



VISIBLE EMPIRE

*Botanical Expeditions & Visual Culture
in the Hispanic Enlightenment*

DANIELA BLEICHMAR

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A MIS PADRES, *con amor y gratitud*

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INTRODUCTION

Natural History & Visual Culture in the Spanish Empire



A Visual Archive

This is a book about twelve thousand images. Created between the late 1770s and the early 1800s, these works depict plants from all corners of the Spanish empire outside of Europe (fig. I.1).¹ The vast number of illustrations reflects the immensity of the Spanish Indies, which at the time comprised a significant swath of the globe: much of South America; all of Central America; the islands of Cuba, Puerto Rico, and half of Hispaniola in the Greater Antