the role of the monopoly's botanist-chemist; Olmedo was free to intervene in the structures of production but not the structures of distribution. Let us now consider how this scheme worked in practice.

Commerce and Control in Context: Vicente Olmedo in Loja in the 1790s

The instructions to Olmedo and Ruiz de Quevedo asked much of them. In addition to overseeing and administering the annual shipments for the Crown, they were expected to improve and reform this process. Chief among Olmedo's responsibilities as botanist-chemist was providing expert advice to Ruiz de Quevedo. Between 1792 and 1794, Olmedo wrote a series of reports on these topics to Ruiz de Quevedo and to Luis Muñoz de Guzman, the President of Quito.[119] These reports provide a profile of Olmedo's activities in Loja, and show how he came to understand the problems facing the Crown's *quina* project, especially the problem of scarcity

[118] Diego Gardoqui to the President of Quito, Aranjuez, 16 March 1796, ANH/Q, FE, c. 147, v. 336, n. 8127-54, fols. 67r-73r.

[119] The relevant reports from Olmedo to Ruiz de Quevedo include: Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 27 June 1792, ANH/Q, FE, c. 126, v. 294, n. 7311, fols. 263r-v; Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 10 December 1792, AGI, Indiferente 1556, fols. 260r-261v; Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 22 September 1793, ANH/Q, FE, c. 136, v. 313, n. 7637-180, fols. 228r-v; Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 17 December 1793, ANH/Q, FE, c. 136, v. 313, n. 7637-190, fols. 239r-240r; Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 15 May 1794, ANH/Q, FE, c. 137, v. 316, n. 7644-126, fols. 151r-v; Vicente de Olmedo to Tomás Ruiz de Quevedo, Loja, 7 September 1794, ANH/Q, FE, c. 137, v. 316, n. 7644-246, fols. 293r-294r. It is not clear why Olmedo's reports to Quevedo end in 1794. As of July 2008, I have not found any reports from Olmedo after 1794 regarding the *quina* project in archives of Spain nor Ecuador. Olmedo also wrote a few reports directly to Luis Muñoz de Guzman, the President of Quito, see: Vicente de Olmedo to Luis Muñoz de Guzman, Malacatos, 20 June 1793, ANH/Q, FE, c. 136, v. 313, n. 7637-63, fols. 82r-83r; Vicente de Olmedo to Luis Muñoz de Guzman, Malacatos, 17 December 1793, ANH/Q, FE, c. 136, v. 313, n. 7637-186, fols. 236r-v.

(Table 5.1). In their first few years in Loja, Olmedo and Ruiz de Quevedo spent much time assessing the situation, both in terms of the environmental conditions of the cinchona trees and the social conditions of governance in the *Audiencia* of Quito. Eventually, they tried to implement two kinds of solutions: the reform of current extractive techniques and the introduction of new techniques to intensify and sustain the extraction of cinchona bark. The first kind of solution was more conservative while the second was more radical. In both instances, results were mixed.

Olmedo and Ruiz de Quevedo arrived in Loja to take up their charge late in the summer of 1791.[120] In his first three years on the job, Olmedo conducted examinations of several different forests. At the request of the *corregidor*, Olmedo started his survey with the forests near Cuenca in October 1791. He visited forests in the province of Yangana in 1793 and again in 1794. Also in 1794, he surveyed "the places called Caxanuma and Curitroje" near Loja.[121] These surveys took several years: the forests were vast, and Olmedo's responsibility to oversee the preparation of the annual shipments left him only a few months each year to conduct his examination. Upon completion, Olmedo gave a general picture of the status of the forests. Those cinchona trees that produced the best bark were scarce; other, seemingly useless, cinchona species were abundant; and further exploration and exploitation of these forests faced several obstacles.

Olmedo's main point was that scarcity had a specific geography. For example, after visiting the town of Paute in the Province of Cuenca, Olmedo reported that stands of cinchona trees in "those Forests easily accessible and close to the

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[120] In August 1791, Manuel Vallano y Cuesta, the acting *corregidor* of Loja, reported the arrival of Tomás Ruiz de Quevedo, see: Manuel Vallano y Cuesta to Estanislao de Andino, Loja, 7 August 1791, ANH/Q, FE, c. 123, v. 287, n. 6979-176, fols. 238r-239r.

[121] Olmedo to Ruiz de Quevedo, Loja, 7 June 1794, ANH/Q, FE, c. 137, v. 316, n. 7644-246, fols. 293r.

Town" were "clear cut and destroyed" and the "thickest tree," which Olmedo found, "did not exceed eight inches in circumference."[122] On his first visit to the town of Yangana in 1793, Olmedo only found two trees of "fine *cascarilla*" that were "in the condition for cutting or extracting the bark."[123] The observations contrasted with his observation of December 1793 that "*Quina* or *Cascarilla* grows [throughout] the Royal Range of the Andes [and] all its branches or arms."[124] Later in this same report to Ruiz de Quevedo, Olmedo explained that the scarcity of cinchona trees "is effective in the noted vicinities [of towns and villages] but not in the infinite remainder of Forests which [bark collectors] do not know."[125] Here, Olmedo illuminated the geography of the scarcity – trees that produced the best quality bark became scarcer in the vicinity of human settlements. This finding was hardly surprising, since the most accessible forests were those closest to villages and towns. These were the locations where bark collectors would go first when looking to fill their annual quota of bark.

Both bark collectors and the Crown had recognized the scarcity of good cinchona trees. However, the problem had a different meaning to each group. Indigenous bark collectors that sold their *quina* to Olmedo and Ruiz de Quevedo expressed the problem of scarcity in terms of receiving a fair price from the Crown for their labor. In a 1793 report to Ruiz de Quevedo, Olmedo recounted three main complaints from the collectors: that Olmedo rejected too much of their bark as poor quality, that good cinchona trees were scarce, and that the price offered by the Crown was too low. In particular, bark collectors told Olmedo,"the price at which [His Majesty] pays [bark collectors] for *quina* is not equivalent in any way to the great

[122] Olmedo to Ruiz de Quevedo, Loja, 10 December 1792, AGI, Indiferente 1556, fol. 261r.
[123] Olmedo to Ruiz de Quevedo, Loja, 22 September 1792, ANH/Q, FE, c. 136, v. 313, n. 7637-180, fol. 228r.
[124] Olmedo to Quevedo, Loja, 17 December 1793, ANH/Q, FE, c. 136, v. 313, n. 7637-190, fol. 239v.
[125] Ibid.

[amount of] work which it requires of [us]."[126] While Olmedo noted that "in order to deliver one *arroba* of *Quina*, [bark collectors] have to extract six or eight [*arrobas*]," he made no mention of the increasing amount of time and labor because bark collectors had to go deeper into the forests to find harvestable stands of cinchona trees. [127] Olmedo probably avoided the latter observation since it conflicted with his image of indigenous bark collectors as lazy and "endowed with a natural timidity" which made them afraid of the "wild animals" in unexplored forests.[128] While bark collectors framed the problem of scarcity in terms of its detrimental effects on the value of their labor, the Crown, in its instructions to Olmedo and Ruiz de Quevedo, had framed scarcity in terms of conservation of a precious natural resource.

Not surprisingly, Olmedo and Ruiz de Quevedo pursued their efforts at conservation according to the Crown's main focus on production. First, in juxtaposing the scarcity of good cinchona trees near towns with the supposed abundance of cinchona trees in the unknown forests of the Andes, Olmedo implied that one solution was to expand the area of bark extraction to include additional forests. Second, after examining a sample of bark from a "hill or forest called Chima" near Guaranda, Olmedo concluded that this forest might provide "some *cascarillas* useful to His Majesty."[129] As to whether Olmedo and Ruiz de Quevedo could claim and regulate the bark as part of their charge from the King, he suggested that "the spirit of the Superior Orders which govern us" gave them the power for "the general

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[126] Ibid., fol. 240r.
[127] Ibid.
[128] Ibid., fol. 239v.
[129] Olmedo to Ruiz de Quevedo, Loja, 27 June 1792, ANH/Q, FE, c. 126, v. 294, n. 7311, fol. 263r.

acquisition of all good *quina* or *cascarilla*."[130] They could claim authority over these trees because the Crown had defined jurisdiction by the quality of *quina*.

While Olmedo and Ruiz de Quevedo may have had the authority to requisition good quality *quina* regardless of its point of origin, several difficulties stood in the way of expanding extraction geographically. First, the Andean terrain, density of the forests, and presence of dangerous animals meant that the much of the forest was effectively inaccessible. Botanists and bark collectors alike remarked on how geography and climate made some regions impossible to reach. In addition to such environmental obstacles, expansion of extraction into new regions only temporarily solved the problems since newly discovered stands of cinchona trees would eventually become exhausted, too. Contemporary observers often pointed to Loja's depleted population of cinchona trees as an example of poorly managed extraction.

Since expanding extraction geographically was unlikely (not to mention ultimately ineffective), Olmedo and Ruiz de Quevedo turned to another method: improvement of current extraction techniques. In 1793, Ruiz de Quevedo and Olmedo observed that "wealthy and white people" did not engaged in the "work of [collecting] *cascarilla*" because they abhorred "all kinds of work."[131] As a result, the task fell to "Natives or most unfaithful Indians" who were unaccustomed to "any work" because they survived on the "wild fruits" of the forests as needed.[132] Olmedo and Ruiz de Quevedo had a low opinion of indigenous bark collectors as laborers, and often discounted their expertise. For example, in their 1793 report to the Marques de Valdecarzana, they wrote: "Any sudden variation of method or transformation of ideas seemed impossible among those natives who lack all intelligence and who, at

[130] Ibid.
[131] Tómas Ruiz de Quevedo and Vicente Olmedo to Marques de Valdecarzana, Loja, 18 January 1793, ANH/Q, Fondo Especial, Box 136, vol. 313, no. 7637-10, fol. 15v.
[132] Ibid.

the same time, are poorly endowed with little rationality and unable to accept instruction contrary to their erroneous maxims."[133] Such claims were not new. Many European travelers to South America in the eighteenth century commented on the laziness and ignorance of indigenous people. Indeed, many came to South America with such preconceptions. Olmedo and Ruiz de Quevedo, who came to Loja from Spain, were to some extent predisposed to ignore the expertise and knowledge of indigenous laborers. In addition, such a claim about indigenous laborers provided a pre-emptive explanation for shortcomings that the royal pharmacists might find in the annual shipments of *quina* from Loja.

In spite of his skepticism about bark collectors' ability to learn new methods and ideas, Olmedo claimed in 1793 and 1794 that his instructions to bark collectors were producing good results. As outlined in the second article of the 1790 instructions from the Crown, Olmedo was required to give locals – *hacenderos* as well as laborers – "formal instruction regarding the increase, improvement, and conservation of *Quina* trees."[134] Olmedo did so in several instances. After a visit to the forests of Cuenca in 1792, he sent a set of "instructions" to the Governor of Cuenca designated for "all those that may have to cut *Cascarillas*."[135] Before the harvesting season of 1793, Olmedo gave "bark samples" as well as "verbal and written [instruction] to each and every one of the [bark] collectors [*acopiadores*]" in Loja.[136] "We have reaped in this present [year]," he wrote, "the fruit of our labors with the general approval and satisfaction of all, in that we have not rejected a single

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[133] Ibid.
[134] "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fol. 246r-v.
[135] Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 10 December 1792, AGI, Indiferente 1556, fols. 260r-261v.
[136] Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 17 December 1793, ANH/Q, Fondo Especial, box 136, vol. 313, no. 7637-190, fol. 239r.

[scrap of] bark [from the collectors]."[137] Bark collectors had learned how to identify and collect good quality bark as a result of his instructions. It was a significant improvement over the previous year in which bark collectors had complained that Olmedo had rejected too much of their bark.[138]

Olmedo also noted in his 1793 report that since they had been given "instruction and [were] assured" cinchona bark "is becoming more abundant," bark collectors "invest[ed] much less effort in their work."[139] He made a similar claim in a 1794 report on a visit to various forests near the town of Yangana. "In the immense span of hills that surround [this town]," wrote Olmedo, "[the forests] produce fine *Cascarilla* in great abundance; this propagation [of cinchona trees] is accredited to the new regimen for extraction which is observed by means of [my] instruction of the laborers, their assistance, and the other attentions practiced with regard to this interesting matter."[140] Whether Olmedo's techniques and instructions were as effective as he claimed is uncertain; however, these reports suggest that Olmedo was at least attempting to instruct laborers so as to improve yields of good quality *quina* and introduce more sustainable practices of extraction.[141]

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[137] Ibid., fol. 239r-v.
[138] Olmedo reviewed the complaints from bark collectors in his report of December 17, 1793.
[139] Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 17 December 1793, ANH/Q, *Fondo Especial*, box 136, vol. 313, no. 7637-190, fol. 240r.
[140] Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 15 May 1794, ANH/Q, Fondo Especial, box 137, vol. 316, no. 7644-126, fol. 151r. I have not yet found independent confirmation that Olmedo's techniques, communicated by instructions, were as effective as he claimed.
[141] Sustainability is not an actors' category. Instead, they framed the issue primarily in the language of conservation. In addition, Olmedo's claims to success in his reports to Quevedo in 1793 and 1794 is notably at odds with the observations on the ignorance of bark collectors and their seeming inability to learn new techniques of extraction that Olmedo and Quevedo made to the Chamberlain of the Royal Household in a report on January 18, 1793. They wrote, "any sudden variation of method and transformation of ideas was manifestly impossible among natives which are lacking in any intelligence,...., endowed with little rationality, and incapable of accepting instruction against their erroneous maxims," see: Tomás Ruiz de Quevedo and Vicente Olmedo to Marques de Valdecarzana, Loja, 18 January 1793, ANH/Q, Fondo Especial, box 136, vol. 313, no. 7637-10, fol. 15v.

Table 5.1: Reports of the Marques de Valdecarzana, Vicente Olmedo, and Tomás Gómez Ruiz de Quevedo

Year	Date	Event	Location
1788	(Fall)	Hipólito Ruiz and José Pavón return from their eleven-year botanical expedition to Peru and Chile.	
1789	July	Antonio Porlier, Minister of the Indies, asks the Marques de Valdecarzana, Chamberlain of the Royal Household, to propose a systematic policy for the *etanco de quina*.	Madrid
1789	August 15	The Marques de Valdecarzana sends his first report on *quina* to the Minister of the Indies.	Madrid
1789	September 30	The Marques de Valdecarzana sends hi second report on *quina* to the Minister of the Indies.	Madrid
1790	August 26	Instructions issued for Tomás Gómez Ruiz de Quevedo, the new *corregidor* of Quito, and Vicento Olmedo, the new "botanist-chemist" appointed to direct the *estanco de quina* in Loja.	Madrid
1792		Hipólito Ruiz publishes *Quinología*, a study of the cinchona tree and its bark.	Madrid
1792	June 27	Vicente Olmedo submits his earliest known report to Tomás Gómez Ruiz de Quevedo.	Loja
1792	December 10	Olmedo submits a second report to Ruiz de Quevedo.	Loja
1793	January 18	Olmedo and Ruiz de Quevedo submit their first known report to the Marques de Valdecarzana.	Loja
1793	June 20	Olmedo submits his earliest known report to Luis Muñoz de Guzman, President of Quito.	Malacatos
1793	September 22	Olmedo writes another report to Ruiz de Quevedo.	Loja
1793	December 17	Olmedo writes to Ruiz de Quevedo and to Muñoz de Guzman addressing distinct issues.	Loja
1794	May 15	Olmedo submits a report to Ruiz de Quevedo.	Loja
1794	June 11	Ruiz de Quevedo and Olmedo submit a report to Diego de Gardoqui, Valdecarzana's replacement as Chamberlain.	Loja
1794	September 7	Olmedo submits a second report for this year to Ruiz de Quevedo	Loja
1796	March 16	Diego de Gardoqui sends auxiliary instructions to Ruiz de Quevedo and Olmedo. These include implementation of a system of cash prizes to encourage the development of *quina* plantations.	Madrid
1796	November 25	Olmedo and Ruiz de Quevedo submit their last known report to Gardoqui.	Loja

In contrast to all that Olmedo did to improve the techniques of extraction employed by bark collectors, he and Ruiz de Quevedo did little to improve their living and working conditions. In the 1780s, Hipólito Ruiz had commented on the wretchedness of indigenous bark collectors trapped in a system of debt peonage based on the collusion between merchants and church officials. Bark collectors in Loja undoubtedly had a similar experience in which local merchants exploited indigenous labor to collect cinchona bark. Not surprisingly, these laborers, many of which had a transient status to begin with, sought work elsewhere. As shown by Kenneth Andrien, the port city of Guayaquil began in the 1780s to attract laborers from the mountain regions, where Loja was located.[142]

Such conditions frustrated Olmedo and Ruiz de Quevedo's efforts to reform cinchona extraction in Loja. In their 1794 report to officials in Spain, they observed that indigenous bark collectors "have no fixed residence and there is no one who would voluntarily want to extract *cascarilla* for His Majesty."[143] In order to entice (or ensnare) laborers, Olmedo and Ruiz de Quevedo resulted to the same tactic as merchants of "giving [bark collectors] their wage [*importe*] in advance."[144] In addition, Olmedo and Ruiz de Quevedo continued to "instruct and teach" indigenous laborers how to collect the bark. However, they did nothing to change relations between laborers and merchants. As a result, Olmedo and Ruiz de Quevedo experienced an exodus of skilled laborers, in whom the *corredigor* and botanist-chemist had invested much time and money.[145] In 1796, they reported that for every "100 [bark collectors]

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[142] Kenneth Andrien, *The Kingdom of Quito, 1690-1830: The State and Regional Development* (Cambridge: Cambridge University Press, 1995), 37-44, 51-54.
[143] Tomás Ruiz de Quevedo and Vicente Olmedo to Diego de Gardoqui, Loja, 11 June 1794, AGI, Indiferente 1556, fol. 247v.
[144] Ibid.
[145] Ibid.

enlisted in this work" they lost twenty-five of them to death or emigration.[146] These lost laborers then had to be "replaced by Boys and Young People" whom Olmedo and Ruiz de Quevedo had "to instruct anew and always accompany [on their collections]." As a result, Olmedo and Ruiz de Quevedo had "to tolerate [from these inexperienced laborers] some defects in their first attempts."[147]

Olmedo and Ruiz de Quevedo offered no suggestion on how to improve labor conditions. In fact, their recommendation was to intensify the exploitation of indigenous labor. In 1794, they suggested that the Crown give them "a *mita* of fifty Indians." A *mita* was essentially a royal grant to private individuals that forced indigenous communities to provide a set number of laborers to the grantee. Although developed under the Incas, the system was used widely by Spanish colonists in Latin America.[148] These *mitayos*, who would be dedicated solely to the *estanco de quina*, were to have their expenses paid and be freed from any other forms of tribute. For Olmedo and Ruiz de Quevedo, this reform would stabilize their pool of skilled laborers which could then be used to make other improvements such as explore the forests, cultivate cinchona plantations, and build roads into the forest to facilitate extraction and encourage *hacenderos* to establish their own cinchona plantations.[149]

The Crown roundly rejected this proposal. In the auxiliary instructions to Olmedo and Ruiz de Quevedo, the request for a "*mita* of Indians" was denied. The Crown justified this decision in article sixteen where the *mita* was described as "a

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[146] Tomás Ruiz de Quevedo and Vicente Olmedo to Diego de Gardoqui, Loja, 25 November 1796, ANH/Q, Fondo Especial, Box 147, vol. 336, no. 8127-160, fol. 197r.
[147] Ibid.
[148] Tomás Ruiz de Quevedo and Vicente Olmedo to Diego de Gardoqui, Loja, 11 June 1794, AGI, Indiferente 1556, fol. 255r. On the *mita*, see: Burkholder and Johnson, 126-128; Ramírez, *The World Upside Down*, 87-120.
[149] Tomás Ruiz de Quevedo and Vicente Olmedo to Diego de Gardoqui, Loja, 11 June 1794, AGI, Indiferente 1556, fol. 255r.

hateful thing for the Indians as much in name as in substance."[150] Instead, the Crown suggested that Olmedo and Ruiz de Quevedo offer "prizes" and other monetary incentives to cultivate laborers' interest in the work.[151] Such measures were a pittance in comparison to the problems that laborers faced in their everyday interactions with merchants and landowners involved in the *quina* trade. By doing nothing, the Crown and colonial officials implicitly endorsed the existing system of exploitation, namely the *repartimiento de mercancías*. Moreover, in light of the shortage of capital in *Audiencia* of Quito, the state was realistically unable to present an effective alternative to this system.[152]

Alongside their conservative solution of training bark collectors in better methods of extraction, Olmedo and Ruiz de Quevedo also sought to introduce novel modes of production. The first was to establish cinchona plantations. This solution was aimed primarily at local elites that had enough capital to invest in the enterprise; the Crown's instructions suggested that such efforts might restore damaged forests.[153] On the ground in Loja, this project proved much more difficult. Olmedo made hardly any mention of it in his reports to Ruiz de Quevedo. In a 1794 report on his survey of some of the forests near Loja, he suggested to Ruiz de Quevedo that Loja's forests would be the "best sites for establishing the corresponding tests [of artificial plantations] of plants or of seeds" on account of the fact that "there is not a single tree from which bark could be extracted."[154] In other words, there was space

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[150] Diego de Gardoqui to Tomás Ruiz de Quevedo and Vicente Olmedo, Madrid, 16 March 1796, ANH/Q, Fondo Especial, Box 147, vol. 335, no. 8127-54, fol. 71v.
[151] Ibid., fol. 72r.
[152] Andrien, 80-89; Alba Moya, 102-104.
[153] See articles five and thirteen of: "Ynstrucción que han de observar el Corregidor de Loxa y el Botanico Chimico...," Madrid, 26 August 1790, ANH/Q, FE, c. 118, v. 278, n. 6843, fols. 247r-250r.
[154] Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 7 September 1794, ANH/Q, Fondo Especial, box 137, vol. 316, no. 7644-246, fol. 293r.

for the plantations and no worry about contamination from wild populations, but such conditions were not enough to spur Loja's landowners to cultivate the cinchona tree.

Having identified a possible site where such plantations would be most useful, Ruiz de Quevedo and Olmedo outlined the prevailing obstacles to such projects in their 1794 and 1796 reports. In addition to difficulties presented by the local terrain, they pointed to the poverty of the region. "Locals of the Villages, which produce *Cascarilla*," they explained, "find it impossible to care for and develop a plantation."[155] In addition, locals were reluctant to give up land to the uncertain cultivation of cinchona when such land was necessary for subsistence crops or could be used for tried and true cash crops like cacao.[156] "Poverty," explained Ruiz and Olmedo, "is the fundamental [reason] that [landowners] are not able to extract *Cascarilla* on their own account and even less to develop plantations." "It is evident," they added, "that, lacking the workers and interest to care for the little that they have acquired, [we] have found no good reason to oblige [landowners] to [undertake] the uncertain cultivation [of cinchona trees]" in place of crops like "maize and those necessary for their subsistence."[157]

To demonstrate the "utility of the cultivation of *Quina*" to the people, Olmedo and Ruiz solicited "a piece of land in one of the mountain ranges that produce [*quina*] in which to develop a plantation of considerable size."[158] Apparently the locals remained unconvinced; in 1796, Ruiz and Olmedo reported little progress. In addition

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[155]Vicente Olmedo and Tomás Ruiz Gómez de Quevedo, Loja, 11 June 1794, AGI, Indiferente 1556, fol. 247v.

[156] An early twentieth-century study of Dutch plantations of cinchona on the island of Java noted that the Dutch had similar difficulty balancing the planting of cinchona trees for export agriculture and other plants for the subsistence of the laboring population, see the introduction by Peter Hönig to: Norman Taylor, *Cinchona in Java: The Story of Quinine* (New York: Greenberg, 1945).

[157] Vicente Olmedo and Tomás Ruiz Gómez de Quevedo, Loja, 11 June 1794, AGI, Indiferente 1556, fol. 248v.

[158] Ibid., fols. 249v-250r.

to poverty, they suggested that the character of the people was a problem. Aside from a small number of "able residents" (*vecinos pudientes*) of the region, Olmedo and Ruiz found that they "live in the grip of laziness and [are] endowed by their confidence and poverty with a lack of determination [and] as result they lack ideas, curiosity, and the desire to try or experiment."[159]

In March 1796, the Crown addressed such problems in its auxiliary instructions to Ruiz de Quevedo and Olmedo in response to their reports and recommendations.[160] The fifth article identified the "reproduction of good *Quinas*" as an "object of great importance and necessity."[161] Consequently, the instructions ordered that "landlords of those forests," "Mestizo Indians and other natives," cultivate cinchona trees "from seeds and from transplants by hand as much in their lands as in the royal and unused forests and lands [*montes y tierras valdías y realengas*]" with instruction from the "Professor Botanist."[162] Once again, the Crown and its advisors showed that they were willing to intervene in production while at the same time supporting free trade by private individuals. As incentive, Ruiz de Quevedo and Olmedo were to offer "ample Prizes" to "*hacendados* and laborers" who have produced the "greatest number of *Quina* trees" in plantations of seeds or transplants.[163] Aside from these prizes, these instructions said little about the general problem of the region's poverty. Yet, this prize-driven plantation initiative did experience some success: In 1800, Olmedo and Ruiz wrote to the President of Quito

[159] Tomás Ruiz Gómez de Quevedo and Vicente Olmedo to Diego Gardoqui, Loja, 25 November 1796, ANH/Q, Fondo Especial, box 147, vol. 336, no. 8127-160, fol. 197v.
[160] Diego Gardoqui to the President of Quito, Aranjuez, 16 March 1796, ANH/Q, Fondo Especial, box 147, vol. 336, no. 8127-54, fols. 67r-73r.
[161] Ibid., fol. 68r.
[162] Ibid., fols. 68r-v.
[163] Ibid., fol. 68v.

requesting approval to disperse prizes to certain individuals who had successfully cultivated cinchona trees.[164]

It seems a limited success. In 1805, after a visit to Loja, Francisco José de Caldas, a naturalist sent from Santa Fe de Bogotá by the Viceroy of New Granada, reported that Olmedo and Ruiz de Quevedo had done little to prevent the further degradation of cinchona forests.[165] Moreover, in contrast to Olmedo and Ruiz de Quevedo's suggestion that residents of the region did not support plantations because they were too lazy, Caldas suggested that the people of Loja more actively resisted the Crown's plans for establishing cinchona plantations. He noted, "there is great opposition to [cinchona] plantations among the inhabitants of Loja."[166] In his report, Caldas included the story of "an honored and curious resident of Loja" who "transported four young [*cascarilla*] plants to the patio of the religious houses [*casas capitulares*] of that city where they happily prospered."[167] This successful transplantation apparently caused much anxiety among some residents. After all, if these trees, which produced superior *quina*, could be grown in other locations, then Loja surely would lose its exclusive claim to the production of the best bark. Upon the death of this "honored and curious" citizen, other residents of Loja, according to

[164] I have located only a few documents relating to the development of plantations after 1796 except a short letter from the President of Quito, Baron de Carondelet, to a Spanish official noting that Ruiz and Olmedo had received approval to distribute prizes for cinchona plantations, see: Luis Francisco de Hector, Baron de Carondelet, to Miguel Cayetano Soler, Quito, 21 August 1800, ANH/Q, Fondo Especial, box 159, vol. 367, no. 8652, fol. 5r.
[165] Franciso José de Caldas, "Memoria sobre el estado de las quinas en general y en particular sobre la de Loja," Quito, 16 March 1805, in: *Obras Completas de Francisco Jose de Caldas* (Bogotá: Imprenta Nacional, 1966), 241-260.
[166] Ibid., 253.
[167] Ibid., 252-253.

Caldas, "introduced horses into the place where the four *quina* trees grew [and the horses] destroyed [the trees] and made them die."[168]

There was a third solution to the problem of scarcity and another way to modify the mode of production – intensification of extraction. This strategy primarily entailed using known cinchona resources more effectively. Once in Loja, Olmedo pursued this strategy in two ways, also with mixed results. Olmedo's first method was to try to identify alternative uses for known stands of cinchona trees, especially stands of inferior quality cinchona bark. In September 1793, Olmedo reported that, on a recent visit to a forest near the town of Yangana, he found stands of "fine *cascarilla*" to be "annihilated" while "two species of [*cascarillas*] *crespillas*" were "very abundant" in this same forest.[169] Eager to find a use for these species and turn their abundance into an advantage, Olmedo subjected these "*crespillas*" to several "different experiments."[170] Alas, these kinds of cinchona trees ultimately proved "useless for any purpose."[171] In 1794, after surveying forests near Loja, Olmedo discovered "two unknown species of *Cascarillas* or *Quinas*." While he was unable to finish his "experiments" with these species, Olmedo reported that one species seemed to possess a medical utility similar to known species of "fine *cascarilla*" while

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[168] Ibid., 253. Caldas does not reveal the identity of the "honored and curious resident of Loja" and he is similarly vague on who destroyed the cinchona trees that had been transplanted to the city. In a 1796 report to Diego Gardoqui, Joseph Garcia de Leon y Pizarro, a former *visitador general* to Quito, reported that Manuel Vallano y Cuesta, *corregidor* of Loja from 1784 to 1790, established some plantations of cinchona trees. Caldas story may be a reference to Vallano's plantations, see: Joseph Garcia de Leon y Pizarro to Diego Gardoqui, Madrid, 7 January 1796, AGI, Indiferente 1556, fols. 343r-399v. Garcia de Leon, incidentally, was one of the primary authors of the auxiliary instructions sent to Olmedo and Ruiz in March 1796.

[169] Vicente Olmedo to Tomás Ruiz Gómez de Quevedo, Loja, 22 September 1793, ANH/Q, Fondo Especial, box 136, vol. 313, no. 7637-180, fol. 228r.

[170] Ibid.

[171] Ibid. A year earlier, Olmedo reported a similar failure to find a use for alternate kinds of *quina* in the forests near Cuenca, see: Vicente Olmedo to Tomás Ruiz Gómez de Quevedo, Loja, 10 December 1792, AGI, Indiferente 1556, fols. 260r-261v.

the other species, which proved medically useless, might gain "great esteem for the mechanism of dyeing."[172]

Olmedo's second method for intensifying extraction of cinchona bark was to further process the bark into a *quina* extract. The extract was the result of chemical manipulation of the bark. This may explain why Valdecarzana specifically recommended a botanist-chemist as opposed to just a botanist. Interest in developing an extract of cinchona bark emerged largely from the infusion of chemical ideas and practices into medicine and pharmacy in the eighteenth century.[173] Indeed, the roots of Pierre Joseph Pelletier and Joseph Bienaimé Caventou's isolation of the alkaloid quinine in 1820 can be traced to early chemical experiments with cinchona bark and other medicaments in the late seventeenth and early eighteenth centuries.[174] Several accounts from the eighteenth century suggest that French naturalist Joseph de Jussieu was one of the first to make an extract from cinchona bark during his visit to Loja as part of the joint French-Spanish expedition to Quito (1735-1744).[175] Certainly, Jussieu was one of the first to produce the extract in South America. By the time that Hipólito Ruiz and José Pavón were preparing for the expedition to Peru and Chile in 1777, chemical experiments to produce a cinchona

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[172] Vicente Olmedo to Tomás Ruiz Gómez de Quevedo, Loja, 7 September 1794, ANH/Q, Fondo Especial, box 137, vol. 316, no. 7644-246, fols. 293r-v. *Quina*'s other main usage in the eighteenth century was as a dye. In fact, in some instances when the Royal Pharmacy deemed a shipment of *quina* to be inferior for use in medicine, the Crown opted to sell the bark for use as a dye, see: María Luisa de Andrés Turrión, "Quina del Peru para la Real Hacienda Española (1768-1807): Notas sobre su <<Estanco>>," in: *La Expedición Botánica al Virreinto del Perú (1777-1788)*, edited by Antonio González Bueno (Barcelona: Lunwerg Editores, 1988), 71-84.

[173] Andreas-Holger Maehle, *Drugs on Trial: Experimental Pharmacology and Therapeutic Innovation in the Eighteenth Century* (Rodopi: Amsterdam: 1999).

[174] Teodoro S. Kaufman and Edmundo A. Rúveda, "The Quest for Quinine: Those Who Won the Battles and Those Who Won the War," *Angewandte Chemie International Edition* 44 (2005), 854-885.

[175] According to Hipolito Ruiz, Antoine de Jussieu, Joseph de Jussieu's nephew, reported using his uncle's cinchona extract to cure a patient forty years after Jussieu produced the extract, see: Ruiz, *Quinologia*, 47.

extract had become commonplace in Europe. However, as Ruiz noted in his *Quinología* (1792), extract produced in Europe had mixed results such that many European physicians and pharmacists considered extract made in Spanish "pharmacies" with dried cinchona bark "very inferior" to using powdered bark. In response, Ruiz suggested that extract made in America had "more virtue" than that made in Europe because the bark was fresher.[176] Consequently, both the Crown and Casimiro Gómez Ortega, Director of the Royal Botanical Garden in Madrid, gave Ruiz and Pavón explicit instructions to investigate the production of extract during their expedition to South America.[177]

Production of the extract, as described by Ruiz, involved several common chemical techniques of the eighteenth century.[178] First, the "finely broken" pieces of bark "recently stripped from the trees" was mixed with "common water" at a ratio of one part bark to four parts water. The infusion was allowed to sit for forty hours at which point the mixture was cooked on a "light fire" until "half of the liquor" had been "consumed." The remaining liquid was transferred to an earthen pot (*vasija de barro*). Meanwhile, a little less than half the original amount of "common water" was added to the "residue of the barks" in the vessel in which the original infusion was cooked. This secondary infusion was brought to a boil over a "moderate fire" until, again, "half of the liquor" was "reduced." The secondary infusion was then drained to remove the pieces of bark. The product of the second infusion was joined to that of the first infusion in the earthen pot and left to "sediment" for twenty-four hours. Next, the "dregs" and any other particulate matter were strained out to leaving a "clear liquor."

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[176] Ruiz, *Quinologia*, 46-48.
[177] Ibid., 48.
[178] Paula De Vos, "From Herbs to Alchemy: The Introduction of Chemical Medicine to Mexican Pharmacies in the Seventeenth and Eighteenth Centuries," *Journal of Spanish Cultural Studies* 8 (2007), 135-168; Paula De Vos, "The Art of Pharmacy in Seventeenth- and Eighteenth-Century México," PhD (University of California, Berkeley, 2001).

This liquor was then cooked until it "acquired the consistency of honey" at which point it was moved to "another, smaller pot" and cooked over a "very light fire" until the product became a caramel-like substance. During this process, a wooden spatula was used to stir the extract continuously. Finally, the extract was moved to some kind of storage container – "glass or *talavera* jars," "tin-plated jars," or "boxes made from *Cascarilla* wood" – and sealed very carefully to keep out "ambient humidity."[179]

Ruiz described extracts, in general, as: "*cocimientos*, essences, or tinctures well purified, impregnated with the most precious and virtuous [*virtuales*] substances of bodies from which they are extracted, and reduced to a solid consistency by way of evaporation."[180] "Well made extracts," he continued, "retain and conserve, for many years without alteration, the qualities and virtues of the simples from which they are taken."[181] Longevity of medical efficacy was just one of several advantages noted by Ruiz. He also explained that a *quina* extract held out the promise of "more constant and certain dosage" since the extract could be given in pill form or easily dissolved in liquor.[182]

Whether or not the extract offered medical advantages, it offered economic ones. According to Ruiz, his *quina* extract promised "greater exploitation of all [cinchona] barks" (*el mayor aprovechamiento de todas las Cortezas*)" and offered a final product that was better suited to transportation than pieces of cinchona bark.[183] "Fabrication of the extract," explained Ruiz, "helps to overcome the loss of more than two thirds of *Cascarilla* Bark because it is not admitted to commerce" due to its poor

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[179] Ruiz, *Quinologia*, 42-43.
[180] Ruiz, *Compendio Historico-Medico Comercial de las Quinas*, 106.
[181] Ibid. Ruiz does not give evidence to support this claim.
[182] Ibid.
[183] Ruiz, *Quinologia*, 51.

quality.[184] In particular, lesser quality bark, which was not of "equal disposition for drying" as superior bark, could produce an extract of "equal virtue" to that of superior bark. Water was the great equalizer of *quina* extracts. "Water," Ruiz noted, "indifferently takes the extract part from all [types of bark]."[185] Ruiz's extract had the potential to make previously useless bark useful. But was the Crown receptive to this approach?

In their original instructions to Olmedo and Ruiz de Quevedo, neither the Marques de Valdecarzana nor the Crown made mention of the extract. Casimiro Gómez Ortega first suggested the idea in a letter to the Marques de Baxamar in 1791.[186] Gómez Ortega used a recent chemical analysis of cinchona bark conducted in Paris and reported in "Annals of Chemistry" in February as the occasion to suggest that Olmedo should conduct chemical experiments with cinchona bark in Loja.[187] According to Gómez Ortega, French chemists had emphasized "the importance of repeating the analysis with larger quantities [of bark which would be] sufficient to obtain more perceptible and certain results and with fresh or recently harvested *Cascarilla*."[188] He noted that Olmedo was well situated to obtain "all the fresh *Quina* needed."[189] Such experiments promised more than a contribution to the budding science of the chemical analysis of plants and their parts. Gómez Ortega also noted another "advantage" of such work: "the elaboration of the Extract of *Quina* as an integral part of the analysis."[190] Gómez Ortega was well aware of the advantages of the extract. He had recently read a manuscript of Ruiz's *Quinología.* Not

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[184] Ibid.
[185] "...el agua saca de todas indiferentemente la parte extractiva," see: Ruiz, *Quinologia*, 52.
[186] Casimiro Gómez Ortega to the Marques de Baxamar, Madrid, 26 May 1791, AGI, Indiferente 1555, fols. 623r-625v.
[187] Ibid., fol. 625r.
[188] Ibid.
[189] Ibid.
[190] Ibid., fol. 625r-v.

surprisingly, he reported that the *quina* extract offered "great utility to the ill" and allowed from the "exploitation of all thick barks which are wasted."[191] Ruiz's *Quinología* was published in 1792 and shortly thereafter the Crown asked Olmedo to start working with the extract of *quina* and its usefulness for improving and increasing the exploitation of cinchona bark.[192]

Implementing this program in Loja was difficult. The main problem was that Olmedo lacked the technology. In a 1794 report to Ruiz de Quevedo, Olmedo noted that he was not able to pursue research on the extract for lack of "some well known instruments that have not [yet] been sent from the Court."[193] In 1796, Olmedo and Ruiz de Quevedo were still waiting for the necessary instruments. They explained to Diego Gardoqui, the Minister of the Indies, that, in order to make the extract, they needed "at least two or three pans [*peroles*] of different sizes and two or three stills [*alambiques*] of different sizes" which were made of "glass" or "tin-plated copper."[194] Such instruments represented the state of the art in chemistry and chemical medicine at the time. They may have been difficult to find or fabricate in the *Audiencia* of Quito.[195] Without them, Olmedo would not have been able to produce *quina* extract of sufficient quality for the Crown or for commerce, especially since many chemists

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[191] Ibid., fol. 625v.

[192] In a 1794 letter to Ruiz de Quevedo, Olmedo reported that, while he was waiting in Cádiz to depart for Loja, he received a letter from the Chamberlain of the Royal Household in which the Chamberlain noted that "the extract of *Quina* is one the points [most] interesting to His Majesty," see: Vicente Olmedo to Tomás Ruiz de Quevedo, Loja, 7 September 1794, ANH/Q, Fondo Especial, box 137, vol. 316, no. 7644-246, fol. 293v. Olmedo and Ruiz do not mention the extract in the summary of their activities in their 1794 report to the Chamberlain of the Royal Household. They first mention the extract in their 1796 report.

[193] Olmedo to Ruiz de Quevedo, 7 September 1794, fol. 293v.

[194] Tomás Ruiz de Quevedo and Vicento Olmedo to Diego Gardoqui, Loja, 25 November 1796, ANH/Q, Fondo Especial, box 147, vol. 336, no. 8127-160, fol. 199v. I would like to thank Dr. Paula De Vos for help in translating the technical chemical terms in these passages. She also informed me that this type of equipment was state of the art for chemical distillation in eighteenth-century Europe.

[195] Hipólito Ruiz noted in his *Quinologia* that there were many "Makers of the Extract" in the Viceroyalty of Peru. Presumably, these extract makers made due without glass or tin-plated copper distillation equipment, see: Ruiz, *Quinologia*, 43.

and pharmacists believed that earthenware vessels – the more traditional choice for making distillations and extracts – compromised the purity of the extracts they contained.[196] For lack of technology, the extraction project failed alongside the plantation project, which failed for other reasons such as the general poverty of the region, the scarcity of capital, and the unwillingness of local elites to take a chance on cultivating cinchona tree.

Conclusion

This chapter has shown the prospects and problems of reform in the *quina* project around the year 1790. Whereas the *estanco de quina* in previous decades had been heavily imbued with the spirit that government intervention was needed, in 1790, a new commitment to a policy of free trade led many to recommend a more marginal role for the state. Valdecarzana and other officials remained committed to a policy of *laissez-faire* even in the face of mounting evidence that the status quo was threatening the Crown's supply of cinchona bark. Instead of state monopoly, Valdecarzana embraced a program in which economic incentive would motivate private individuals to cultivate cinchona trees and restore Loja's cinchona forests. Science, in particular botany (and also chemistry), played a key role. On the one hand, Hipólito Ruiz, one of the foremost experts on the cinchona tree in Spain and Europe, came out in favor of a private plantation system in his published work on *quina* in 1792. On the other hand, the Crown appointed a botanist-chemist to study the cinchona trees further and to instruct local elites and laborers in how to extract the bark more effectively and intensely. From the perspective of the Bourbon Reforms, a monopoly was undesirable. Instead, Valdecarzana recommended expanding state

[196] De Vos, "The Art of Pharmacy," 192-258.

intervention in the production of the bark while maintaining its limit role in the bark's distribution.

In the end, two main elements of the ideology of Bourbon Reforms – commerce and control – were operative in defining the role of the monopoly's botanist-chemist. They are both represented in the reports produced by the Marques de Valdecarzana and the subsequent imperial policies based on them. Beginning in 1765, the Spanish government began to liberalize trade within the empire by opening up addition peninsular and American ports for trade. Reformers in Spain committed the state to this program by making taxes on commerce a primary means for extracting revenue from the American colonies. Another important element of the ideology of the Bourbon Reforms was control. In addition to introducing new taxes, Spanish officials employed administrative reforms to increase state revenue in order to make the implementation and collection of taxes more effective. To this end, reformers, notably Minister of the Indies José de Gálvez (r. 1776-1787), introduced a more hierarchical and centralized structure to the structures of imperial government. Colin MacLachlan has characterized this move as an attempt to de-politicize the colonial government by restricting the opportunities for American interests groups to influence imperial policy and its implementation.[197]

How did commerce and control condition the role of botany in the Spanish empire? Commerce, in the case of the Marques de Valdecarzana's recommendations to the Crown, played a negative role by defining the limits within which the monopoly's botanist-chemist had to work. When it came to distribution of the bark, Valdecarzana sought to limit the impact of botanists – not just the

[197] Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988), 126-130.

monopoly's botanist but others as well. Control played a positive role in the sense that botanists became agents of empire and benefited from the general move to impose a more hierarchical and centralized structure to colonial governance. This meant expanding the parameters of the botanist's jurisdiction and directly connecting the botanist to the authority of the Ministry of the Indies. Although seemingly contradictory, the imperatives of commerce and control did function harmoniously. While Valdecarzana desired to preserve free trade as the main means for the *distribution* of the bark, his commitment to reclaiming and increasing royal authority meant that he was wiling to give botanists the authority to intervene in local structures for the *production* of the bark.

Spanish botanists also played a part in defining their role in the imperial enterprise. Around the time that Valdecarzana was formulating his reports for the King, botanists Hipólito Ruiz and José Pavón had just returned from their eleven-year expedition in Peru and Chile, in which they had been specifically instructed to study the cinchona tree. Royal orders to Ruiz and Pavón indicate that they were to examine the cinchona tree and its bark not only as objects of scientific interest but also as objects of critical interest to the state and the imperial economy. Ruiz and Pavón's expedition provided an example of the utility of botany to the empire and defined the kinds of problems and solution botanists could provide to the state. In addition, the information collected and reported by Ruiz and Pavón is crucial to understanding Valdecarzana's conception of the role of the monopoly's botanist-chemist.

No discussion of Bourbon Reforms and the role of science in the Spanish empire can be complete without some consideration of the challenges of implementation. In the previous section, we saw how Vicente Olmedo, the

monopoly's botanist-chemist in Loja, worked within the constraints defined by the objective of commerce as well as the possibilities defined by the objective of control. However, he also worked within the constraints and possibilities defined by the social, environmental and technological conditions in Loja. Thus, the practicalities of implementation as well as the parameters of ideology conditioned the role of science, in this case botany, in the Spanish empire in the late eighteenth century.

Within this matrix of policies and practices, scarcity was cast as a problem of production: that there was not enough bark to harvest. We could imagine contemporary commentators invoking hoarding as an explanation for the scarcity of cinchona bark. So far as we know, they did not. Perceptions of the problem, instead, focused on the conditions of production. As a result, the implementation of botany to solve this problem remained narrowly focused on production as well. Ultimately, in the face of some limiting factors (ideological, social, environmental and technological), the monopoly's botanist-chemist could do little to enact real reform since Valdecarzana's plan aimed primarily at maintaining the status quo.

When Vicente Olmedo became botanist-chemist to the *estanco de quina* in Loja in 1790, it was an important moment in the relations between science and empire in the Spanish Atlantic World as the two became more tightly intertwined.[198] Both the Royal Botanical Garden and the Crown claimed Olmedo as their own. Whereas previous accounts of science in the Spanish Empire have largely treated the scientific and imperial enterprises as distinct and disengaged from each other, this episode in the history of the *estanco de quina* suggests otherwise. Science was not just a *tool* of empire; nor was empire simply a *means* for scientists to gain access to

[198] Olmedo's career has received little, if any, attention in the historical scholarship because it is only accessible through archival materials. Olmedo never published a scientific treatise and even the manuscript traces of his existence are few and far between.

natural phenomena. The interaction was more profound than such terminology suggests.

But, despite this intertwining, practical results were ambivalent at best. Plantations were slow to catch on (if they ever did). Locals lacked the capital to invest in a cinchona plantation – an unprecedented enterprise – and, in some cases, actively resisted attempts to establish plantations. As for the *quina* extract, Olmedo was unable to conduct his tests and establish production for lack of the proper distillation equipment. There is no evidence that Olmedo and Ruiz de Quevedo ever got the instruments they needed. Finally, the economic conditions of the *Audiencia* of Quito were such that Olmedo experienced a virtual continuous "brain drain" of sorts among his bark collectors as these itinerant and seasonal laborers were increasingly attracted to the opportunities and higher wages offered at the port of Guayaquil which experienced a boom in the late eighteenth century due, in part, to the Crown's free trade legislation.

Olmedo and Ruiz de Quevedo managed to continue the annual shipments of *quina* to the Royal Pharmacy, and their bark was well received and considered to be good quality, but one botanist-chemist was not enough to implement a full-scale reform of the mode of production. Indigenous laborers remained trapped in a system of debt peonage and local merchants were reluctant to switch from extraction to plantation. In a way, the Crown got exactly what it wanted. After all, Valdecarzana had made it clear that the botanist-chemist and the new *corregidor* were not to introduce any novelty into the *quina* trade. In this context, botany in the Spanish Empire ended up enforcing the status quo as bureaucrats negotiated and implemented the seemingly contradictory ideological objectives of commerce and

control. Science did little to change imperial interactions in the late eighteenth-century Spanish Atlantic World.

Chapter 6

The Co-production of Nature and Empire:

Botanical Debate and the "Two Paths" for Exploiting *Quina* (1792-1808)

"However deplorable may be the acrimony with which each of the naturalists of these two expeditions have endeavored to maintain the pre-eminence of their discoveries, we are compelled to follow them in their quarrels in order to bring back the question to the proper point of view."

– MM. Delondre and Bouchardat (1855)[1]

Vicente Olmedo was not the only agent of imperial science in the Spanish Atlantic working on the problems related to *quina* in the late eighteenth and early nineteenth centuries. The Crown also had several botanists on the case – namely those associated with the Royal Botanical Expeditions to South America led by José Celestino Mutis, Hipólito Ruiz, and José Pavón. In the early 1790s, Mutis and Ruiz, in separate publications, tackled the thorny but crucial issue of the identification and classification of *quina*. These publications represented the concrete results of the Crown's investment (moral as well as financial) in the expeditions. Knowing what was the best bark was essential to crafting appropriate government policy for the management of this commodity. In the end, these publications resulted in contention rather than clarification: no consensus emerged. It was a striking contrast to the botanists' promises of the utility of their science to the state.

[1] MM. Delondre and Bouchardat, "The Cinchona Barks and the More Important Questions which Relate to Them," *Pharmaceutical Journal and Transactions* XIV, nos. II, IV, XI and XII (1855): 77-83, 165-168, 513-517, 556-570.

For lack of consensus, botany in this instance failed the empire. What explains the inability to establish consensus? Such difficulties must have been a stark contrast to the initial optimism of botanists. After all, as the previous chapters have shown, botanists had more or less successfully inserted themselves into the imperial knowledge complex as the primary advisors to the Crown on matters relating to *quina* and other American natural entities. Moreover, they achieved this position of preeminence largely through the exclusion or effacement of the contributions of local experts (local bureaucrats and indigenous bark collectors).[2] Who now posed a significant challenge to the authority and expertise of European learned experts especially botanists? Only other botanists. As this chapter shows, it was not simply internal divisions that promoted debate and dissension in the botanical ranks. Rather, I argue that the impotence of science was in fact the result – an unintended consequence– of the depth of the integration of botany into the Spanish imperial enterprise. The more important the issue was the less likely was there to be consensus.

Contrary to previous historical accounts of this episode, the debate over the classification of *quina* that erupted between botanists in the early nineteenth century was not simply an intellectual affair among learned experts. Rather, it was symptomatic of a larger rift between two visions of imperial order – one regalist and

[2] Many works on colonial and imperial science discuss the effacement or erasure of the contributions of indigenous informants to the works of European naturalists and scientific travelers, see: Neil Safier, *Measuring the New World: Enlightenment Science and South America* (Chicago: University of Chicago Press, 2008); Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900* (New York: Palgrave Macmillan, 2007); Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005); Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004); Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860* (Cambridge: Cambridge University Press, 1995).

another mercantile – as well as the social and political networks in which these visions were embedded. Science was so intertwined with the Spanish imperial state that it too was subject to the tensions and contradictions of imperial governance. As a result, the idiom of "co-production" – the notion that two entities, in this instance science and governance, constitute each other simultaneously rather than one preceding the other – describes this case well.[3] The co-production of science and state has a deeper history than previously thought. In the early modern period, the intertwining of questions of knowledge and the social order was not simply about the moral economy of gentlemanly society and the social order of a narrow group of European elites. Rather the Spanish case shows how the *entire organization of an empire was a stake*. To give Shapin and Schaffer's (in)famous conclusion an Iberian twist: solutions to the problem of knowledge in the late eighteenth Spanish Atlantic were solutions to the problem of imperial order.[4] Indeed, science and empire were more closely and profoundly intertwined in the Spanish context than elsewhere in the Atlantic World – a point that few prior histories have emphasized. Finally, this case demonstrates that science in imperial contexts was just as likely to be embodied in a state bureaucracy as in a gentlemanly society. Let us now turn to the so-called "war of the *quinas*."

[3] Sheila Jasanoff, "The idiom of co-production," in *States of Knowledge: The co-production of science and social order*, edited by Sheila Jasanoff (New York: Routledge, 2004), 1-12.
[4] The original phrase is: "solutions to the problem of the knowledge are solutions to the problem of social order," see: Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985), 332.

Complementary Traditions: Mutis and Ruiz on the Classification of *Quina*

José Celestino Mutis and Hipólito Ruiz each published a work on *quina* in Spain in 1792 (Table 6.1).[5] These two texts contained strikingly different schemes for identifying and classifying the bark. Even though such differences had potentially profound practical implications, no one seemed troubled by them – at first. As we have seen, the necessity of finding a reliable and effective means for distinguishing true from false, good from bad bark was imperative in light of the prevalence of fraud and misinformation in the *quina* trade. This was especially true for the *estanco de quina* in which imposing a universal standard of quality of *quina* was as much a matter of knowledge as it was a matter of asserting imperial authority over local autonomy. In spite of the potential differences, Mutis and Ruiz did not engage in open debate until 1800, almost a decade after they first published their texts.

Were the accounts of Mutis and Ruiz necessarily contradictory? I suggest not. Differences between the two systems of classification reflected differences *between* two different scientific disciplines rather than a rupture within one discipline. To put it in the starkest terms: Mutis wrote his *Instrucción formada* (1792) and *El Arcano de la Quina* (1793-4) for physicians and pharmacists while Ruiz wrote his text *Quinología* (1792) for botanists. Moreover, while Mutis employed the approach and

[5] Hipólito Ruiz, *Quinologia, o Tratado del Arbol de la Quina* (Madrid: En la Oficina de la Viuda é Hijo de Marin, 1792); [José Celestino Mutis], *Instruccion formada por un facultativo existente por muchos años en el Perú, relativa de las especies y virtudes de la Quina* (Cadiz: Don Manuel Ximenez Carrero, 1792). It is not clear whether Mutis' pamphlet was published with his permission (or knowledge). The title notes that the anonymous author has "resided for many years in Peru." Mutis lived and worked in the Viceroyalty of New Granada and never visited Peru. It is likely that the publisher assumed that Mutis lived in Peru because most Europeans knew *quina* as the "Peruvian bark" since the late seventeenth century, see: A. W. Haggis, "Fundamental Errors in the Early History of Cinchona," *Bulletin of the History of Medicine* 10 (1941), 417-459, 568-592; Saul Jarcho, *Quinine's Predecessor: Francesco Torti and the Early History of Cinchona* (Baltimore: Johns Hopkins University Press, 1993), 192-210.

methods of medical practitioners, Ruiz employed the approach and methods of botanists.

Table 6.1: Chronology of A Debate: Texts and Events (1792-1808)

Year	Event
1788	Hipólito Ruiz and José Pavón return to Madrid from their expedition to Peru and Chile.
1792	Hipólito Ruiz publishes *Quinologia* in Madrid.
1792	José Celestino Mutis' *Instrucción formada por un facultativo existente por muchos años en el Peru, relativa de las especies y virtudes de la quina*, is published anonymously in Cádiz.
1793-1794	Mutis publishes his *El Arcano de la Quina* in installments in the *Papel Periódico de Santa Fe de Bogotá*.
1795	A summary of *El Arcano de la Quina* is anonymously published in the *Mercurio Peruano* in Lima, Peru.
1798	Extracts of *El Arcano de la Quina* appear in *Seminario de agricultura y artes dirigido a los párrocos* in Madrid.
1800	Francisco Antonio Zea publishes his summary and defense of Mutis' *El Arcano de la Quina* in the *Anales de Historia Natural* in Madrid.
1801	Ruiz and Pavón publish *Suplemento a la Quinología*, their vitriolic response to Zea, in Madrid.
1808	Mutis dies. Ruiz reads his manuscript, *Compendio Histórico-Médico-Commercial de las Quinas* to the Royal Academy of Medicine in Madrid.

There was much overlap and interaction between botany and medicine in the early modern period. However, these two disciplines had developed distinct traditions of research and writing on *quina* in the eighteenth century. While medical practitioners tended to focus on problems relating to the theory and therapeutic application of cinchona bark as a medicament, botanists were interested primarily in the cinchona tree and its proper place in European plant taxonomies. Thus, there was an established and implicit division of intellectual labor in the scientific study of the cinchona tree and its bark. Since Mutis and Ruiz each worked within a separate tradition, their results were complementary rather than contradictory. At least, that

was the case until 1800 when Francisco Antonio Zea in an article in the *Anales de Historia Natural* asserted the superiority and veracity of Mutis' classificatory scheme over that of Hipólito Ruiz.[6] With this, Zea threatened to undermine the balance and division of labor between the medical and botanical study of *quina*.

Relations between Mutis and Ruiz were civil if not amicable prior to Zea's pamphlet for good reasons. For one, they were engaged in a common enterprise: to identify "official" species of *quina* and the cinchona tree and to provide a method for distinguishing closely related species. Recently, Mauricio Nieto Olarte has explained that the identification of this "official" species of cinchona became an important project for naturalists, physicians, pharmacists, and merchants in the late eighteenth century.[7] For these groups, the idea that there was an "official" species came from Linnaeus who coined the name *Cinchona officinalis* for his description of a species of cinchona tree that first appeared in his *Species Plantarum* (1753). Linnaeus' description and classification of cinchona was based on the article and illustrations published by Charles Marie de la Conadmine in the 1738. The inspiration for the genus name – *cinchona* – undoubtedly came from the myth of the Countess of Chichón, the wife of a seventeenth-century Viceroy of Peru who was supposedly the first European to be treated with the bark and the first to introduce the bark to Europe.[8] Nieto Olarte further suggests that Linnaeus chose the term *officinalis*, which means "of the office" in Latin, in order to reflect usage of this kind of cinchona in the

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[6] Francisco Antonio Zea, "Memoria sobre la quina según los principios del Sr. Mutis, por D. Francisco Antonio Zea, Botánico de la expedicion de Santa Fe, y discípulo del mismo Sr. Mutis, Director de ella," *Anales de Historia Natural* vol. 2, no. 5 (September 1800): 196-235.
[7] Mauricio Nieto Olarte, *Remedios para el imperio: Historia natural y la apropiación del nuevo mundo* (Bogotá: La Imprenta Nacional de Colombia, 2000), 193-215.
[8] The mythic status and lack of factual basis for the story of the Countess of Chinchón has been shown by a number of authors including: Jaime Jaramillo Arango, *Estudio Critico acera de los hechos basicos de la historia de la Quina* (Quito: Imp. de la Universidad, 1950); Haggis, "Fundamental Errors."

offices of physicians.[9] "The problem with the word *officinalis*," Nieo Olarte continues, "is that it was simultaneously a classification and an evaluation."[10] Consequently, the term *officinalis* had implications for both science and commerce.

Confusion and contention about "official" cinchona species abounded, especially since there was no consensus on what was the referent for this term. For botanists, identification of the "official" tree species was the key to classification of all cinchona species and provided a means for them to link their work to the authority of the great Linnaeus. Meanwhile, for bark collectors and merchants, they could fetch a higher price for their product if it was designated "official." Thus, both profit and prestige fueled the debate over and search for "official" cinchona or *Cinchona officinalis*.[11] Later, Hipólito Ruiz and José Pavón argued that La Condamine's account of the cinchona tree, on which Linnaeus based his description and classification, was actually a conflation of two distinct species. This botanical error in conjunction with commercial interests further destabilized the ability of botanists, bark collectors, and merchants to reach consensus on what was "official" cinchona.[12]

Both Mutis and Ruiz agreed that identification of the "official" species of cinchona was crucial. What they disagreed on was the *how*. One fundamental

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[9] Nieto Olarte, 201.
[10] Ibid.
[11] This connection between botanical name and commercial value, as suggested by Mauricio Nieto Olarte, seems plausible but documentation that merchants or bark collectors used this category – as opposed to more common categories based on the color of the bark is yet to be found. In documents from the *Archivo General de Indias* in Seville and the *Archivo Histórico Nacional de Ecuador* in Quito, I have not yet found a reference to "official" cinchona while the designation of a certain type of cinchona bark as "legitimate" is quite common. As I have suggested elsewhere, the inefficacy of botanical classification in solving the problems of fraud or ignorance in the cinchona trade may have been due to the fact that the names and classifications used by European botanists were not in use in the quina trade, see: Matthew James Crawford, "'Para Desterrar las Dudas y Adulteraciones': Scientific Expertise and the Attempts to Make a Better Bark for the Royal Monopol of Quina (1751-1790)," *Journal of Spanish Cultural Studies* 8 (2007): 193-212.
[12] Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964).

difference was their object of analysis. Mutis provided an examination and classification of different kinds of cinchona bark as evidenced by the title of his work, *The Secret of Quina*. In contrast, Ruiz offered a classification of the tree as reflected in the title of his work, *Quinology or Treatise on the Tree of Quina or Cascarilla*.[13] As discussed in Chapter 1, the cinchona tree and its bark went by many different names in the seventeenth and eighteenth centuries.[14] One consistent distinction, however, was in the use of *quina* to refer to cinchona bark or its powdered medicinal form. To refer to the tree, naturalists and others resorted to phrases like "Tree of Quina" or "the Fever Tree." Here, I will use "cinchona tree" for the sake of readability even though it was not a contemporary term.

Mutis and Ruiz also had different conceptions of what it meant to designate a species of *quina* or cinchona as "official." For Mutis, such a designation was a matter of medical utility whereas Ruiz considered this designation to be purely a matter of nomenclature. Different conceptions led to different conclusions. Both agreed that there were seven identifiable species (whether bark or tree) in need of classification. According to the criteria of medical utility, Mutis concluded that four of the seven species of *quina* were "official." Indeed, this was the big "secret" alluded to in the title (*The Secret of Quina*). Mutis revealed that red, orange, yellow and white *quina* constituted "four legitimately official species [of bark] in which reside eminent [medicinal] virtues" while the other three species were of "lesser efficacy."[15] While all

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[13] The titles of both works are actually quite a bit longer than the titles given here. However, these short titles have enough information to indicate the crucial difference in object of both treatises.

[14] Jarcho, *Quinine's Predecessor*; Haggis, "Fundamental Errors."

[15] Note that Mutis followed the naming practices of merchants and bark collectors and identified his four "official" species by the interior color of the bark: orange, red, yellow, and white. He further revealed that each of these four "official" *quinas* worked best against a specific kind of fever or disease, see: José Celestino Mutis, *El Arcano de la Quina. Discurso que contiene la parte médica de las cuatro especies de Quinas oficinales, sus virtudes*

species had utility as a febrifuge, orange *quina* was the most effective febrifuge and red *quina* was most effective for treating gangrene. Meanwhile, according to the tenants of botanical classification and nomenclature employed by Ruiz, there could be only one "official" species of cinchona tree – each unique species had to have a unique name.[16] Indeed, the one name per species system derived from Linnaeus' central objective to reduce the cacophony of redundant plant names proliferating in eighteenth-century European botany.[17] Ruiz had further incentive for employing this approach since Linnaean taxonomy was the official system of classification of the Spanish Empire.[18]

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eminentes y su legítima preparacion, edited by Manuel Hernandez de Gregorio (Madrid: Ibarra, 1828). Unless otherwise noted, citations from Mutis' *El Arcano de la Quina* are from this 1828 posthumous edition. I have compared this version with the edition that appeared in the *Papel Periódico de Santa Fe de Bogotá* and found no significant difference between the texts other than the 1828 editor's notes and appendix. For comparison, see: Mutis, José Celestino. "Extracto de una memoria del Dr. D. Joseph Celestino Mutis, célebre médico y botánico de Santa Fe de Bogotá," *Seminario de agricultura y artes dirigido a los párrocos* no. 85 (16 August 1798): 101-110 and no. 86 (23 August 1798): 119-123.

While orange quina was a "direct" febrifuge, meaning that it treated the root cause of fevers, Mutis designed red, yellow, and white quina as "indirect" febrifuges, meaning that they treat the occasional or accidental causes of fevers. This distinction is explained in one of the footnotes in Francisco Antonio Zea's summary of Mutis' work, see: Zea, "Memoria sobre la quina," 212, n. 1. Unfortunately, Zea does not explain what is meant by the "occasional" causes of fever except to note that there are many and that red, yellow, or white quina might not combat them all. It is likely that Zea's fever theory, as was true for many eighteenth-century naturalists and physicians, was based on Galenic and Hippocratic theories which identified a multiplicity of causes and types of fevers, see: Jarcho, *Quinine's Predecessor*, Appendix A, 217-261.

[16] Mutis critiqued this approach directly, "nothing could be known fundamentally in Europe regarding the legitimacy of primitive *Quina* [i.e. orange *quina*], while ignoring its true generic character within the complete description of that species and all the other [species], which remain confused under the name *Official Cinchona* among botanists and the name *Quina* or *Cascarilla* among physicians, pharmacists and merchants." Here, he emphasized his central insight that there were many "official" species of *quina* by pointing out that the botanists' practice of designating only one species as "official cinchona" perpetuated the erroneous assumption that there was only one kind of *quina*, see: Mutis, *El Arcano*, 5-6.

[17] Tore Frängsmyr, ed., *Linnaeus: The Man and His Work* (Canton: Science History Publications, 1994); Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004), Chapter 5 "Linguistic Imperialism."

[18] This is not to say that Mutis was not a Linnaean. Technically, Mutis, as director of the Royal Botanical Expedition in New Granada, was bound by this official policy as well. Indeed, he was not only a follower of the Linnaean system but also corresponded with its namesake

In spite of such differences, the methods of Mutis and Ruiz did converge and complement each other. Mutis employed the techniques of both botany and medicine. Drawing on his skills "as a Botanist," he was able "to distinguish the legitimate species and varieties from other closely-related kinds [*géneros*] that [are] also new."[19] Meanwhile, drawing on his skills "as a physician," Mutis was able "to separate the official species from other less virtuous [species], though legitimately of the same kind [*género*]."[20] While botany provided the means to a coarse grain distinction of cinchona trees from other kinds of trees, medicine provided the means to a fine grain distinction between *quina* species that were more or less useful in the treatment of disease.

Both men also incorporated analysis of the bark into their method of classification. This was largely a pragmatic move. In order to make their texts useful (as well as informative), both Mutis and Ruiz needed to provide techniques for determining the identity of a particular piece of bark. After all, this was the challenge that the majority of their readers (physicians, pharmacists, and naturalists) faced, especially those in Europe without access to the tree itself. Yet, while both authors employed analysis of the bark as a means of classification, they disagreed significantly on how to conduct this analysis (Table 6.2). While Mutis' method of analysis involved much more manipulation of the bark than Ruiz's method, the only direct manipulation of bark sample in Ruiz's method was in determining the "breaking quality." Ruiz used a broader spectrum of the senses in his analysis including sight,

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many times, even regarding the cinchona tree. Steele, *Flowers for the King*, 57-60; Antonio Lafuente and Nuria Valverde, "Linnaean Botany and Spanish Imperial Biopolitics," in: *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, edited by Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), 134-147; Antonio Lafuente, "Enlightenment in an Imperial Context: Local Science in the Late-Eighteenth-Century Hispanic World," *Osiris* 15 (2000): 155-173.

[19] Mutis, *El Arcano*, 16.

[20] Ibid.

touch, smell and taste whereas Mutis relied primarily on seeing and tasting.[21] Different disciplinary traditions explain such distinctions. The methods of medical practitioners, especially pharmacists, generally involved more manipulation of natural objects, in order to produce something new (such as a concoction), than did the methods of botanists, who relied primarily observing objects in the field and dried specimens in the cabinet.[22]

Such differences did not necessarily imply that contention characterized Mutis and Ruiz's interactions in the early nineteenth century. Nonetheless, existing historical scholarship tends to emphasize the conflict between them such that one historian refers to Mutis' rift with Ruiz as "the war of the *quinas*."[23] The situation looks less contentious if we consider that the two authors were working in two different but complementary traditions of reading and writing on *quina* – medicine and botany. Indeed, in 1792, Ruiz was far from animosity. Witness his exclamation on the prospect of further work on *quina* by Mutis: "What enlightenment would the publication of the Quinology of such a wise Physician and Botanist be able to promise

[21] In general, historians of science characterize a gradual shift to vision as the predominate sense in the observation and analysis of the natural world. More recently, David Howes and others have initiated inquiries into cultural history and social construction of the use of the senses, see: David Howes, *Sensual Relations: Engaging the Senses in Culture and Social Theory* (Ann Arbor: University of Michigan Press, 2003); David Howes, ed., *Empire of the Senses: The Sensual Culture Reader* (Oxford: Berg, 2005). I would like to thank Dr. Matthew Eddy at Durham University for calling my attention to this literature.

[22] These methods of observation and assessment of the medical sciences and of natural history suggest that the two disciplines had different conceptions of objectivity and values in observing nature. As shown in the recent work of Peter Galison and Lorraine Daston on scientific atlases, the history of objectivity is a rich and relatively unexplored dimension of the history of science, see: Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (1992), 81-128 and Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007).

[23] Gonzalo Hernández de Alba, *Quinas Amargas: El sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Tercer Mundo Editores, 1991), 243.

us!"[24] While Ruiz considered Mutis a botanist (and Mutis would have agreed with this characterization), Mutis was a physician first and botanist second.

Table 6.2: Key Characteristics for Analysis of *Quina* from Ruiz and Mutis[25]

	Ruiz *Quinologia* (1792)	**Mutis *El Arcano de la Quina* (1793-1794)**
1	Surface Texture	Internal Color (Dry)
2	External Color	Internal Color (Wet)
3	Internal Color	Color (Pulverized)
4	Curl of the Bark	Color, Flavor and Sediments of Cold Infusion (12 oz. rainwater + 1 oz. Powdered quina)
5	Thickness of the Stalk	Color, Flavor and Sediments of Cold Infusion + 2 oz. boiling water
6	Fleshiness of the bark	Color, Flavor, and Sediments of Cold Infusion + 12 oz. "spirit of wine"
7	Weight	Characteristics of chewed bark
8	Consistency	Color and consistency of saliva after chewing bark
9	Breaking quality	Effects on tongue and lips while chewing
10	Gummy resinous sap	Characteristics of fibers at breakage point as examined with a lens
11	Odor	Color [of breakage examined with lens?]
12	Taste	Interstices between fibers and powder [examined with lens?]

The two disciplinary traditions – the medical and botanical – framed the problems of *quina* in different and complementary ways. Since Europeans had first encountered *quina*, physicians and pharmacists had grappled with question of the proper therapeutic administration of the bark and, in the eighteenth century, medical practitioners addressed and debated discussed such questions in a wide and

[24] "Prologue," in: Ruiz, *Quinologia*, nn. 6r.
[25] The characteristics are listed here in order that they appear in their respective texts.

extensive literature on fevers and their treatment.[26] Mutis engaged with this medical literature directly as evidenced by the subtitle of his work, "Discourse that contains the medical part of four species of official *Quinas*, their eminent virtues and legitimate preparation." After describing his four official species, Mutis, in the second part of his *El Arcano de Quina*, described their medical uses and provided descriptions of medicinal preparations using the bark in the third part. In contrast, Hipólito Ruiz's *Quinologia* engaged primarily with the literature on the botanical description and classification of the cinchona tree dating back to Charles Marie de la Condamine's 1738 article in the journal of the Academy of Sciences in Paris.[27]

Though related, medical accounts of *quina* remained separate and distinct from botanical accounts for much of the eighteenth century. In contrast to our own academic culture today, there was not much call for interdisciplinary study of the bark.

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[26] Jarcho, *Quinine's Predecssor*. The topic of fevers their cause and treatment was addressed in a steady stream of published texts in eighteenth-century Spain. These works include: Miguel Marcelino Boix y Moliiner, *Hippócrates defendido de las imposturas y calumnias que algunos médicos poco cautos le imputan* (Madrid: Matheo Blanco, 1711); Antonio Díaz del Castillo, *Hypocrates desagraviado, de las ofensas por Hypocrates defendido: en particvlar en la cvracion de calenturas agudas, de dolor de costado y tercianas* (Alcala: Julian Garcia Briones, 1713); Martin, Martínez, *Medicina sceptica, y Cirugia moderna: con vn tratado de operaciones chirurgicas...*Compuesto por el Doctor Don Martín Martínez, 2 vols. (Madrid, 1722-1725); Francisco Suárez de Ribera, *Medicina invencible, legal o theatro de fiebres intermitentes complicadas* (Madrid, 1726); Francisco Sanz de Dios Guadalupe, *Medicina Práctica* (Madrid, 1730); Félix, Pachecho Ortiiz, *Rayos de luz prácitica con que desvanece las sombras con que el Dr. D. Francisco Sanz intentó obscurecer la hypóthesis de Fiebres del Dr. D. Martin Martínez, y hace resplandecer la particular hipóthesis y debida curaci´øn de las fiebres intermitentes del Dor. D. Luis Enriquez* ([Madrid?], 1731); Antonio José Rodríguez, *Palestra crítico-médica* (Pamplona: Oficina de Joseph Joaquín Martínez y Zaragoza, 1734-1749); Francisco García Hernández, *Tratado de fiebres malignas, con su curacion acomodado á la mas racional prácitca* (Madrid: M. F. Rodriguez, 1747); Pasqual Francisco Virrey y Mange, *Palma febril, medico-prácitca, hypocratica-chymica, methodico-galenica, seguro methodo de curar las fiebres,* 2 vols. (Madrid, 1756); André Piquer y Arrufat, *Tratado de las calenaturas* (Madrid: Ibarra, 1760); Luis José Pereyra, *Tratado completo de calenturas, fundado sobre las leyes de la infamación y putrefacción. Compuesto con méthodo geométrico y caracteres botánicos* (Madrid: B.R.A. de M. de Madrid, 1768); Juan Sastre y Puig, *Reflexiones instructivas apologéticas sobre el eficaz y seguro remedio de curar las calenturas pútridas y malignas, inventado por el ilustre Sr. Dr. D. Josef Masdeval [sic]* (Cervera, 1787-1788); Joseph Masdevall, *Reflexiones instructivo-apologenéticas sobre el eficas y seguro método de curar las calenturas pútridas malignas* (Cervera, 1788).

[27] Charles Marie de la Condamine, "Sur l'arbre de quinquina," *Historie de l'Académie Royale des Sciences* (1738): 226-243.

For much of the eighteenth century, medical works on *quina* paid little attention to the classification of tree species. Mutis' *El Arcano de la Quina* exemplifies this tradition. While giving a detailed account of the medical utility and therapeutic application of his four official *quinas*, it provides no botanical description of the tree. In contrast, the botanical literature focused primarily on description and classification of the tree with little attention to the details of medicinal administration of the bark. Ruiz's *Quinologia* is a good example of this botanical literature: he devotes the entire second half of his work to giving botanical descriptions of different species of cinchona while discussing the medical uses of the bark in only one paragraph.[28] Like the literary traditions in which they operated, the two works thus complemented each other; they dealt with different problems regarding the classification and distinction of the cinchona tree and its bark. This division of intellectual labor by object of analysis was a significant factor in forestalling direct conflict between these two systems of classification.

Differences in the location and format of their publications might also account for the lack of debate. Might it be the case that Mutis and Ruiz simply did not know each other's work? This is unlikely. As later attested by Alexander von Humboldt, Mutis was well connected to various networks of information in the Atlantic World. As the son of a book dealer, Mutis knew the book trade well and remained an avid collector of scientific texts eventually amassing one of he most impressive scientific libraries in the eighteenth-century Atlantic world.[29] He also maintained an extensive correspondence network; if he did not have a copy of Ruiz's *Quinología* in hand shortly after its publication, he would have at least gotten a summary of its contents and main points from one of his correspondents in Spain. While slowness of

[28] For Ruiz's description of the many uses of quina in medicine see: *Quinologia*, 39-40.
[29] Hernández de Alba, *Quinas Amargas*, 18.

communications as determined by the physical geography of the Atlantic World was the main obstacle to Mutis learning about Ruiz's work, Ruiz would have had difficulty learning about Mutis' work due to both geography and the format of his text. Mutis first published his *El Arcano de Quina* in thirty-nine installments in a periodical based in Santa Fe de Bogotá between 1793 and 1794. It is unlikely that Ruiz had access to this periodical. Nonetheless, Mutis work was dispersed through other channels. An anonymous summary was published in Cádiz in 1792 and other versions appeared in periodical publications throughout the Spanish Atlantic in the 1790s. These included the *Mercurio Peruano* in Lima in 1795 and the *Seminario de agricultura y artes dirigido a los párrocos* in Madrid in 1798 (Table 6.1). Moreover, like Mutis, Ruiz had his own correspondence network that stretched across the Atlantic including regular correspondence with Juan Tafalla, the continuing director of the Royal Botanical Expedition in Peru.

Zea's "Botanical Synonyms:" The Emergence and Development of a Debate

With other versions and summaries of Mutis' work circulating, why, then, did Ruiz choose to challenge Mutis' system of classification only after Francisco Antonio Zea, a student and supporter of Mutis, published a short article on *quina* in the *Anales de Historia Natural* in Madrid in 1800?[30] It is because Zea violated and undermined the hitherto implicit intellectual division of labor between medicine and botany with regard to the cinchona tree and its bark. Ruiz with help of his co-author and fellow

[30] Zea, "Memoria sobre la quina." In 1801, Hipólito Ruiz and José Pavón co-authored a second work on the classification of cinchona species entitled *Suplemento a la Quinología*. It was a sequel to Ruiz's *Quinología* that provided updated results of Juan Tafalla's study of cinchona species in South America. While ostensibly printed to announce Tafalla's discovery of a few new species of cinchona, Ruiz and Pavón devoted much of the work to defending Ruiz's system of classification proposed in his *Quinología* while at the same time critiquing that of José Celestino Mutis, see: Hipólito Ruiz and José Pavón, *Suplemento a la Quinologia* (Madrid: En La Imprenta de la Viuda e Hijo de Marin, 1801).

botanist, José Pavón, sought to enforce the line of demarcation in his 1801 *Suplemento a la Quinología* (Table 6.1).

Zea's main transgression was his claim that a "botanical synonymy" (*la sinonimia botánica*) existed between the cinchona species described by Ruiz and Pavón and the four "official" *quinas* described by Mutis.[31] In his article, Zea provided a textual description of the "official" *quinas* with a list of the equivalent cinchona species in the works of prominent botanists including those from Ruiz's *Quinología* (1792) and the first volume of the *Flora Peruviana et Chilensis* that Ruiz and Pavón published in 1798.[32] There was nothing particularly novel or inflammatory in this. Many eighteenth-century botanical texts provided such lists as a way to help readers correlate the equivalent species between texts that often employed divergent species names. Yet, Zea's "botanical synonymy" had two specific elements that represented a direct challenge to Ruiz. First, Zea made a strong claim that Mutis' "official" species were not just medical kinds but botanical kinds as well. Second, he condensed all of Ruiz and Pavón's cinchona species, of which there were now eight in 1800, into only three of Mutis' "official" *quinas* (Table 6.3). From Zea's perspective, Ruiz and Pavón had committed two errors: not only had they failed to recognize that several of their species were actually one and the same but they had also failed to identify an additional species of cinchona (Mutis' *C. ovafolia*). In addition to being a direct attack on Ruiz and Pavón's system of classification, Zea's "botanical synonymy" crossed a significant boundary in the division of intellectual labor by suggesting that medicinal distinctions represented botanical distinctions as well.

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[31] Zea, 51.

[32] Hipólito Ruiz and José Pavón, *Flora Peruviana et Chilensis*, vol. 1 (Madrid, 1798). Ruiz and Pavón had also published an introduction to their *Flora* four years earlier, see: Hipólito Ruiz, and José Pavón, *Flora Peruviana et Chilensis. Prodromus, descripciones y láminos de los nuevos géneros de plantas de la Flora del Perú y Chile* (Madrid, 1794).

Table 6.3: Francisco Antonio Zea's "Botanical Synonymy" (1800)

Mutis' Species	**Orange Quina (*Cinchona lancifolia*)**	**Red Quina (*Cinchona oblongifolia)***	**Yellow Quina (*Cinchona cordifolia*)**	**White Quina (*Cinchona ovalifolia*)**
Ruiz *Quinologia*[33]	*C. officinalis* *C. glabra* *C. fusca?*[34]	*C. lutescens*	*C. purpurea* *C. tenuis* *C. pallescens* *C. micrantha*	-
La Condamine	Quinquina	-	-	-
Linnaeus	*C. officinalis*	-	*C. officinalis?*[35]	-
Wahl	*C. officinalis*	-	*C. pubescens*	*C. macrocarpa*

Zea found inspiration for his botanical synonyms in the work of his teacher. Mutis, however, did not suggest equivalence between his species and that of European botanists. In fact, according to Mutis, there was no equivalence to be made since the botanists had gotten it all wrong. "The botany of our times," wrote Mutis, "threatens to bring other calamities no less damaging [than those wrought by

[33] Zea determined the equivalence of Ruiz and Pavón's cinchona species with those of Mutis through their descriptions in two different publications: Ruiz's *Quinologia* (Madrid, 1792) and the second volume of their *Flora Peruviana et Chilensis* (Madrid, 1798-1802). To make things more complicated, Ruiz and Pavón changed the species name of some of the cinchona species between the publication of Ruiz's *Quinologia* and the second volume of their *Flora Peruviana*. As explained by Arthur R. Steele, Ruiz and Pavón made the following changes (the first name is the name from the *Quinologia* and the second is from the *Flora*): 1) *Cinchona officinalis* to *C. nitida*; 2) *C. tenuis* to *C. hirsuta*; 3) *C. glabra* to *C. lanceolata*; 4) *C. lutescens* to *C. magnifolia*; 5) *C. pallescens* to *C. ovata*, see: Steele, *Flowers for the King*, 195-197. For simplicity sake, I will use the species names as originally given in Ruiz's *Quinologia* in the discussion here. In his article, Zea uses the species names from one or both of the works. In those cases, I will use the original name from the *Quinologia* as well. The only exception is *C. micrantha*, which was apparently a new species introduced in the *Flora Peruviana et Chilensis*. It has no equivalent in Ruiz's *Quinologia*.

[34] The question mark appears in Zea's original article indicating some uncertainty as to whether the species is equivalent to the Mutis' quina species.

[35] Linnaeus' *C. officinalis* appears under two of Mutis' species because Zea, like many of his contemporaries, thought that this species was actually based on a confusion and mixing of two different species of cinchona by Charles Marie de la Condamine, whose work Linnaeus' classification and description was based.

bark collectors and merchants]."[36] These calamities included misidentification of certain plants as species of cinchona and the misclassification of *bona fide* cinchona species. For example, Mutis cast doubt upon the proposed species of cinchona described by several prominent botanists and scientific travelers of his time including Nikolaus von Jacquin (1727-1817), Georg Forster (1754-1794), Olaf Swartz (1760-1818), and Johann König (1728-1785).[37] Rather than reject each proposal individually, Mutis instead undermined the general reliability of all such botanical classification, "all these *Quinas* have been introduced according to systematic principles before the true essential character of the genus has been fixed."[38] He was not rejecting botanical technique per se but identification and classification of cinchona or *quina* solely on botanical characteristics. The problem was that this approach did not take account of the essence of the tree or its bark – an essence that Mutis ultimately identified with medical virtue. Consequently, it was a short but significant leap for Zea, following in the footsteps of Mutis, to make medical kinds and botanical kinds equivalent. Moreover, a table that accompanied the first installment of Mutis' *El Arcano de la Quina* in the *Papél Periódico de Santafé de Bogotá* further

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[36] Mutis, *El Arcano*, 13.

[37] Jacquin claimed to have discovered cinchona in the Caribbean while Forster claimed to have found it in the Pacific and König and Swartz in the East Indies. All of the botanists' descriptions of cinchona species were made in print; this is probably how Mutis learned about them. The one exception is Georg Forster, who, according to Mutis, described his observations of cinchona species on islands in the Pacific in a letter to Linnaeus in 1775. This letter was mentioned in the publication of the Academy of Uppsala, see: Mutis, *El Arcano*, 14-16. Nikolaus von Jacquin, *Selectarum Stirpium Americanarum Historia* (Vindobonae: Ex Officina Krausiana, 1763); Nikolaus von Jacquin, *Observationum botanicarum iconibus ab auctore delineatis illustratam*, 4 vols. (Vindobonae: Ex Officina Krausiana, 1764-1771); Olaf Swartz, *Nova Genera & Species Plantarum seu Prodromus descriptionem vegetabilium, maximem partem incognitorum quae sub itinere in Indiam Occidentalem* (Holmiae: In Bibliopoliis acad. M. Swederi, 1788); Andreae Johannis Retzii, *Observationes botanicae: sex fasciculis comprehensae quibus accedunt Joannis Gerhardi Koenig Descriptiones monandrarum et epidendrorum in India Orientali factae* (Liepzig: Siegfried Lebrecht Crusium, 1779-1791).

[38] Mutis, *El Arcano*, 15.

supported this idea of equivalence in its parallel presentation of the "names and properties of *quinas-oficinales* in botany, in commerce, [and] in medicine" (Table 6.4).

Table 6.4: Table from Mutis' *El Arcano de la Quina* (1793)[39]

Botanical Names	Cinchona lancifolia	Cinchona oblongifolia	Csinchona cordifolia	Cinchona ovalifolia
Translation of Botanical Names	Quina with spear-shaped leaves	Quina with oblong leaves	Quina with heart-shaped leaves	Quina with oval leaves
Commercial Name (I)	Orange quina	Red quina	Yellow quina	White quina
Commercial Names (II)	Primitive quina	Substitute quina	Replacement quina	Wild quina
Medicinal Properties	Aromatic	Austere	Pure	Acerbic
	Balsamic	Astringent	Acibaradic	Syrupy
	Antipyretic	Antiseptic	Cathartic	Rhyctic
	Antidote	Polycresta	Ecphractic	Prophylactic
	Nervous	Muscular	Humoral	Visceral
	Febrifuge	Indirect febrifuge	Indirect febrifuge	Indirect febrifuge

Lest the significance of his "botanical synonymy" be missed, Zea challenged Ruiz and Pavón to recognize their mistakes and make the required changes to their system. "It is indispensable," he wrote, "for me to indicate their errors because they are based on observations made on the native soil of *quina* by Botanists distinguished with a public character that authorizes them."[40] Zea elaborated on the "public character" of Ruiz and Pavón in a footnote. "[Ruiz and Pavón]," he observed, "had a special charge from the Government [to study] everything concerning *quina* and, in fulfillment of this commission, they published in Madrid in the year [17]92 a

[39] José Celestino Mutis, "El Arcano de la Quina," *Papél Periódico de Santafé de Bogotá* no. 11 (11 October 1793): 465. Also in: Joseph H. Kirkbride, Jr., "The Cinchona Species of Jose Celestino Mutis" *Taxon* 31, no. 4 (1982): 695.
[40] Zea, "Memoria," 230.

work entitled: *Quinologia, o tratado del árbol de la Quina*."[41] Here, Zea suggested that readers ought not assume the veracity of Ruiz and Pavón's classifications simply because they had been commissioned by the government and made observations while on the "native soil of quina."[42] Zea used similar credentials (direct experience and association with Mutis, director of the Royal Botanical Expedition of New Granada commissioned by the Crown) to establish his own authority to critique Ruiz and Pavón's claims. So, why should we trust his assessment of Ruiz and Pavón and his assertion that all of their species could be subsumed under just three of of Mutis' "official" *quinas*?

Zea demonstrated the equivalence of his botanical skill to that of Ruiz and Pavón in his justification of his botanical synonyms. He attacked Ruiz in particular for his misunderstanding of Linnaean classification of cinchona. Whereas Ruiz in his *Quinología* had treated Linnaeus' *Cinchona officinalis* as distinct from La Condamine's *quinquina*,[43] Zea considered the two to be equivalent such that Ruiz's treatment of them was akin to dividing "synonyms which are inseparable."[44] To make matters worse, Ruiz and Pavón in their *Flora Peruviana et Chilensis* dropped all reference to the species described by Linnaeus and La Condamine in favor of their own species names *C. officinalis* and *C. glabra*.[45] Zea was not convinced and, instead, cast this feature of Ruiz and Pavón's *Flora* as an erroneous cleavage of

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[41] Ibid., 230, n.1.
[42] Ibid., 230.
[43] Ruiz equated Linnaeus' *C. offinalis* with his own *C. officinalis* while equating La Condamine's *quinquina* to his *C. glabra*.
[44] Zea, "Memoria, 227.
[45] By the time of the publication of the *Flora Peruviana et Chilensis*, Ruiz and Pavón had come to the conclusion that samples and drawings on which La Condamine's and Linnaeus' species descriptions were based had actually come from a mixture of two different species of quina. Thus, it no longer made sense to retain either name in botanical nomenclature because they had been based on faulty and mixed samples and images, see: Nieto Olarte, *Remedios para el Imperio*, 193-215.

equivalent species into distinct species.[46] An examination of the "skeletons" (dried plant samples) in the herbarium of Ruiz and Pavón revealed that the alleged "difference" between the two samples was "entirely accidental" such that "they could be from the same tree."[47] Zea further suggested that changes in elevation could account for the apparent difference.[48] At the same time that these claims undermined those of Ruiz and Pavón, they also aligned Zea (and, in turn, Mutis) with the authority of Linnaeus by maintaining the ontological integrity of Linnaeus *C. officinalis* and its equivalence to Mutis' orange *quina*.

Zea supported his attack on Ruiz and Pavón and his translation of their eight species into Mutis' four "official" *quinas* with explicit appeals to the authority of Linnaeus. Consider Zea's suggestion that four of Ruiz and Pavón's cinchona species were reducible to two species, with *C. tenuis* and *C. pallescens* comprising one and *C. purpurea* and *C. microantha* comprising the other. As to the difference between these species, Zea observed that it is "so small and accidental that I do not believe that it is worth the attention of the Botanist, according to the principles of Linnaeus."[49] Once again, Linnaeus served as a guide and source of authority. Ultimately, Zea asked Ruiz and Pavón to recognize the veracity and consequences of his critiques of their system of classification. "I should hope," Zea wrote, "from their love of science and humanity that, far from engaging in a useless contestation, they will agree to

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[46] Zea, "Memoria," 227.
[47] Ibid.
[48] Ibid. Zea, unfortunately, does not cite any texts to support his hypothesis of variation due to elevation. However, he may have drawn upon some of the idea and literature in the emerging of biogeography in which naturalists examined the distribution of plant species by elevation, see: Jorge Cañizares-Esguerra, "How Derivative was Humboldt? Microcosmic Nature Narratives in Early Modern Spanish America and the (Other) Origins of Humboldt's Ecological Sensibilities" in: *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, edited by Londa Schiebinger and Claudia Swan, (Philadelphia: University of Pennsylvania Press, 2005), 148-165.
[49] Zea, "Memoria," 229.

illustrate the material by exhibiting methodically the observations that they have made and by separating experiences from conjectures."[50] Zea considered any critique by Ruiz and Pavón to be useless. In addition, he proposed that they use their own observations to further illuminate "the material" (i.e. Mutis' four official *quinas*). Zea also encouraged Ruiz and Pavón to use his critiques to their benefit especially since "not every professor is disposed to reconcile the apparent contradictions that are found on every line of the cited volume of the *Flora* and in the *Quinologia o tratado del árbol de la Quina*."[51]

The Primacy of Botany in the Division of Labor: Ruiz and Pavón Respond

Ruiz and Pavón's response was both prompt and prolific. Within a year of Zea's article, they published their *Suplemento a la Quinología*: a line-by-line refutation that ran to more than eighty pages.[52] They first reinforced the division of intellectual labor. "[We are] leaving to the Professors of Medicine," they wrote, "the contestation of the Extract that Don Francisco Antonio Zea took from the Periodicals of Santa Fe for his Article on the virtues that Dr. Don José Celestino Mutis attributes to his four Quinas orange, yellow, red and white and their mode of operation."[53] The crux of Ruiz and Pavón's response to Zea and Mutis however went beyond a simple reassertion of the division between medicine and botany. Instead, they argued that

[50] Ibid., 231.
[51] Ibid.
[52] Hipólito Ruiz and José Pavón, "Defensa que hacen de la Quinas finas Peruvianas y de las de Loxa los Botánicos de la Expedición del Perú Don Hipolito Ruiz y Don Josef Pavón, respondiendo a la Memorio que Don Francisco Antonio Zea insertó en los Anales de Historia Natural Quaderno numero 5 sobre las Quinas de Santa Fe y demostracion de que estas son muy inferiores a aquellas," in: *Suplemento a la Quinologia*, 21-105. Ruiz and Pavón also included a "Summary" of their main arguments for readers unwilling to slog through all eighty-pages of tedious refutation, see: *Suplemento a la quinologia*, 110-114.
[53] Ruiz and Pavón, *Suplemento*, 21.

within this division of intellectual labor, botanical classification provided the foundation for medical analysis of *quina*. Their opponents had claimed just the opposite.

Ruiz and Pavón's rejection of Zea's proposed synonyms for Mutis' orange *quina* exemplifies their response. Recall that Zea had suggested that orange *quina* was equivalent to Linnaeus' *Cinchona officinalis* as part of a larger move to undermine the authority of his opponents. Ruiz and Pavón responded in kind: neither Mutis nor Zea "knew botanically" the cinchona species described by Linnaeus and La Condamine. Furthermore, they lacked "exact knowledge" of the species described by Ruiz and Pavón. Therefore, Zea could not possibly claim the authority to propose orange *quina* as a botanical synonym to Ruiz and Pavón's *C. officinalis, C. glabra* and *C. fusca* (Table 7.3). But what did it mean to know a plant species "botanically"?

Botanical knowing, according to Ruiz and Pavón, required two things: direct observation in the field and side-by-side comparison of related species. Both were crucial for true knowledge and accurate classification of cinchona or any other plant. The importance of experience in the field was highlighted in a comparison of their research methods with those of Mutis:

> We do not doubt that Doctor Mutis had traveled extensively through the forests and fields of Santa Fe, Mariquita and other [parts] of the New Kingdom of Granada before being named Director of the [Botanical] Expedition [in New Granada]; but we are sure that from that point onward he was almost always content to send Servants and later Students to collect materials [and that] he was not able, on account of his age and ailments, to go out, with Portfolio underarm, collecting plants, observing them, describing them and painting them in their native habitats like we, the Botanists of Peru, always did; we cannot deny this [is an] advantage, in comparison to Dr. Mutis, along with our eight years of study at the School of the Royal Botanical Garden.[54]

While they often expressed admiration for Mutis, here Ruiz and Pavón underlined their own authority while undermining his by emphasizing their field experience as

[54] Ibid., 25.

well as their formal training. Of their two "advantages," they repeatedly emphasized the advantage of observations made in the field especially in comparison to botanists, like Mutis, that worked in a "Museum" or "Cabinet." They stressed that the images from their magnum opus *Flora Peruviana et Chilensis* "were not drawn in the darkness and comfort of a [Natural History] Museum."[55] The darkness and comfort of such spaces was contrasted with the difficulties and enlightenment offered by observations made in the field. Such tropes were common in Enlightenment Europe and European scientific travelers of the eighteenth century drew on them heavily to establish the moral and epistemological validity of their scientific endeavors.[56]

Ruiz and Pavón did not entirely reject botany done indoors as reflected in their emphasis of the necessity of side-by-side comparison of the same types of materials – whether it be dried samples or images. "The Teacher of Señor Zea should have shown more modesty and moderation in stating his opinion to the public in such a magisterial tone," they suggested.[57] Mutis had not performed direct comparisons of "the Drawings, Skeletons [i.e. dried plants], Descriptions, Observations and Barks of his four *Quinas* with the same materials from our ten [*Quinas*]."[58] As for Zea, Ruiz and Pavón also faulted him for not performing such comparisons. "Why, Mr. Zea, wouldn't Dr. Mutis critique the *Quinologia* of Ruiz?" they asked. "Because," they continued, "it is very difficult, if not impossible, to make such a critique, without having the objects present in order to compare them and to see the differences and similarity between them."[59] The problem with Zea was that he relied too heavily on his

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[55] Ibid., 77.
[56] Bleichmar, "Visual Culture," 201-205; Mary Terrall, "Heroic Narratives of Quest and Discovery," *Configurations* 6 (1998), 223-242; Mary Louis Pratt, *Imperial Eyes: Travel Writing and Transculturation* (New York: Routledge, 1992).
[57] Ruiz and Pavón, *Suplemento*, 24.
[58] Ibid.
[59] Ibid., 30.

memory. "[Zea] dared to reduce, as mere varieties," they wrote, "our Species of *C. [tenuis], purpurea and micrantha* to [Mutis'] *C. cordifolia* [yellow quina] from the ideas he could retain in his imagination in the six years since he left [New Granada]."[60] Memory was no match for direct comparison of similar materials. For Ruiz and Pavón, the root of the problem with Zea's botanical synonyms was that Zea was not a very good botanist and lacked the right kinds of experience in the field and in the cabinet.[61]

This methodological refutation led ultimately to their central claim of the primacy of botanical characteristics over medicinal ones in the identifying and classifying cinchona species. Indeed, at the end of this section of the *Suplemento*, they noted that "methodical knowledge of the various Species of *Quina*" was a matter of "great consideration" such that in order to achieve such knowledge, the King ought to order Juan Tafalla, the botanist continuing the expedition in Peru, "to collect complete Skeletons and Barks of all [the *Quinas* from the Loja region]." These samples would be collated with those already collected by Ruiz and Pavón as well as "those that Dr. Mutis could send" in order to produce "a common collection of all [species of *Quina*]." With such a collection, Ruiz and Pavón noted that they "would

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[60] Ibid., 54.

[61] Ruiz and Pavón were careful to limit their own claims about the classification of cinchona within the limits of their botanical knowledge of the species. Consider their discussion of "orange quina" and "yellow quina." In the case of "orange quina," Ruiz and Pavón were certain that this species was not equivalent to any of those uggested by Zea (*C. officinals, glabra,* and *fusca*) because they possessed the "skeleton" of "orange quina" from Sebastian López Ruiz. In contrast, Ruiz and Pavón were less certain that Mutis' "yellow quina" was equivalent to their *C. pallescens* because they only had "incomplete Skeletons in bad condition." "We cannot be sure [of the equivalence]," they wr0te, "without seeing complete and well conditioned Skeletons." As to their other species (*C. tenuis, micrantha* and *purpurea*) that Zea suggested were not only the same as Mutis' "yellow quina" but also equivalent to each other, Ruiz and Pavón again pointed to the observable differences between the dried specimens of the species that they had in their possession at the Botanical Office in Madrid. Direct comparison and observation was essential to achieving certainty. They wrote, "in order to have assurance in a matter as delicate as this, it is indispensable to observe living plants or at least dried plants and compare them reciprocally," see: Ruiz and Pavón, *Suplemento*, 56 and 67.

be able to assure an exact distinction and knowledge of the true Species of *Cinchona* and to proceed with intelligence from the Species to observation and experiments of the virtues and efficacy."[62] Here was the key contrast. Whereas Mutis and Zea used medical virtue as a means of distinguishing botanical species, Ruiz and Pavón argued that the medical virtue was irrelevant to classification. Botanical classification preceded the determination of medical virtue.

Not surprisingly, Ruiz and Pavón included their own list of botanical equivalencies between Mutis' four "official" *quinas* and cinchona species identified by other botanical works (Table 6.5). In the end, they conceded that Mutis' "official" *quinas* were probably distinct species but still refuted the use of medical utility as the basis for the distinction. They admitted that "all *Quinas* are medicinal" according to "experience" and the "Rule of Linnaeus: *Plantae, quae Genere conveniunt, etiam vitute conveniunt*." "Some are more efficacious and others," they added.[63] Here, Ruiz revealed that "those of the *Quinologia* [are] of the greatest efficacy according to order in which they are listed in that work."[64] From greatest to least efficacy, the seven species of Ruiz's *Quinologia* were ordered in the text as follows: *C. officinalis, C. tenuis, C. glabra, C. purpurea, C. lutescens, C. pallescens, C. fusca*. Yet, this ordering had no bearing on the identification and classification of the botanical species. It was simply one manner of presenting the information – no more or less arbitrary than alphabetizing them. However, Ruiz and Pavón did claim that their refutation of Zea's botanical synonyms revealed the inferior quality of Mutis' "official" *quinas* relative to the bark of their *Cinchona officinalis.*[65] "Even if we were to concede

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[62] Ruiz and Pavón, *Suplemento*, 100.
[63] Ibid., 93. The rule of Linnaeus translates as: "Plants that share a Genus also share virtue."
[64] Ibid.
[65] Since Ruiz and Pavón had determined that Mutis' "red *quina*" corresponded to their *C. lutescens* and suggested that Mutis' "yellow *quina*" was likely equivalent to *C. pallescens*, they

that these four Species grew spontaneously at the same latitude and elevation as the celebrated [quinas] from Loja and the other Peruvian [quinas] (which we cannot concede)," they wrote, "no enlightened Professor will be able to attribute to [these four Species] the same efficacy when they are neither the same species nor variety of [those from Loja and Peru]."[66] Botanical classification was the key especially since it trumped medical virtue as a means of identification.

Table 6.5: Ruiz and Pavón's suggested botanical equivalencies for Mutis' *quinas*[67]

Mutis' Species	**Orange Quina (*C. lancifolia*)[68]**	**Red Quina (*C. oblongifolia*)**	**Yellow Quina (*C. cordifolia*)**	**White Quina (*C. ovalifolia*)**
Lopez Ruiz[69]	*C. angustifolia*	-	-	-
Ruiz *Quinologia*	-	*C. lutsecens*	*C. pallescens*	-
Wahl	-	-	-	*C. macrocarpa*

had already provided evidence that these two quinas from Santa Fe were of medium quality at best. In addition, based on their knowledge of various characteristics of Mutis' orange and white species, Ruiz and Pavón suggested that orange quina, which they agreed was the best of Mutis' four species, "could occupy the fourth place after *C. glabra* among the seven Species of the *Quinologia* of Ruiz." As for white *quina*, they did not even place it among the seven species of the *Quinologia* on account of its "small amount of gummy-resinous sap and the imperceptible acidity" which suggested a lack of medical efficacy, see: Ruiz and Pavón, *Suplemento*, 60-61.

[66] Ruiz and Pavón, *Suplemento*, 101.

[67] Ruiz and Pavón do not provide such a table in their work. These equivalencies are suggested in their *Suplemento*, 44-67

[68] Ruiz and Pavón explained that they could not find mention of "orange *quina*" in any previous works on cinchona and suggest that Mutis was the first to use the term, see: *Suplemento*, 37 and 45. They did, however, suggest that Mutis' "orange *quina*" is equivalent to a species identified by Sebastian José Loepz Ruiz in New Granada (see n. 68) as well as a new species identified by Juan Tafalla in Peru, see: *Suplemento*, 38 and 47.

[69] Sebastian José Lopez Ruiz was a physician from Panama living in the Viceroyalty of New Granada. In the 1770s and 1780s, Lopez Ruiz engaged in a dispute with José Celestino Mutis over which of them first discovered cinchona trees near Santa Fe de Bogotá. During this time, Lopez Ruiz made two trips to the Court in Madrid in support of his case. On these trips, Lopez Ruiz established his relationship with Casimiro Gómez Ortega, director of the Royal Botanical Garden in Madrid and teacher of Ruiz and Pavón, whom he provided with the samples of quina from New Granada.

Quina and the Co-Production of Nature and Empire

If the debate between Mutis, Ruiz and their associates had only been about botanical classification, it might have been resolved amicably. After all, Ruiz and Pavón agreed that Mutis' *quinas* were, in fact, four distinct species. It was only a matter of how to correlate these species with existing classification systems as well as their own. In addition, as shown above, their work on the tree and Mutis' work on the bark fit within two existing and complementary disciplinary traditions of the scientific study of *quina* – the medical and the botanical. Finally, all parties involved agreed that the identification of "official" cinchona or *quina(s)* was a worthwhile enterprise. All of these elements suggest that resolution was possible. Yet, it was never achieved. As we have seen, the debate involved more than mere botanical classification.[70] Zea had to be disciplined and the relative positions of medicine and botany in the division of intellectual labor had to be restored.

But there was more: a primary source of contention between the two sides was their conflicting conceptions of the proper mode of governance and economic organization of the Spanish Empire. Whereas Mutis was a proponent of the *estanco de quina*, Ruiz was a proponent of private cultivation and maintenance of a status quo in which private merchants groups in Lima monopolized commerce in *quina* under the cover of free trade within the empire. Royal monopoly aside, Mutis' success would have meant an end to one of the key conceptual supports of the Peruvian monopoly: the notion that *quina* from Loja and Peru was better than that from Santa Fe de Bogotá and New Granada.

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[70] Other cases studies in the debates and tensions that arose around classification, see: D. Graham Burnett, *Trying Leviathan: The Nineteenth-Century New York Court Case That Put the Whale on Trial and Challenged the Order of Nature* (Princeton: Princeton University Press, 2007); Harriet Ritvo, *The Platypus and the Mermaid and other Figments of the Classifying Imagination* (Cambridge, MA: Harvard University Press, 1997); Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Books, 1973),

Co-production – the notion that science and society constitute each other simultaneously – is one way of describing the primary *modus operandi* of the Spanish Empire especially when it came to problems of knowledge.[71] As described in Chapter 1, the imperial culture of knowledge production in the Spanish Atlantic was characteristically political, meaning that the production of natural knowledge was bound to questions of policy and governance. This is why understanding the culture of knowledge production embedded in the Spanish imperial bureaucracy is so central to understanding the role of botanists and their science in the empire. This culture provided the conditions of possibility for the various visions of the natural world and the imperial order proposed by its participants.[72] This was as much the case for botanists as it was bureaucrats.

Casting this case as instance of co-production requires additional clarification. The question of the social order was not a stark choice between democracy and monarchy, independence or empire. Rather, it was a question of what kind of imperial order – state-centered or merchant-centered, regalist or mercantile.[73] Jeremy Adelman, in his recent account of debates over sovereignty in the Iberian

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[71] Sheila Jasanoff, "The idiom of co-production."

[72] I am not making a strong casual or deterministic claim here on purpose. Instead, I have opted for describing the political culture and structure of the Spanish imperial enterprise as the condition of possibility mainly because neither of the groups in this debate offered such a radical vision that would have undermined the Spanish imperial order as a whole. The respective social visions of how the state could manage *quina* as a natural resource – through royal monopoly (Mutis) or private initiative (Ruiz and Pavón) – were both consistent with extant policies and ideologies in the Spanish empire. In other words, within the broader political culture and structure of the Spanish imperial enterprise in the eighteenth century, it was common for the Crown and officials in Spain to solicit different and conflicting opinions of those officials or other experts with knowledge of the matter under consideration, see: Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988).

[73] Here, regalist is used to indicate a vision of the Spanish imperial order which emphasized the power of the Crown over all other entities in the empire (towns, merchant guilds, elites, etc...). Recently, Gabriel Paquette has described regalism as one of the central characteristics of the Bourbon Reforms, see: Paquette, *Enlightenment, Governance and Reform*

Atlantic on the eve of the Latin American revolutions, has described the development of different visions of imperial order as characteristic of the late eighteenth century Iberian Atlantic World.[74] How did these imperial visions structure the debate between Mutis and Ruiz?

Consider the issue of identifying the "official" species of *quina* or cinchona. This was in many ways an iteration of the general problem of the bark's quality. If Ruiz and Pavón's primary concern was to assert the primacy of botany as the means to classification, why then did they spend so much time discussing the medical efficacy of Mutis' *quinas*? Why did they frame response to Zea as a "defense" of "the fine Peruvian *Quinas* and those from Loja"?[75] The answer is that their *Suplemento a la Quinología* was as much a defense of a vision of imperial order as it was a defense of the natural order. Moreover, in contrast to Mutis' monopolistic vision, Ruiz and Pavón had a mercantile vision – one that privileged the interests of merchants and capital in the management of *quina* as a natural resource. Evidence suggests that the *limeño* merchant community gained Ruiz and Pavón's support of their vision of the imperial order through their financial support of Ruiz and Pavón's vision of the natural order, their magnum opus, the *Flora Peruviana et Chilensis*. Let us now consider the various imperial networks in which Mutis, Ruiz and other botanists were embedded.

Mutis' Monopolistic and Regalist Vision of the Imperial Order

We have seen previously that José Celestino Mutis was directly involved in the administration of operations for the *estanco de quina* in Santa Fe de Bogotá in the

[74] Jeremy Adelman, *Sovereignty and Revolution in the Iberian Atlantic* (Princeton: Princeton University Press, 2006), Chapter 4, "The Wealth of Empires."
[75] Ruiz and Pavón, *Suplemento*, 21.

mid 1780s. His commitment to monopoly predated his involvement with the *estanco* by almost two decades. Mutis first expressed his views in a letter to Charles III first in 1763 and again in 1764. The primary purpose of these letters was to secure royal patronage for natural history in New Granada. Mutis explained that royal support would benefit both science and empire, since natural historical research would produce further knowledge of the "natural treasures" in Spain's American territories.[76] He used *quina* as an example of a natural treasure "bestowed uniquely to the Dominions of Your Majesty" and proposed that natural historical research on *quina* would restore its reputation among the "Physicians of Europe" by providing "observations" on how to "handle [it] with greater confidence, clarity, and certainty."[77]

But knowledge alone was not enough to restore the bark's reputation, and Mutis did not just give scientific advice. He also urged direct intervention in the *quina* trade by the Crown in order to put a stop to "the miseries, which we fundamentally fear, multiply as a result of the ambition of those that trade in this precious good [*genero*]."[78] Merchants and bark collectors who harvested and traded in *quina* for personal gain simply could not be trusted. Moreover, they contributed to the problem of scarcity by "the indiscriminate cutting of an entire *Quina* tree in order to obtain only a small portion [of it]."[79] In addition, the "ignorance or malice of those wanting to increase [the volume] of their merchandise" gave rise to the "reprehensible" practice

[76] Mutis wrote, "this Science [i.e. natural history] would have never obtained the perfection, with which it is admired in our century, if sovereigns and other distinguished persons had not conceived the idea of liberally promoting, supporting, and rewarding various Learned Naturalists," see: "Representación hecha al Rey," in: A. Federico Gredilla, *Biografia de Jose Celestino Mutis y Sus Observaciones sobre al Vigilias y Sueños de Algunas Plantas*(Bogotá: Plaza & Janes, 1982 [1911]), 41.
[77] Mutis, "Representación hecha al Rey," 44.
[78] Ibid.
[79] Mutis projected that such practices would "make this tree just as unknown in Peru as in Norway," see: "Representación hecha al Rey," 44-45.

of mixing barks of different quality and even species.[80] Of all the problems with the *quina* trade, Mutis considered the worst to be a bark shortage resulting from unsustainable harvesting practices. He predicted, "there will be a shortage in the third century since its happy discovery, if Your Majesty does not apply the most opportune precautions in time."[81]

Mutis drew on two models to make his case for the monopoly. The first was the 1753 report of the "erudite Miguel de Santisteban" that endorsed the Crown's original plan to establish the *estanco de quina* as means to restore the quality and value of the bark.[82] Mutis supported Santisteban's recommendations, and considered it a "detriment to the public good and the Royal Treasury" that they had not yet been "put into practice."[83] Another model was the Dutch commercial empire. Mutis urged the King to "approve the establishments which [his vassals] will form for the cutting and economy of these trees, for the transportation of *Quina* to Spain and its distribution to all Nations" so that "the public will be able to obtain at a moderate price fresh and select *Quina*."[84] The Crown had the authority to create a monopoly "by the same reason that the Dutch distribute cinnamon from Ceylon."[85] Thus, by pointing to

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[80] Mutis, "Representación hecha al Rey," 45
[81] Ibid., 44.
[82] Mutis' knowledge of Santiseban's report probably came directly from the man himself. After all, Santisteban was an official at the Royal Mint in Santa Fe de Bogotá and Mutis used Santisteban as a key source for knowledge of quina from Loja. As a testament to his confidence in Santisteban's knowledge of quina, Mutis sent samples of quina collected by Santisteban and drawings of the tree made by Santisteban to Linnaeus in 1764, see: José Celestino Mutis, [Letter to Carolus Linnaeus], Santa Fe de Bogotá, 24 September 1764, in: *Archivo Epistolar del Sabio Naturalista Don Jose Celestino Mutis*, vol. 1, edited by Guillermo Hernandez de Alba (Bogotá: Editorial Kelly, 1968), 44-46; Nieto Olarte, *Remedios para el Imperio*, 198; Hernández de Alba, *Quinas Amargas*, 124-128.
[83] Mutis, "Representación hecha al Rey," 44.
[84] Ibid., 45. Although Mutis refers to the "establishments" of vassals in the plural, I read this term as referring to the multiple proposals for a royal monopoly from various colonial officials especially since Mutis supports royal administration of the quina trade everywhere else in his writings.
[85] Ibid., 44.

the model of the Dutch and the plan previously proposed by Santisteban, Mutis made his case for royal administration of the quina trade.

He never wavered in his support of this project and never hesitated in making what were essentially imperial and economic policy recommendations. In 1773 and again in 1787, Mutis wrote to the Crown seeking the establishment of a royal monopoly as outlined in Santisteban's 1753 report. Part of the impetus for Mutis' support for the monopoly came from his connections with the court of the Viceroy of New Granada in Santa Fe de Bogotá. The Viceroys of New Granada, beginning with José Solís in 1753, consistently supported the royal monopoly project.[86] Such connections to the Viceroy helped secure Mutis a position as director of the short-lived *estanco de quina* operation near Santa Fe de Bogotá in the mid 1780s (see Chapter 4). In May 1785, the Crown solicited information from the *Audiencia* of Santa Fe regarding the *quinas* from that region. Initially, the *Audiencia* gave the task to Sebestian López Ruiz, a local physician, but, ultimately, it fell to Mutis. In April 1787, Archbishop-Viceroy Caballero y Góngora endorsed and sent Mutis' report including a renewed plea for the *estanco de quina* to the Crown. In his accompanying letter, Caballero y Góngora clearly indicated that he had no problem with Mutis making policy recommendations as well as providing natural knowledge on the cinchona tree. "I have ordered Mutis," the Archbishop-Viceroy wrote, "with whom I have spoken previously regarding this matter, to outline a program for certain administration. This man, of equal value as political advisor, philosopher, statist and scientist, drew up a

[86] Marcelo Frías Núñez, *Tras El Dorado Vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783-1808)* (Seville: Diputación de Sevilla, 1994), 196-206; For eighteenth-century views from the Viceroys of New Granada, see the summaries of documents in: "Desde el año de 1773 a 1784. El expediente original formado en el Consejo de Indias sobre el estanco," AGI, Indiferente 1554, fols. 777r-1024r.

detailed plan."[87]

Caballero y Góngora also pointed to the Dutch as a model:

> At almost the same time as the purse of Cádiz [*la bolsa de Cádiz*] took charge of the business of *quina*, the Dutch company [VOC] displaced the Portuguese from the business of spices by force. The East India Company gained millions of pounds of cinnamon such that while knocking down the cinnamon trees of Conchinchina and Malabar with one hand, it was planting with the other hand the new [trees] which were necessary to meet demand. The causes, by which the production of cinnamon increases and that of the bark [*quina*] decreases, are clear: the Dutch concentrate all species and drugs under the state monopoly and determined the profit by official conduct. We must learn from the Dutch![88]

The contrast between Spain and the Netherlands and their respective strategies for managing their most precious natural resources could not be starker. While the Dutch profited from cinnamon via a state monopoly, Spain experienced nothing but the increased scarcity of trees and decreased *quina* as long as the industry remained in private hands. Ultimately, after further testing in December 1787 suggested that *quina* from Santa Fe was not as good as that from Loja, the Crown put an abrupt end to the *estanco de quina* in Santa Fe. Nonetheless, from 1785 and 1787, Mutis oversaw shipments of *quina* from Santa Fe for the Royal Pharmacy – a brief realization of his monopolistic vision.[89]

When read in the context of these events of the late 1780s, Mutis' claim that there were four "official" *quina* in his *El Arcano de la Quina* (1793-4) takes on new significance. Here, he was openly rejecting the findings of experts in Madrid that *quina* from Santa Fe was inferior quality to *quina* from Loja. This text thus falls in the

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[87] This quote is from a larger excerpt of Caballero y Góngora's report cited in: Hermann A. Schumacher, *Mutis, un forjador de la cultura*, translated by Ernesto Guhl (Bogotá: Emprese Colombiana de Petróleos, 1984), 81-82. The original document is listed as: "Oficio de Caballero y Góngora al Marqué de Sonora" Cartagena, 16 April 1787 in: Frías Núñez, 205, n. 151.
[88] Ibid.
[89] Frías Núñez, 205-207.

tradition of Pedro de Valdivieso and Miguel García de Cáceres and all those other experts in South America who rejected European expert knowledge. What is more important than his refutation of European experts is what Mutis hoped to achieve. The Crown's decision to shut down the Santa Fe *estanco* upon the determination that *quina* from Santa Fe was inferior had shown that the two – the survival of the *estanco* and the quality of the bark – were interlinked. Thus, the revitalization of Mutis' monopolistic vision of empire depended (as well as the local monopoly in Santa Fe), in this instance, on establishing that *quina* from Santa Fe was just as good as, if not better than, *quina* from Loja and Peru.

Mutis' strategy was both ambitious and ingenious. Rather than publish a simply defending *quina* from Santa Fe, Mutis attempted to change the rules for identifying and classifying the bark. By making medical utility the primary characteristic of an "official" *quina*, Mutis shifted the emphasis away from classification according to botanical methods and geographical location. Obviously the lack of medical efficacy of *quina* from Santa Fe had been the main problem for experts in Madrid (even though a few years earlier that had approved the bark on this same criteria). So, Mutis probably knew that he was not going to convince them directly and, instead, employed a strategy in which he opened the category "official" to several kinds of *quina* (rather than just one) and publicized his findings not in scientific journals but the periodicals in Santa Fe and especially in Lima, where many *quina* merchants were to be found. Perhaps by highlighting the prestige and potential profitability the four "official" *quinas* to be found in Santa Fe, Mutis hoped to attract the attention of the Crown and achieve a royal monopoly of *quina*.

In contrast to Mutis' monopolistic or state-centered vision of empire, Ruiz was much more a supporter of a mercantile vision of empire in which trade within in the

empire, even in *quina*, would be left in the hands of private merchants. Both of these visions were consistent with conceptions developed in the broader eighteenth-century discussion about the structure of Spain's economic and political relationship with its American territories, and in the specific discussion of the *estanco de quina* from the 1750s to the 1780s.

Many officials in South America had developed and debated the "two paths for exploiting" *quina* in the decade before the debate between Mutis and Ruiz. These discursive precedents and existing imperial policies had led to a fairly clear geographical distribution of the two visions of the empire – monopoly and free trade. Consider the American responses to the 1751 royal order the proposed an *estanco de quina* in Loja (Chapter 1). Whereas the residents of Loja and Miguel de Santisteban, special envoy of the Viceroy of New Granada, supported the *estanco*, the Viceroy of Peru was more cautious, suggesting possible negative effects on the merchant community in his jurisdiction. The residents of Loja saw the royal monopoly as an opportunity to stop merchants in Piura from profiting on Loja's product, and Santisteban argued that the Royal Monopoly would help to protect cinchona bark from the greed of merchants which resulted in the increasing scarcity of the trees and the decreasing quality of the product due to the mixing of good quality quina from Loja with inferior types of bark.[90] In contrast, Manso de Velsaco noted that a royal monopoly "eliminates the ability of those, who make living by it, to trade freely [*comercio libre*]."[91] Thus, the very first assessments of the *estanco de quina* reflected the two main visions of the imperial order and the various interests that supported

[90] [Letter from the *vecinos* of Loja], Loja, 14 Abril 1752, ANH/Q, Cascarilla, Caja 1, Expediente 2, fols. 1r-3v; Miguel de Santisteban, "Relación informativa práctica de la quina de la ciudad de Loxa," Santa Fe, 4 June 1753, BPRM, II/2823, fols. 82r-88v.
[91] José Antonio Manso de Velaso, "[Dictamen a Marques de Esenada]," Lima, 4 November 1753, AGI, Indiferente 1552, fol. 337r-v.

them. Moreover, just as these early replies split between the officials in New Granada, advocating royal administration and officials in Peru representing the interests in free trade (even if not outright supporting a policy of free trade), so did Mutis, closely associated with the Viceroy of New Granada, and Ruiz and Pavón, associated with interests in Peru, replicate such divisions.

The particular situation of Loja highlights the complexity of interactions between policies and practices rooted in the regalist and mercantile visions of imperial order. As we have seen, Loja was a key site. Many considered the region to produce the best bark especially since it was in Loja that Europeans allegedly first encountered *quina*. As the *quina* trade flourished, the province of Loja developed a double identity. On the one hand, Loja was under the political jurisdiction of the *Audiencia* of Quito, which, in turn, was under the jurisdiction of the Viceroyalty of New Granada. On the other hand, the province of Loja had strong economic ties with the Viceroyalty of Peru especially since the closest market town (Piura) and Pacific port (Paita) were part of Peru (Map I.1). As a result, the Viceroys of New Granada and of Peru had different interests and stakes in the *quina* trade. These historical conditions combined with ideological commitments to produce concrete social and political networks of actors and institutions in support of conflicting visions of the Spanish imperial order.

Mutis and Ruiz (and the cinchona tree) were situated in the middle of all this. Their debate thus was simultaneously a conflict of visions of the natural and imperial order, and a deeply political conflict between two factions within the Spanish Empire. Mutis' commitment to the *estanco* was not only ideological, but also the result of his own interests being staked to those of the Viceroyalty of New Granada. What about Hipólito Ruiz and José Pavón? After all, unlike Mutis, they were not permanent

residents in South America and at the time of the debate, they had not set foot in Peru for over a decade. First, let us consider their vision of the imperial order.

Ruiz and Pavón's Mercantile Vision

Ruiz's vision for *quina* emphasized private ownership and free trade for Spanish and Spanish American merchants. In "Article III" of his *Quinologia*, Ruiz focused on the commerce in *quina* especially in the Provinces of "Quito, Cuenca, Loja and Caxamarca" and the Peruvian provinces of "Tarma, Xauxa, and los Huamalies."[92] Like Mutis, Ruiz attributed the increasing "exhaustion and annihilation of *Cascarillos* [sic]" to the "bad method" used in harvesting the bark.[93] To address the problem of scarcity, Ruiz recommended a system of private cultivation in which royal lands, on which were found "almost all those Woods and Forests [of *Cascarilla*]," would be sold to "discoverers of stands of *Cascarillos*" at an "equitable price."[94] Sales were to be made on the condition that the "discoverer" would "increase the number of *Cascarillos* [i.e. cinchona trees], with new plantings, and clear the terrain of all undergrowth and trees of a different type so that the *Cascarillos* [can grown] amidst the open air and sun."[95] Many complained that cultivation of *quina* was too difficult and costly because it required a complete transformation of the landscape to eliminate unwanted flora. To such complaints, Ruiz replied, "the Corrals and *Haciendas*, where the *Coca* bush is cultivated, were initially impenetrable forests and such [*Haciendas*] are frequently

[92]He estimated that 50,000 to 70,000 pounds of bark were extracted annually from the Provinces of Tarma, Xauxa, and los Huamilies and 100,000 pounds annually from Quito, Cuenca and Loja, see: Ruiz, *Quinologia*, 13.
[93] Ruiz, *Quinologia*, 14. He says little about this method except to note that after ten, twelve, or fifteen years, these trees do not sprout [new branches] or grow new trunks" This suggests that bark collectors were cutting down branches or whole trees simply to harvest the bark.
[94] Ibid.
[95] Ibid., 15.

formed in the Mountains at little cost."[96] Furthermore, only newly discovered stands of cinchona trees could be sold to private individuals, while the Crown would keep possession of (and the right to monopolize) known stands of cinchona tress on royal lands.

Just as Mutis' vision for the royal administration of quina was embedded in broader political economic discourse (as well as his patronage connections to the vice-regal court in Santa Fe) Ruiz's vision of private cultivation and free trade in *quina* was connected to a different political and social context. Ruiz and Pavón had close ties to the royal court in Madrid. Royal patronage provided material support for their expedition to Peru and Chile, as well as for their continued work in Madrid on the publication of their multi-volume *Flora Peruviana et Chilensis*. As former students of Casimiro Gómez Ortega director of the Royal Botanical Garden, both botanists had strong ties to the garden as reflected in the direct institutional link between the it and the "Botanical Office," the base of their operations upon their return to Madrid in 1788. When Zea in 1800, thus, cited them as botanists with "special charge from the Government," Ruiz and Pavón did not deny the characterization.[97]

Such connections to the Crown may have exerted a direct influence on their views on *quina* and the proper government policy regarding the extraction of the bark. Like Mutis, Ruiz published his *Quinología* in 1792 just a few years after the Crown had definitively decided to close the *estanco* in Santa Fe, leaving the Crown to focus its efforts on the *estanco de quina* operation in Loja. As botanists to the Crown, Ruiz and Pavón had an obligation to support this decision. In their *Suplemento* of 1801, Ruiz and Pavón remarked, "morally we must believe that the primitive *Quina* was the

[96] Ibid.
[97] Zea, "Memoria," 230, n. 1.

same that today is sent from Loja to the King as the most exquisite."[98] In contrast to Mutis, who claimed that "primitive *Quina*" – meaning the first type of *quina* sent to Europe which many believed was also the most potent kind – was different from that which Loja produced in the late eighteenth century, Ruiz and Pavón started with the assumption that the King was getting the best *quina* from Loja and extrapolated that this *quina* must be the same as primitive *quina*. Finally, whereas Mutis had often highlighted the "ignorance and malice" of bark collectors and merchants, Ruiz and Pavón valorized the knowledge of the quality of *quina* from Loja that "natives and Dealers" had passed down for generations.[99]

Such connections provide some explanation as to why Ruiz and Pavón explicitly framed their response to Zea in 1801 as a "Defense of the fine Peruvian Quinas and those from Loja by the Botanists of the Expedition of Perú."[100] This defense involved demonstrating the superiority of *quina* from Loja and Peru over that of Santa Fe and northern New Granada. "It will be fully explained," wrote Ruiz and Pavón, "that orange, red, yellow and white *Quinas* of Santa Fe are notoriously inferior Species to those from Loja and other Peruvian [*quinas*], [which have been] used in Medicine as the most exquisite and efficacious."[101]

Ruiz and Pavón employed several strategies to establish the inferiority of *quina* from Santa Fe. One was to continually reinforce the distinctions between *quina* from Santa Fe and *quina* from Peru through the use of geographical adjectives. Their *Suplemento* is riddled with juxtapositions of "the fine *Quinas* from Loxa and superior Peruvian [*quinas*]" with "*Quinas de Santa Fe*."[102] The equator emerged as an

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[98] Ruiz and Pavón, *Suplemento*, 37.
[99] Ibid.
[100] Ibid., 21.
[101] Ruiz and Pavón, "Aviso al Lector," in: *Suplemento*, nn. 4r.
[102] Ruiz and Pavón, *Suplemento*, 21

important dividing line between the two locations, as they highlighted differences in the terrain and local climatic conditions of Peru and Santa Fe – aspects that many in the *quina* trade considered essential to the quality of the bark.[103] Ruiz and Pavón also noted that the province of Huánuco, where they studied the cinchona tree and a major *quina*-producing region in Peru, was closer to Loja than Santa Fe and had similar terrain and climate, implying that Peruvian *quinas* were of comparable quality to *quina* from Loja, and were certainly better than *quina* from Santa Fe.[104]

Two additional kinds of evidence spoke to the inferiority of the "*quinas* from Santa Fe." One was the historical usage of different kinds of bark in commerce and medicine. For example, how could Mutis claim that "red *quina*" was "official" when it "never achieved much esteem in Commerce nor use in Medicine nor is it likely to ever achieve [esteem or use] as long as we have more virtuous and efficacious Species?"[105] Such evidence, however, only spoke to specific kinds of *quina*. To support their claim of the inferiority of all four of Mutis' "official" *quinas*, Ruiz and Pavón cited the results of therapeutic tests conducted in Madrid. "Experiments performed on the order of the Superior Council of the Royal Hospitals of Madrid in 1796," they wrote, "have shown that [the *quinas* of Santa Fe] do not produce the effects that Mutis claims."[106] "Other Professors of this Court" had observed a lack of medical efficacy among the *quina* from Santa Fe – undoubtedly a reference to the

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[103] For example, Ruiz and Pavón made the following contrast: "We recognize a difference in the climate and land [*temperamento y suelo*] of Loja and that of Santa Fe, while Loja is situated almost 4 degrees South [of the Equator?], Santa Fe is 4.5 degrees North [of the Equator]. The Mountains [in Loja] are much closer to the South Sea than those of Santa Fe," see: *Suplemento*, 101.

[104] Ruiz and Pavón noted that Huánuco and Loja were separated by "five degrees" of latitude while Santa Fe and Loja were separated by "nine degrees" of latitude. Huánuco was also "almost as close to the South Sea" as Loja and had a comparable altitude relative to the "Kingdom of Santa Fe," see: *Suplemento*, 101.

[105] Ruiz and Pavón, *Suplemento*, 37.

[106] Ibid., 51-52.

tests from the late 1780s that convinced the Crown to close down the *estanco* in Santa Fe. Finally, Ruiz and Pavón argued: "the virtues, which Dr. Mutis attributes to [orange *quina*], are more theoretical than practical."[107] With such evidence, Ruiz and Pavón provided an effective (and scientific) defense of the Crown's decision to reduce its *estanco de quina* to Loja.

Table 6.6: Total contributions from Spanish America to the publication of *Flora Peruviana et Chilensis* sent prior to 1801[108]

Location	*Pesos*	*Reales*	% Total
Viceroyalty of Peru	17,929	0.5	**45.5**
Viceroyalty of New Spain	6,377	4	**16.2**
Viceroyalty of New Granada	4,409	4.5	**11.2**
Chile	4,160	0	**10.6**
Cuba	2,893	2	**7.3**
Viceroyalty of La Plata	2,864	0	**7.3**
Philippines	586	6	**1.5**
Venezuela	181	4	**0.5**
TOTAL SENT FROM SPANISH AMERICA	**39,402**	**5.0**	**100.0**

Yet, there had never been an *estanco de quina* in Peru, so why did Ruiz and Pavón defend the quality of Peruvian *quinas* as well as that from Loja? As it turns out, the Crown was not their only patron. Just prior to the publication of their *Suplemento* in 1801, the two botanists developed direct economic ties to patrons

[107] Ibid., 61.
[108] Data in the table are based on data from Steele's *Flowers for the King*, 218-224 and Appendix B. These figures represent the amounts sent from Spanish America mostly in 1792 and 1793. Ruiz and Pavón received these contributions between 1793 and 1796. The appendix also shows the actual amounts received by Ruiz and Pavón after shipping costs are subtracted. Additional funds arrived in Spain after 1801 including funds from the bishopric of Cuzco in Peru (1803), La Paz (July 1804), and Guatemala (August 1809). In this table and the following, I have included only those amounts that Ruiz and Pavón would have received prior to the publication of their *Suplemento* in 1801.

from South America, especially Lima, in course of soliciting funds for the publication of their *Flora Peruviana et Chilensis*.[109] This work was to be their magnum opus and, in 1792, the Spanish Crown expressed its desire that the *Flora* be a publication of "grandeur and magnificence."[110] Unfortunately, the Crown was unwilling to provide sufficient funds for the project.

On September 17, 1791, Charles IV asked his American subjects to underwrite the publication of the *Flora*. The royal decree reported, "as the work is so vast, and the expenses required for its execution in typography, engraving, and coloring are so great, the Royal Treasury cannot support them." The Crown urged officials and notables in the Spanish America to contribute to this work that was "principally in honor of [America's] inhabitants."[111] Although the *Flora* focused only on Peru and Chile, the royal solicitation was sent to officials throughout Spanish America and, in turn, funds arrived from all parts of the American territories including even the Viceroyalty of New Spain (Table 6.5). The majority of the contributions arrived in the late 1790s just in time for publication of the first volume of the *Flora* and well in advance of publication of the *Suplemento a la Quinología* (1801).

Although contributions came from all parts of Spanish America, the majority of the funds came from the Viceroyalty of Peru. Indeed, the combined contributions of the collective territories of Peru and Chile accounted for just over half (56.1%) the total contribution from Spain's American kingdoms (Table 6.5). In addition to publicizing American nature to the European scientific community, the *Flora Peruviana et Chilensis* also represented a powerful means to arouse the interest of

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[109] No previous account of Ruiz and Pavón has suggested the possible influences of such patronage connections on the content of their work on *quina* and the natural history of Peru and Chile.
[110] Quoted in: Steele, 225.
[111] Royal Order, San Lorenzo, 17 September 1791, quoted in: Steele, 212, n. 2.

European merchants in the botanical products of these regions following upon the success of *quina* which many Europeans thought came from Peru since it was shipped through Lima.

Additional data collected by Arthur Steele provide a more detailed picture of which residents of Peru and Chile in particular supported this project. Table 6.6 provides a breakdown of contributing groups from the Viceroyalty of Peru using Steele's original categories and titles. Note that the city of Lima provided the majority of the contribution from Peru. Of the total contribution from Spanish America prior to 1801, *limeños* provided an astounding thirty-eight percent of the funds. These two tables (6.5 and 6.6) also indicate that the *Consulado* (merchant guild) in Lima, an institution representative of merchant interests, alone contributed almost as much as the entire Viceroyalty of New Spain and more than any of other geographical regions in Spanish America (after Peru and New Spain).

The profile of these contributions to Ruiz and Pavón's *Flora Peruviana et Chilensis* reflect a economic link between Spanish American interests and the Crown's botanists. With significant contributions from Peru and especially the merchant community in Lima for the publication of their most significant scientific work, the two botanists had additional motivation to frame their 1801 *Suplemento* as a defense of *quinas* from Peru as well as *quina* from Loja. In addition, Mutis' broader definition of the four "official" *quina* threatened the monopoly that *limeño* merchants had on the best bark. If "official" *quina* could be gotten elsewhere, such as the port of Cartagena on the northern coast of South America, why would European merchants expend the extra time and expense to deal with *quina* merchants in Lima? Thus, the *limeño* merchants may have seen Ruiz and Pavón as potential allies in their attempts to defend their *de facto* monopoly by defending the quality of Peruvian *quinas* relative

to those from Santa Fe.

Table 6.7: Contributions from the Viceroyalty of Peru to the publication of the *Flora Peruviana et Chilensis* between 1792 and 1793[112]

Location	Donor	*Pesos*	*Reales*	% Total contribution from Spanish America (prior to 1801)
Lima	*Consulado* (commercial body)	6,000	0.0	15.2
Lima	*Cabildo* of Lima (from city funds)	3,000	0.0	7.6
Lima	University of San Marcos	3,000	0.0	7.6
Lima	Townspeople of Lima	2,067	4.5	5.2
Lima	Gabriel de Avilés, inspector general of al military troops in the vieroyalty	100	0.0	0.3
Lima	José Manuel de Tagle Ysoaga, commisar of war and navy, for himself and his uncle, José de Tagle y Bracho, senior *oidor* of the *audiencia*	100	0.0	0.3
Lima	Archbishop of Lima	200	0.0	0.5
Lima	Viceroy Francisco Gil de Taboada y Lemos	500	0.0	1.3
Lima	**Total from Lima**	**14,967**	**4.5**	**38.0**
Huamanga	Total from Huamanga	1,787	0.0	4.5
Arequipa	Total from Arequipa	648	0.0	1.6
Cuenca (bishopric)	Total from Cuenca	425	0.0	1.1
Unidentified (probably mostly Huamanga)	Total	101	4.0	0.3
	Total from Peru	**17,929**	**0.5**	**45.5**

Since we lack a fine-grained profile of whom in the Lima merchant community contributed, and we do not know how much of the funds came from those merchants

[112] These data are from: Steele, 219-220.

involved in the *quina* trade, this conclusion is more suggestive than definitive. Without supporting documentation, it is difficult to know also what motivations merchants and others had for contributing to the publication of the *Flora*. Indeed, half of the funds came from regions that would not directly benefit from the publication of *Flora*. This suggests that contributors had other interests in the project or perhaps unrealized economic objectives. [113] Nevertheless it is reasonable to assume that at the same time that Spanish America "rescue[d] the *Flora*," in the words of Arthur Steele, Ruiz and Pavón came to the rescue of Peruvian *quinas*. In defending bark from Peru, Ruiz and Pavón returned the favor to their American patrons.[114]

Conclusion

The visions of the natural order espoused by Mutis and Ruiz were intertwined with their visions of the imperial order. Their different perspectives on nature and empire, in turn, were connected to their location in the Spanish Atlantic World. Place determined the social and political networks in which Mutis and Ruiz were involved. Mutis' primary network was based in the Viceroyalty of New Granada and its capital city, Santa Fe de Bogotá, where the vice-regal court was located and also where, after 1791, the Royal Botanical Expedition in New Granada was based.[115] Meanwhile, the network centered on Ruiz (and also Pavón) was based, after their return to Spain in 1788, at their Botanical Office in Madrid. In terms of patronage, both sets of naturalists had connections to the Crown in Madrid, especially since the King funded their expeditions. Yet, the strength of these connections differed

[113] Future archival research in both Spain and Peru will hopefully resolve some of these questions.
[114] Chapter 12 of Steele's *Flowers for the King* is entitled "America Rescues the *Flora*," 212.
[115] Eduardo Estrella, "Expediciones botánicas," in *Carlos III y la ciencia de la Ilustración*, edited by Manuel Sellés, José Luis Peset, and Antonio Lafuente (Madrid: Alianza Editorial, 1987), 331-351.

significantly. In general, Mutis' ties to the Crown were weaker due to his physical distance from Madrid, while Ruiz and Pavón were in close proximity to the court in Madrid and had direct connections with the Royal Botanical Garden. In spite of his weaker ties to the Crown, Mutis maintained strong ties to a major center of political power in Spanish America: the vice-regal court in Santa Fe de Bogotá.

At first glance, the debate between Mutis and Ruiz may seem to be a conflict between an imperial center (Madrid) and a colonial periphery (New Granada), but this interpretation overlooks the significant links between Ruiz and Pavón and the commercial elites of South America, especially in the Viceroyalty of Peru. Whereas Mutis had the support of Archbishop-Viceroy Caballero y Góngora, Ruiz and Pavón in the 1790s received direct financial support from officials throughout Spanish America with majority of contributions from the Viceroyalty of Peru and the *Consulado* in Lima. This gives a new perspective on the dispute from a rift between regional and imperial interests to a rift between two regions *within* the empire – New Granada and Peru.

The outline of these social and political networks also highlights the distinctive structure of the Spanish imperial state as a network of different institutions, entities, and groups with competing and contradictory interests. The Crown was just one among many elements which comprised the Spanish imperial state – and when it came to funding botanical work, it was by no means the controlling interest. In this case, it just so happens that the Viceroyalty of Peru, by the 1790s, had already enlisted the Crown as its ally in pursuit of policies that favored the interests of Lima and Peru over those of Cartagena and New Granada in the *quina* trade.[116] This imperial alliance was not necessarily conscious or coerced but rather conditioned by a historical precedent in which structures for exploiting *quina* from Loja had already

[116] See Chapter 4.

developed *before* those for exploiting *quina* from New Granada. Such historical precedents provided a powerful barrier to Mutis and his associates, even with the support of the Viceroy of New Granada, to convincing other botanists and the Crown, as well as merchants, of the efficacy of *quina* from Santa Fe and its equivalence to quina from Loja.[117] Yet, despite these complexities, science – as embodied by botanists and the botanical expeditions – became a form of statecraft wielded as much by officials in South America as by the Crown in Spain, as it became integrated into the existing structures of imperial governance and knowledge production.

This debate between Mutis and Ruiz also highlights the difficulties involved in characterizing and, more importantly, *situating* the production of natural knowledge in its broader sociocultural contexts.[118] The historical evidence shows that this debate was never a purely intellectual dispute disconnected from political concerns, social contexts, and commercial interests. Mutis and Ruiz articulated their differences in many more registers beyond the language of botany and medicine. Yet, the evidence does not suggest unidirectional lines of causality from the social to the intellectual, either.

One solution to this dilemma is to emphasize the mutual influence and interdependence of the content and context of science.[119] Historians of colonial

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[117] Indeed as a concession to the commercial interests of Peru and the *Audiencia* of Quito, the Viceroy of New Granada, Antonio Caballero y Góngora proposed in the late 1780s that the quina trade be divided between the two viceroyalties with New Granada supplying Europe via its port of Cartagena and Quito and Peru supplying New Spain, the Philippines, and Asia, see: Hernandez de Alba, *Quinas Amargas*, 191. Unfortunately, Hernandez de Alba does not give the exact date the Viceroy's proposal for the division of the quina trade.

[118] For a helpful overview, see: John A. Schuster, *The Scientific Revolution: An Introduction to the History and Philosophy of Science* (Sydney: School of History and Philosophy of Science UNSW, 1995) 206-246.

[119] A variety of historians of science and science studies scholars have offered many different iterations of this solution, see: Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985); Peter Galison, *How Experiments End* (Chicago: University of Chicago Press, 1987); Bruno Latour, *The Pasteurization of France* (Cambridge: Harvard University Press, 1988);

science as well as a science and empire have benefited and contributed to the development of this approach.[120] For example, in the introduction to their recent volume on colonial botany, Londa Schiebinger and Claudia Swan emphasize the intimate relationship between Europe's scientific and colonial enterprises, "the expanding science of plants depended on access to ever farther-flung regions of the globe; at the same time, colonial profits depended largely on natural historical exploration and the precise identification and effective cultivation of profitable plants."[121] Such a view rightly emphasizes the interdependence of these enterprises.

However, the rubric of interdependence may overemphasize the distinctions between science and empire at least as it applies to the Spanish case. That is, it seems to recognize "science" as a separate category of activity; yet, the story told her shows how closely integrated it was. Consequently, I have cast this episode in the imperial knowledge complex as an instance of "co-production – a term that calls attention to the intertwining of conceptions of the natural and social order. Sheila Jasanoff writes, "knowledge and its material embodiments are at once products of social work and constitutive of forms of social life; society cannot function without knowledge any more than knowledge can exist without appropriate social supports."[122] In this view, science does not precede the social order, the state, or empire but is instead a constitutive element of those entities not unlike Pierre Bourdieu's notion of *habitus* as a structure yet structuring structure.[123]

Peter Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997).

[120] Paolo Palladino and Michael Worboys, "Science and Imperialism," *Isis* 84 (1993), 91-102; Michel Paty, "Comparative History of Modern Science and the Context of Dependency," *Science, Technology & Society* 4 (1999), 171-204.

[121] Schiebinger and Swan, "Introduction," *Colonial Botany*, 2.

[122] Jasanoff, "The idiom of co-production," 2-3.

[123] Pierre Bourdieu, *Outline of a Theory of Practice*, translated by Richard Nice (Cambridge: Cambridge University Press, 1977).

One of the distinctive features of the Spanish Empire that makes it so difficult to distinguish science from empire was the fact that a culture of knowledge production was embedded in the imperial bureaucracy. With this in mind, one wonders if the "idiom of co-production," while a useful analytical tool to historians, would be surprising to the historical actors. After all, as this dissertation has demonstrated, one of the characteristic features of the imperial governance in the Spanish context was that problems of knowledge were *always* connected to problems of imperial governance. So, for Mutis to try to implement his vision of the imperial order by making an argument about the natural order was, in a sense, simply business as usual.

The debate between Mutis and Ruiz illustrates the connections between the ordering of the natural and social worlds. Both botanists' proposals were as much about how to order the production of *quina* (royal vs. private cultivation) as how to produce a proper taxonomic order of the species of cinchona (many vs. one "official" species). Neither drew a line demarcating their "science" from their "service the state" as their counterparts in later centuries would. The methods of both Muits and Ruiz for identifying and classifying "official" *quina* or cinchona had consequences for the Crown's policies on the production of the bark. If Mutis had convinced officials that he was "right," then the decision to confine the *estanco de quina* to Loja needed re-evaluation. After all, one of the central tenets of the *estanco* project was to provide the King with the best bark and, as we saw in Chapter 5, in the 1790s, Spanish officials redefined the jurisdiction of the *estanco* according to the quality of the bark. If the *quinas* of Santa Fe were "official" and good quality, then there was precedent for expanding the royal monopoly. But if they were not, then not. Conversely, Ruiz's vision of one "official" *quina* supported the status quo in which the *estanco de quina*

remained centered on Loja – the unique locus of the best bark. Thus, the natural knowledge produced by Mutis and Ruiz had direct implications for the realization of different kinds of imperial order – regalist and state-centered or mercantile and commerce-centered.

Mutis and Ruiz were also embedded in different sociocultural networks that influenced natural knowledge that they produced. As a physician to the Viceroy of New Granada, Mutis focused his work on *quina* on clarifying its medical application. At the same time, he supported the extension of the royal monopoly to the region of Santa Fe – a project that was commensurate with Archbishop-Viceroy Caballero y Góngora's plans for state-centered economic development of his viceroyalty. Meanwhile, as botanists in the (more) direct employ of the Spanish Crown, Ruiz and Pavón coupled their botanical observations of the tree to a defense of the quina being monopolized by the Crown and, in Ruiz's *Quinologia*, to an endorsement of private cultivation of the tree. While it is perhaps a coincidence that these botanists came to endorse opposing scientific views and opposing views on empire, it seem likely that such alignments were *more* than coincidental. Moreover, mapping Mutis' and Ruiz's connections to the diverse groups that comprised the imperial state provides a fuller understanding of the rift between Mutis, Ruiz, and their associates. There was much more at stake than the facts of nature.

In the end, botanists and bureaucrats had a similar goal in mind. Both groups thought that knowledge of the proper classification of *quina* would provide a solid foundation for imperial policies aimed at exploiting this natural resource. Mutis observed, "no [government] order will be effective, as his enlightened Ministry [i.e. the Ministry of the Indies] wishes, while the opinions of distinguished professors, who ought to provide the enlightenment necessary in this matter to [produce] certainty in

resolutions, do not agree."[124] Here, Mutis made explicit his conception of the connection between knowledge and imperial governance. The Crown and imperial officials took a similar view as reflected most forcefully in the Archbishop-Viceroy's observation that Mutis was a man "of equal value as political advisor, philosopher, statist and scientist." In practice and in defiance of the royal will, however, the directors of the royal botanical expeditions did little to establish consensus and clarity with respect to *quina*. How could they? How could these agents of empire act in any consistent or coordinated way when that empire was composed of competing interest groups with diverse conceptions of the proper imperial order? This is the central irony of the role of botany in the Spanish Empire in the late eighteenth century. As botanists became integrated into the structures and culture of imperial governance, they became less able to serve the empire since integration meant association with the different interest groups competing to define what "the empire" was. And so, science failed the empire because science was too imperial.

[124] Mutis, *El Arcano*, 5.

Conclusion

Imperial Epistemology:

The Politics of Knowledge in the Spanish Atlantic World (c. 1800)

"The authors did not consider it necessary, in their researches through the literature of the barks, to go back beyond the year 1792 because it was only at that period that the *Quinologia* of Ruiz threw some light upon the history of this valuable drug…"

– MM. Delondre and Bouchardat (1855)[1]

"There is no King, there is no Spain"

The story of the *estanco de quina*, like that of the rest of the Spanish Empire, ends in the early decades of the nineteenth century. Yet, contemporaries noticed that both empire and *estanco* had started breaking down long before. In 1814, Carlos Suarez, acting (and self-proclaimed) "lieutenant of the [*quina*] commission," submitted a prescient report to Torivio Montes, the President of Quito. Suarez was especially eager to explain why there had been no shipments of *quina* from Loja for the Royal Pharmacy in the previous three years. He blamed "the circumstances of the times" a reference to the turmoil created by Napoleon's invasion of the Iberian Peninsula in 1808 and the six-year war for independence that ensued.

Smugglers, according to Suarez, took full advantage of the situation, as Spanish imperial governance was crumbling at its foundations. For example, foreign merchants encouraged bark collectors to trade by claiming that "there is no King [and]

[1] MM. Delondre and Bouchardat, "The Cinchona Barks and the More Important Questions which Relate to Them," *Pharmaceutical Journal and Transactions* XIV, nos. II, IV, XI and XII (1855): 77-83, 165-168, 513-517, 556-570.

there is no Spain," while telling other groups of bark collectors that the Crown had "opened [the harvesting of cinchona bark] to all those that wanted to extract it."[2] Contraband traders were so convinced of the imminent collapse of Spanish imperial power that they even issued "threats against the employees [of the monopoly]" without fear of reprimand.[3] They guessed correctly. In 1822, the region, formerly known as the *Audiencia* of Quito, achieved its independence from Spain.

Over the next few decades, the nascent South American republics would face a new kind of smuggler – British naturalists looking to transplant the cinchona tree from South America to Southeast Asia.[4] Ultimately, these naturalists succeeded and by the turn of the twentieth century, the Dutch, through plantations of cinchona trees in Indonesia, secured a veritable monopoly on the world's supply of quinine – the anti-malarial alkaloid that French pharmacists Pierre Joseph Pelletier and Joseph Bienaimé Caventou isolated from cinchona bark in 1820. While quinine became one of the most important tools of European imperialism in the nineteenth and twentieth centuries, the case of *quina* does not derive its historical significance solely from its status as "quinine's predecessor."[5] In the eighteenth-century Atlantic World, *quina* was a junction point between the worlds of science, empire, and commerce and, as

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[2] Carlos Suarez to Torivio Montes, Loja, 26 September 1814, ANH/Q, Cascarilla, Box 5, Expediente 13.
[3] Ibid.
[4] Mark Honigsbaum, *The Fever Trail: In Search of the Cure for Malaria* (New York: Farrar, Strauss and Giroux, 2001); Kavita Philip, "Imperial Science Rescues a Tree: Global Botanic Networks, Local Knowledge and the Transcontinental Transplantation of Cinchona," *Environment and History* 1 (1995), 173-200; Lucile Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Garden* (New York: Academic Press, 1979).
[5] Teodoro S. Kaufman and Edmundo A. Rúveda, "The Quest for Quinine: Those Who Won the Battles and Those Who Won the War," *Angewandte Chemie International Edition* 44 (2005), 854-885; Saul Jarcho, *Quinine's Predecessor: Francesco Torti and the Early History of Cinchona* (Baltimore: Johns Hopkins University Press, 1993); M. L. Duran-Reynals, *The Fever Bark Tree: The Pageant of Quinine* (Garden City: Doubleday & Company, Inc., 1946); Norman Taylor, *Cinchona in Java: The Story of Quinine* (New York: Greenberg, 1945).

such, provides a useful vantage point from which to view the relations between all of these enterprises.

The Politics of Knowledge in the Spanish Empire

Historians have often used nineteenth-century Britain as the primary lens for examining science and empire, since the British Empire achieved global dominance in the nineteenth century, in large part through the use of science and technology.[6] In the early decades of historical scholarship on imperial science, Britain and its former colonies proved fertile ground for exploring both science in imperial history and "science as imperial history."[7] While such work is useful for understanding British imperial science, problems arise when the idiosyncrasies of the British case are taken as a model for assessing the complex processes of knowing and governing in other geopolitical contexts. Sciences and empires varied greatly across time and space. By highlighting the unique assemblages of imperial governance and knowledge production in the late eighteenth-century Spanish Atlantic World, *Empire's Experts* reveals not a derivative instance of science and empire but a distinctive one. The Spanish imperial bureaucracy was the primary locus for the production of natural knowledge, which was distributed throughout the structures of imperial governance rather than concentrated in formal institutions of science like royal societies or

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[6] Christine Daniels and Amy Turner Bushnell, eds., *Negotiated Empires: Centers and Peripheries in the Americas, 1500-1820* (New York: Routledge, 2002); Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven: Yale University Press, 2000); Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca: Cornell University Press, 1989); Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981).

[7] Roy MacLeod, ""On Visiting the 'Moving Metropolis': Reflections on the Architecture of Imperial Science," in *Scientific Colonailism: A Cross-Cultural Comparison*, edited by Nathan Reingold and Marc Rothenberg (Washington, D.C.: Smithsonian Institution Press, 1987), 217-249. By "early decades," I mean the 1960s, 1970s, and 1980s in which the history of imperial science grew, in part, out of British imperial history.

academies. From the broader perspective of the entire early modern Atlantic World, Britain appears as just one instance of the various ways in which science and empire interacted.

Nonetheless, some comparison with nineteenth-century Britain helps to illuminate the importance of the *estanco de quina*. Let us consider, for a moment, natural history in Victorian Britain as described in Jim Endersby's recent book, *Imperial Nature*.[8] Endersby portrays the practices of natural history through the biography of botanist Joseph Hooker. In particular, he sets Hooker's career as a botanist in the context of the larger story of an expanding empire, and British botany's path to becoming one of England's "great imperial sciences" in the nineteenth century.[9] This shift was a significant change for botany and botanists, which in the 1820s and 1830s had a low status in the British hierarchy of sciences.[10] In an address to the British Association for the Advancement of Science, philosopher William Whewell demarcated "fact-gathering" from "science." "The mere gathering of raw facts," Whewell said, "may be compared to the gatherings of the cotton from the tree. The separate filaments must be drawn into a connected thread, and the threads woven into an ample web, before it can form the drapery of science."[11] For Whewell and many others botany only could become scientific and philosophical when its practitioners shifted from merely collecting natural phenomena to interpreting and explaining the underlying causes of these phenomena. According to Endersby, many British scientists in the nineteenth century argued that botany would only improve its

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[8] Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008).
[9] Endersby, 34.
[10] Endersby, Chapter 1. Here, Endersby provides evidence from both the papers presented at the meetings of the BAAS and the funding provided by BAAS as well as reviews of botanical texts in popular publications of the time.
[11] William Whewell, *BAAS Report* (1841), xxxiii, quoted in: Endersby, 41.

status through the study of "systematics (the principles and laws of classification), plant anatomy and physiology (structure), and plant distribution (particularly as a way of discovering the laws that governed vegetation)."[12] In this nineteenth-century British vision, botany prior to 1800 was neither philosophical nor scientific.[13]

This notion that to be "scientific" a discipline must engage in more than just collecting and identifying natural phenomena is still common today. Yet, if we apply nineteenth-century standards and definition to the natural sciences prior to 1800, we miss a lot. From this perspective, many of the activities described in the preceding chapters would not count as "science" – even the activities of Spanish botanists. What *Empire's Experts* has shown is that such definitions underestimate the philosophical dimensions of the identification and stabilization of natural phenomena. As Martin Rudwick has shown, there is no such thing as a raw fact.[14] This notion can be extended to the supposedly "natural" objects collected and circulated in the Spanish Atlantic. After all, much of the debate and disagreement among and between botanists, bureaucrats, and bark collectors in the late eighteenth-century Spanish Atlantic was over the identification of cinchona bark and the proper techniques for doing so. Although these debates did not take place in the context of a European academy of science or in the pages of a learned journal, they were no less philosophical. Moreover, establishing the identity of a natural entity in a context of practice within the administrative councils of government was just as fraught with

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[12] Endersby, 41-42.
[13] Classification was one of the central interests of eighteenth-century naturalists, but it was not the only one.
[14] M. J. S. Rudwick, *The Great Devonian Controversy: The Shaping of Scientific Knowledge Among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1985); M. J. S. Rudwick, *The Meaning of Fossils: Episodes in the History of Paleontology* (New York: Science History Publications, 1976).

theoretical, ontological and epistemological questions as any philosophical debate that occurred in Europe's formal institutions of learning and knowledge.

It is also important to recognize that in the various eighteenth-century debates about the cinchona tree and its bark there was no outside "truth" to adjudicate divergent views. The veracity and authority of knowledge were made through social processes. Bark served, in a sense, as a material substratum on which various claimants to the truth about *quina* built their interpretations. Moreover, samples of the bark were constantly in motion – both literally and figuratively – and were a crucial part of many polemics among the empire's experts. Such practices flip common conceptions of center-periphery on their head, especially since the "periphery" of the Spanish Empire was central to this enterprise. Much depended on the work done in the Andean forests of South America because these forests were the only source of *quina*. In addition, it was in Loja and the other *quina*-producing regions that the bark started out intact.

Context was important too, and, in different sociocultural contexts, various experts saw *quina* in different ways – even if they were supposedly looking at the same exact thing. Once stripped from the tree (and sometimes beforehand), *quina* became a malleable object subject to the influence of a bewildering variety of physical, social, and cultural forces, and, since the imperial government engaged a wide variety of experts in the *estanco de quina*, there was no single fixed point from which to identify and understand the bark. As a result, there were as many *quinas*, in a sense, as there were groups of experts employed by the Crown. A pharmacist's *quina* was not the same as a botanist's *quina*, which, in turn, differed from those of an imperial bureaucrat or a bark collector.

Natural knowledge was political in other ways as well. Imperial projects like the *estanco de quina* reveal just how closely intertwined science and empire could be during the Enlightenment. After all, government bureaucracies were key structures that made the production of natural knowledge possible in the Atlantic World.[15] The Spanish imperial bureaucracy simultaneously comprised and defined forms of social organization, networks of circulation, and techniques of collection for the production of knowledge of various kinds. Moreover, this bureaucracy fostered a culture of knowledge production that valued direct observation of natural phenomena and observations from many different experts. The *estanco de quina* in its daily operations exemplifies this approach. Such practical engagements of botanists and other scientific practitioners were just as important and, in some cases, more important than any of their other activities that historians have construed as "more scientific," such as publishing a plant catalogue or assembling a natural history collection.

Bureaucrats, as much as botanists, played a crucial role in the making of knowledge about *quina* and other American botanical products. The imperial bureaucracy and its associated culture of knowledge production made for fertile ground for debate and discord among the Crown's various expert advisors as botanists, pharmacists, physicians, bark collectors, and bureaucrats jockeyed to assert their authority and influence relative to each other. From this perspective, lack of consensus among experts was not necessarily an instance of failure but rather a sign that this apparatus of knowledge production was operating *as it should*. After all, imperial bureaucrats actively sought multiple perspectives and opinions in the course

[15] Commercial networks were also essential for the production of natural knowledge in the Atlantic World, see: James Delbourgo and Nicholas Dew, eds., *Science and Empire in the Atlantic World* (New York: Routledge, 2008).

of making decisions about which policies to endorse. Governance in this view was the weighing and balancing of the variable effects that any policy – such as a royal monopoly – might have on the interested parties. Moreover, as Bourbon reformers worked to reconstitute royal power after 1750, they increasingly made the Crown and its ministries the locus for the adjudication of competing claims.[16] The power to adjudicate was the essence of Spanish imperial power.[17] Since the production of knowledge about New World nature relied on the long distance networks established and maintained by the Spanish state, it should be no surprise that botanists and other experts were also subject to these processes of negotiation and adjudication in the chambers of the Crown and its Ministry of the Indies.

The *estanco de quina* and other projects like it provided a context in which learned experts, such as botanists and pharmacists, had to contend with local experts, such as Pedro de Valdivieso, Miguel García de Cáceres, Miguel de San Andres and the bark collectors of Loja. Here a comparison with pharmacists and botanists in places like London, Paris, or Rome is revealing. These groups did not have the same kind of direct link to bark collectors in South America that Spanish botanists and pharmacists did. In theory at least, a Spanish botanist like Hipólito Ruiz could exert influence over the actual production of the bark. For a pharmacist in England, however, the feedback loop was mediated through the complex and convoluted networks of trade that crisscrossed the Atlantic Ocean. In the context of

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[16] Gabriel B. Paquette, *Enlightenment, Governance, and Reform in Spain and its Empire, 1759-1808* (New York: Palgrave Macmillan, 2008); Gabriel B. Paquette, "Empire, Enlightenment and Regalism: New Directions in Eighteenth-century Spanish History," *European History Quarterly* 35 (2005), 107-117; Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988); D. A. Brading, "Bourbon Spain and its American Empire," in *The Cambridge History of Latin America*, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984).

[17] Colin M. MacLachlan, *Spain's Empire in the New World: The Role of Ideas in Institutional and Social Change* (Berkeley: University of California Press, 1988).

the *estanco de quina*, the practical application and policy implications of knowledge were much more immediate for Spanish botanists, pharmacists, and physicians. This was knowledge produced in a context of application. As a result, the knowledge and politics were virtually indistinguishable. Questions of knowledge were always questions of politics in the context of the *estanco de quina*. In many cases, imperial officials in Spain often requested information and policy recommendations from learned and local experts in the same questionnaire or royal order.

Spanish botanists offered no objection to this arrangement. Instead, they embraced it. *At no point* did any botanist claim that he *just did botany* – or that it was inappropriate for him to make policy recommendations. Botanists, just like the empire's other experts, did not make a strict distinction between fact and value. Yes, their expertise on the natural world provided the basis for their *initial* involvement with imperial governance. However, as a part of the imperial culture of knowledge production, botanists like Casimiro Gómez Ortega, Hipólito Ruiz, José Celestino Mutis, and Vicente Olmedo moved easily from making claims about the natural world to making recommendations on imperial and economic policies. For example, both the published and manuscript works of Hipólito Ruiz and José Pavón were full of suggestions on how to reorganize or improve the production and circulation of cinchona bark. These recommendations were, in turn, supported by their visions of the proper imperial order – a vision in which commerce was central. Other experts including physicians, pharmacists, and local experts also shifted easily from knowledge claims to policy recommendations. Moreover, the receivers of this knowledge and advice never complained that botanists and other experts overstepped their bounds. Recall that in 1787the Archbishop-Viceroy of New Granada referred to José Celestino Mutis as a man "of equal value as political

advisor, philosopher, statist and scientist." [18] Most, if not all, of the knowledge about *quina* (and many other American botanical products) was produced in a context of application making it difficult, if not impossible, to impose a strict cleavage between knowledge or science on the one hand and politics or empire on the other.[19]

Imperial officials relied upon experts that were dispersed throughout the empire from botanists in Madrid to bark collectors in Loja. Consequently, knowledge was also political in the sense that it was the product of negotiations between and within different localities in the empire. The forests of Loja, the merchant guild in Lima, the vice regal court in Santa Fe de Bogotá or the Court in Madrid – all these places constituted different sociocultural contexts with variable standards and values for *quina* in particular and the natural world in general. Empire was the larger context that drew all these places together through a variety of social, cultural, and commercial networks. The question was: which place with its associated values and standards would achieve prominence throughout the network?

In 1751, when the Crown established the *estanco de quina*, the answer to this question was far from clear. At first officials in Spain seemed content to let local

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[18] This quote is from a larger excerpt of Archbishop Viceroy Caballero y Góngora's report cited in: Hermann A. Schumacher, *Mutis, un forjador de la cultura*, translated by Ernesto Guhl (Bogotá: Emprese Colombiana de Petróleos, 1984), 81-82. The original document is listed as: "Oficio de Caballero y Góngora al Marqué de Sonora" Cartagena, 16 April 1787 in: Frías Núñez, 205, n. 151.

[19] In this way, the Spanish imperial culture of knowledge production appears similar to what some science policymakers called "Mode 2" knowledge production, which is knowledge produced in a direct context of application (as opposed to dividing the production of knowledge and its application into two steps known as Mode 1). There has been much debate about this scheme of knowledge production and its implied history. For example, some historians have disputed the notion that Mode 1 knowledge production was every put into practice, and claim, instead, that this conception of knowledge production represents a kind of modernist ideology of knowledge production, see: Lissa Roberts, Simon Schaffer, and Peter Dear, eds., *The mindful hand: Inquiry and invention from the late Renaissance to early industralisation* (Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen, 2007); Helga Nowotny, Peter Scott, and Michael Gibbons, "Introduction: 'Mode 2' Revisited: The New Production of Knowledge," *Minerva* 41 (2003), 179-194; Michael Gibbons et al., *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies* (Thousand Oaks, CA: Sage, 1994).

officials decide what counted as true and good *quina*. As the decades progressed, botanists, and to a lesser extent pharmacists, in Madrid undermined the authority of local experts as they emphasized their own. Such connections and contentions effectively intertwined the politics of knowledge and the politics of *quina* (the social, economic and political structures that fostered certain modes of production of the bark). As a result, the *estanco de quina* represented a "regime of hybrid productivity" in which there was no rigid distinction between the production of natural knowledge of *quina*, of *quina* as a botanical commodity, and of imperial power over this natural resource. All were simultaneously co-produced.[20] More importantly, when one kind of production failed, the others were likely to fail too. To make a rigid distinction between any of these elements in hindsight obscures the interesting and important ways in which these processes were connected. For instance, our understanding of practices like the *repartimento de mercancias* – the system of debt peonage through which merchants, landowners, and government officials exploited indigenous labor for the *estanco de quina* and other enterprises – is enriched by attention to ways in which the production of natural knowledge about *quina* supported or undermined this enterprise. Knowledge about *quina* – its distribution, abundance, and quality of different species – had implications for its production and circulation in commerce.

Each of these dimensions of the politics of knowledge in Spain's *estanco de quina* help to address what otherwise appears paradoxical: Why did relations between science and empire persist even when practical results were not forthcoming? In practice, the two enterprises were almost indistinguishable. The structures of the imperial state often served simultaneously to produce knowledge and enact governance. In addition, when botanists, pharmacists and other learned

[20] Roberts, Schaffer, and Dear, eds., *The Mindful Hand*.

experts on the natural world got involved with the state, they became integrated into an extant imperial culture of knowledge production. Discourses of empire and commerce that circulated in Enlightenment Spain also fostered this entanglement of science and empire. Much of the economic discourse at the time offered a new vision of empire that privileged commerce over conquest – a vision of the reinvigoration of Spain through reaping the economic benefits of its American territories. Looking to the model of the Dutch, the great economic success story of seventeenth-century Europe, Spanish political and economic writers in the eighteenth century suggested that Spain's imperial salvation lay in the development and exploitation of American commodities, especially botanical ones. As shorthand, we might call this the discourse of commercial imperialism. This new approach to empire required commodities as well as knowledge of these commodities, and, since most Latin American commodities in the eighteenth century were natural (often botanical) products, this knowledge was natural knowledge. From this perspective, empire needed experts on the natural world.

This discourse also fostered the intertwining of science and empire because of a remarkable convergence between economic and scientific visions of empire and nature. Both imperial bureaucrats and Spanish naturalists emphasized utility and construed American nature generally as a vast collection of useful things to be exploited commercially and studied scientifically.[21] Certainly, it was not uncommon in the early modern period for the enterprises of science, commerce, and empire to go

[21] Daniela Bleichmar, "Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire," in *Science and Empire in the Atlantic World*, edited by James Delbourgo and Nicholas Dew (New York: Routledge, 2008), 225-252; Paula De Vos, "Natural History and the Pursuit of Empire in Eighteenth-Century Spain," *Eighteenth-Century Studies* 40 (2007), 209-239; Paula De Vos, "The Science of Spices: Empiricism and Economic Botany in the Early Spanish Empire," *Journal of World History* 17 (2006), 399-427.

hand in hand.[22] Yet, this convergence of imperial visions around the concept of utility also rendered science and empire at times indistinguishable. As a result, Spanish botany became a hybrid enterprise serving scientific, economic, and political functions and ends simultaneously.[23] One unique feature of the Spanish Atlantic is that the relations between science and empire achieved a level of profundity not seen in other imperial contexts prior to 1800 – and the discourse of commercial imperialism provided key ideological support for forging of this alloy of knowledge and power.

One of the architects of this commercial discourse was José del Campillo y Cosió, a prominent thinker in the Spanish Enlightenment who had also worked in Spain's Ministry of the Indies. In 1742, near the end of his life, Campillo composed his *Nuevo Sistema de Gobierno Económico para América* in which he urged Spain to give up policies inspired by a "spirit of conquest" in order to pursue "the advantages and utility of commerce." Campillo could not stress the importance of commerce enough and even described it as "that which maintains the body politic, just as the circulation of the blood maintains the natural body."[24] Ultimately, he proposed an economic system in which the American kingdoms would provide agricultural products and other raw materials in exchange for Spanish manufactured goods and suggested that Spanish officials in America focus their efforts on "the cultivation of

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[22] Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007); Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005); Pamela Smith and Paula Findlen, eds., *Merchants & Marvels: Commerce, Science, and Art in Early Modern Europe* (New York: Routledge, 2002).

[23] This claim is true at least for the generation of botanists that came of age in the late eighteenth century. In the nineteenth century, Antonio Cavanilles, Director of the Royal Botanical Garden, worked tirelessly to elminate the utilitarian emphasis of Spanish botany that flourished under Casimiro Gómez Ortega, see: Antonio González Bueno, *Tres botánicos de la Ilustración: Gómez Ortega, Zea, Cavanilles: la ciencia al servicio del poder* (Nivola: Tres Cantos, 2002).

[24] José del Campillo y Cosío, *Nuevo Sistema de Gobierno Económico para América*, edited by Manuel Ballesteros Gaibrois (Oviedo: Grupo Editorial Asturiano, 1993 [1789]), 69.

those products that are most consumed in Europe."[25] This recommendation typifies Campillo's vision of European governments and consumers as the prime movers of commerce in the Atlantic world. In addition, Campillo not only privileged the economic value of nature, but also emphasized the necessity of scientific expertise in the pursuit of this new vision of commercial imperialism.[26]

Spanish botanists readily took advantage of the situation by emphasizing the utility of the study of plants to the state. While European botany had historical ties to commerce, the economic potential of botanical knowledge became particularly inflected in the eighteenth-century Spanish Atlantic.[27] José Quer, Miguel de Barnades, and Casimiro Gómez Ortega, the first three directors of the Royal Botanical Garden in Madrid, all emphasized the utility of their science to state and commerce in their printed works and manuscripts, a perspective that dovetailed with both the needs of the Crown and its new vision of commercial imperialism. This vision of imperial botany came to fruition in the writings and activities of Casimiro Gómez Ortega, Barnades' successor as director of the Royal Botanical Garden.[28] Gómez Ortega, like many of his contemporaries, treated scientific investigation of the natural world as a new mode of Spanish imperialism. In place of territorial expansion, naturalists would help the Crown expand its commercial exploitation of those regions

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[25] Campillo suggested controversially that uncultivated lands be given to indigenous peoples so that they could more directly reap the benefits of their labor and increase the amount of productive land, see: Campillo y Cosío, *Nuevo Sistema*, 16, 125-141, and 175.
[26] See Chapter 2.
[27] Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994); Pamela H. Smith and Paula Findlen, eds., *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (New York: Routledge, 2002); Steffan Müller-Wille, "Nature as Marketplace: The Political Economy of Linnaean Botany" *History of Political Economy* 35 (2003): 154-172; Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005); Paula De Vos, "The Science of Spices: Empiricism and Economic Botany in the Early Spanish Empire," *Journal of World History* 17, no. 4 (2006): 399-428
[28] Casimiro Gómez Ortega to José de Gálvez, Madrid, 23 February 1777, AGI, Indiferente 1544, nn. 3r.

already in its possession. This emphasis on the utility of botany fit neatly into the existing discourse of commercial imperialism: both botanist and bureaucrat envisaged the economic potential in a generally construed American nature but also emphasized the commercial development of specific products.

The Spanish Crown and its Ministry of the Indies responded favorably to this rhetoric and rewarded botanists with patronage and increased standing as exemplified by the botanical expeditions to South America.[29] The Crown's instructions to its botanists reflected the range of motivations for supporting such expeditions. Yet, in the context of the Bourbon program of reform and its commercial discourse, we can imagine that the stated goal of "foster[ing] commerce" resonated with all parties involved. Here, the Crown embraced and reinforced a vision of botany as a means to re-formulate the empire as a commercial enterprise – a further step in the intertwining of science and empire. Such activities were the result not just of overlapping economic, political, and scientific interests of the Crown and its botanists but of a shared vision of the value of nature under imperial governance.[30]

Together the practices of imperial governance and the convergent economic visions of nature and empire explain the persistence of the relations between science and empire in the eighteenth-century Spanish Atlantic World. As some recent work has shown, European science abroad was often a fragile enterprise. The development of *estanco de quina* in the late eighteenth-century Spanish Atlantic is an example of an arrangement in which the relations between science and empire proved fragile yet enduring. It was fragile in the sense that the slightest complications

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[29] Daniela Bleichmar notes that between 1735 and 1800, the Spanish Crown organized and executed a total of twenty-five expeditions to the Americas, including eight natural history expeditions; Bleichmar, "Visual Culture," 10-11. Ten expeditions were sent to study the South Seas and seven were sent in search of the Northwest Passage.

[30] De Vos, "An Herbal El Dorado," 117.

could undermine the edifice of the imperial culture of knowledge production. It was enduring in the sense that the interconnections between botanists, bureaucrats, and bark collectors persisted even without clear practical results. The Crown continued to support the efforts of a variety of experts to know and control *quina* and other American botanical commodities until the dissolution of the majority of its empire in the Americas in the early nineteenth century. As this case suggests, both practices and perceptions blurred the lines between science and statecraft to such an extent that to give up on science would have been tantamount to giving up on the empire.

This characteristic of the relationship between knowledge and governance suggests one way in which the Spanish Atlantic may be more adequately included in historical accounts of modernity. In general, as Jorge Cañizares-Esguerra has most forcefully pointed out, the Iberian World has been ignored if not actively excluded in such narratives.[31] One response to such exclusion has been to take some ready made standard for judging a historical phenomena (such as Renaissance, Enlightenment, industrialization, modernity, or science) and show how such phenomena were manifested in Spain, Portugal, South America, or other parts of the Iberian world.[32] In many instances, other European societies and states have served as the standard bearers of these phenomena. But why should we measure the Iberian World with yardsticks derived from other historical, social, and cultural contexts, such as the British Empire?

It is not my intention here to review in full the existing critiques of such historical approaches, but, instead, to present another – decidedly more relativistic –

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[31] Jorge Cañizares-Esguerra, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World* (Stanford: Stanford University Press, 2006); Jorge Cañizares-Esguerra, "Renaissance Iberian Science: Ignored How Much Longer?," *Perspectives on Science* 12 (2004), 86-125.

[32] As noted by Cañizares-Esguerra, this response has been especially prevalent in the work of historians of science in Spain.

approach.[33] Rather than showing how Iberian case studies meet British (or other) models, I propose that we take greater advantage of the variability captured by terms like modernity and science. Here, let me briefly describe how *Empire's Experts* suggests such an approach through focusing on supposedly "modern" relations between expertise and governance.

Scholarship on the relations between modern science and the state has paid great attention to rule by experts or technocracy.[34] There is a strong tendency in such scholarship to treat these phenomena as unique to the twentieth century, but the history of the *estanco de quina* shows that the involvement and integration of experts into structures of governance has a longer history. To call the Spanish imperial government a technocracy would be anachronistic. Yet, as *Emprie's Experts* has shown, a variety of experts had a hand in imperial governance in the late eighteenth century, especially since the Crown solicited their opinions on policy. While the worries over transparency and democracy, which tend to motivate studies of more recent technocracies, are not necessarily operative for the late eighteenth-century Spanish Atlantic, the Spanish empire illustrates a particular historical formulation in the relations between experts and empires and between sciences and states – well before the word "technocracy" came into being. A more expansive view of the history of technocracy may help us to put its more recent formulations into perspective and suggests one way in which the histories of science and empire, as

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[33] One of the best is provided by David Ringrose in his discussion of the problems of judging Spanish economic history according to the model of the British industrial revolution, see: David Ringrose, *Spain, Europe, and the "Spanish Miracle," 1700-1900* (Cambridge: Cambridge University Press, 1996).

[34] Such work has roots in the classic work of Max Weber, see: "Science as a Vocation," in: *From Max Weber: Essays in Sociology*, ed. H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1958). See also: Harry Collins and Robert Evans, *Rethinking Expertise* (Chicago: University of Chicago Press, 2009); Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge: Harvard University Press, 1990); Frank Fischer, *Technocracy and the Politics of Expertise* (Newbury Park: Sage Publications, 1990).

well as science and technology, in the early modern period have bearing on current discussions and debates about science and the state. Moreover, by recognizing the technocratic tendencies of early modern states, this approach suggests one way in which the Iberian World did, in fact, participate in the emergence of modernity.

Coda: Empire in a Box

One of the last *quina* shipments for the royal monopoly arrived in Madrid in 1806 just a few years before the dissolution of the *estanco* and Spain's empire in America. Following the usual protocol, the Crown asked a group of experts to review the bark and determine its quality and utility. This group included two botanists, Hipólito Ruiz and José Pavón, and a pharmacist of the Royal Chamber, Castor Ruiz del Cerro.

Upon reviewing three of the boxes of *quina*, the examiners produced divergent assessments of the shipment. While the pharmacist, Ruiz del Cerro, found the bark to be "sufficient" for royal purposes, Ruiz and Pavón withheld their endorsement of the bark's utility.[35] These differences derived from their views on what was in the boxes. While Ruiz del Cerro asserted that this *quina* "was the same species that had always come to the Royal Pharmacy without any other [species] mixed in," Ruiz and Pavón asserted that the *quina* was actually a mixture of two kinds of bark known as "*cascarilla colorada* and *amarilla*" (colored and yellow *cascarilla*).[36] Once again,

[35] The original reports from Ruiz, Pavón, and Ruiz del Cerro remain to be found. This account is taken from an 1808 report to the Head Pharmacist of the Royal Pharmacy by Gregorio Bañares, a Chamber Pharmacist to the King, see: Gregorio Bañares, "Informe sobre la Memorio hech apor el Doctor D[o]n Fran[cis]co Josef Caldas del estado de las Quinas en general y en particular de la de Loxa," Madrid, 28 January 1808, AGI, Indiferente 1557, fols. 874r-905v.

[36] Here, as explained by Bañares, Ruiz and Pavón were following the opinion of their "disciple," Juan Tafalla, a botanist in Peru who continued the operations of the botanical expedition to Peru after Ruiz and Pavón returned to Spain in 1788. On August 15, 1806, Ruiz

expert disagreement left the Crown without a clear course of action. If Ruiz del Cerro was right, then the Royal Pharmacy could use the bark. If Ruiz and Pavón were right, then the bark must be burned or, at best, sold as a dyestuff. While measures had been put in place to protect the bark from physical degradation and fraud, the empire's experts still disagreed on fundamental issues such as the number of species of cinchona tree, which kind of bark was the best, and how to distinguish one variety of bark from another. Such questions about the identity of this scientific object proved just as intractable as the ones that nineteenth-century botanists would tackle regarding plant systematics, physiology, and distribution.

One contemporary observer, Gregorio Bañares – a respected pharmacist with ties to the Crown, the Army, the Royal Academy of Medicine in Madrid, and the Royal College of Physicians – considered the botanists to be at the root of the problem. [37] In his 1808 report to the royal pharmacy, Bañares castigated the botanists for using the phrase "it seems" (*al parecer*) to express their view that the *quina* in the shipment was actually a mixture of two different kinds of bark.[38] Betrayed by their choice of words, Ruiz and Pavón failed to provide the Crown with a definitive assessment of whether the shipment should be used or destroyed. Bañares, in contrast, did not mince his words. He declared that the two botanists had put "everything in doubt," and explained that use of the phrase "it seems" was akin "to saying nothing [at all]."[39]

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and Pavón published a summary of a letter from Tafalla in the *Gaceta de Madrid*, in which they noted that Tafalla noted that the *quina* sent from Loja to the Royal Pharmacy was a mixture of "*cascarilla colorada y amarilla*," see: *Gaceta de Madrid*, no. 67 (15 August 1806): 699-701.

[37] Bañares listed his affiliations on the title page of a published pamphlet on *quina*, see: Gregorio Bañares, *Memoria sobre las ventajas y utilidades de la quina Buena y perjuicios de la mala* (Madrid: Imprenta Real, 1807).

[38] Gregorio Bañares, "Informe sobre la Memorio hecha por el Doctor D[o]n Fran[cis]co Josef Caldas del estado de las Quinas en general y en particular de la de Loxa," Madrid, 28 January 1808, AGI, Indiferente 1557, fols. 874r-905v.

[39] Bañares writes, "al parecer, que no es decir nada," fol. 882.

Ruiz and Pavón had good reason for their equivocation. After all, as good followers of Linnaeus, they would have considered it impossible to make a definitive identification of a tree species by its bark.[40] Certain classification for botanists required at the very least a sample of the tree's flowers.[41] Bañares saw things differently. Ruiz and Pavón's strict adherence to botanical method was an obstacle to the production of useful knowledge and, by extension, an obstacle to imperial governance. In trying to be good botanists, they ended up being bad advisors.

Opening (and closing) boxes was a central, if mundane, material practice of the *estanco de quina*. Opening boxes has also been a central conceptual practice in this dissertation, and in historical and social studies of science generally.[42] Following boxes of bark and their openings at various locations throughout the Spanish Atlantic has required some opening of concepts like science, empire, and modernity. In the *estanco de quina*, the main function of boxes was to mitigate the forces of impurity that threatened their contents. After all, bark collectors and imperial officials worked hard to produce these little pieces of the natural world and wanted to keep them separate from the rest of nature. In this sense, *quina* was an artifact not simply a natural object.[43] Europeans also used boxes, literally and conceptually, to impose divisions on American nature so as to make it knowable, governable, and useful.[44] In

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[40] Ruiz and Pavón were required by the Crown to follow the Linnaean method.
[41] Ruiz and Pavón had emphasized precisely this methodological point in their debate with José Celestino Mutis.
[42] Bruno Latour has used this imagery and approach most prominently, see: Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy* (Cambridge: Harvard University Press, 2004); Bruno Latour, *We Have Never Been Modern* (Cambridge: Harvard University Press, 1993).
[43] Jim Endersby makes a similar claim about natural historical specimens in Victorian Britain, see: Endersby, 18 and 55.
[44] The literature on European perceptions of non-Europeans is vast. Some examples include: Stuart B. Schwartz, ed., *Implicit Understandings: Observing, Reporting and Reflecting on the Encounters between Europeans and Other Peoples in the Early Modern Era* (Cambridge: Cambridge University Press, 1994); Anthony Pagden, *European Encounters with the New World from Renaissance to Romanticism* (New Haven: Yale University Press, 1993); Anthony

this way, botanists, bureaucrats, and bark collectors were engaged in analogous and, at times, overlapping enterprises. Boxes were an important imperial technology and remain a useful metaphor for imperial epistemologies.

Historical scholarship has also made use of boxes to produce and preserve the purity of matters like "science" and "empire" or "knowledge" and "politics."[45] All attempts to divide and contain social or natural worlds rely on some principle of selection. Consequently, not everything ends up in boxes, but only those things that historians (or imperialists) deem useful or valuable. *Empire's Experts* has offered some exploration of certain matters that do not quite fit into our conceptual boxes. Upon opening the boxes of science and empire, we find much that supposedly does not belong there – much like the royal pharmacists in eighteenth-century Madrid, who found that the boxes of the royal monopoly guaranteed neither the stability of natural knowledge nor the durability of imperial power.

Grafton, April Shelford, and Nancy Siraisi, eds., *New Worlds, Ancient Texts: the Power of Tradition and the Shock of Discovery* (Cambridge: Harvard University Press, 1992); Fredi Chiappelli, ed., *First Images of America: the Impact of the New World on the Old* (Berkeley: University of California Press, 1976).

[45] Latour, *We Have Never Been Modern*; Latour, *The Politics of Nature*.

APPENDIX A

Officials of the Imperial Bureaucracy (c. 1750-1800)

Ministers of the Indies

José de Carvajal y Lancaster (r. 1748-1763)

Juan Pizarro y Aragon (r. 1763-1771)

Julian de Arriaga (r. 1771-1776)

José de Gálvez y Gallardo (r. 1776-1787)

Francisco Monino (r. 1787-1792)

Antonio de Porlier, Marques de Bajamar (r. 1792-1809)

Viceroys of New Granada

José Alonso Pizarro, Marques de Villar (r. 1749-1753)

José Solís Folch de Cardona (r. 1753-1761)

Pedro Mesía de la Cerda (r. 1761-1772)

Manuel de Guirior (r. 1772-1776)

Manuel Antonio Flores (r. 1776-1781)

Juan de Torrezar Díaz Pimienta (r. April 1, 1782-June 11, 1782)

Antonio Caballero y Góngora (r.1782-1788)

Francisco Gil de Taboada y Lemos (r. 1788-1789)

José Manuel de Ezpeleta (r. 1789-1797)

Pedro Mendinueta y Múzquiz (r. 1797-1803)

Viceroys of Peru

José Antonio Manso de Velasco, Conde de Superunda (r. 1746-1761)

Manuel de Amat y Juniet (r. 1761-1776)

Manuel de Guiror (r. 1776-1780)

Agustín de Jáuregui y Aldecoa (r. 1780-1784)

Teodoro de Croix (r. 1784-1790)

Francisco Gil de Taboada y Lemos (r. 1790-1796)

Ambrosio O'Higgins, Marquis of Osorno (r. 1796-1801)

Presidents and Regents of Quito

José Diguja (r. 1767-1776)

José García de Leon y Pizarro (r. 1776-1783)

José Villalengua y Marfíl (r. 1793-1789)

Juan Antonio Mon y Velarde (r. 1789-1790)

Estanislao Joaquín de Andino (r. 1790-1796)

Fernando Marquez de la Plata (r. 1796-1801)

Corregidores de Loja

Gabriel de Piedrahita y Saavedra (r. 1754-1755)

General don Pedro Manuel Palacios Sandoval y Sánchez (r. 1756-1760)

Ignacio Checa Carrascoso (r. 1761-1765)

Manuel Daza y Fominaya (r,. 1765-1770)

Manuel Fernández de Avilés (r. 1770-1773)

Pedro Xavier Valdivieso y Torres (r. 1773-1784)

Manuel de Vallano y Cuesta (r. 1784-1790)

Tomás Ruiz Gómez de Quevedo (r. 1790-1820)

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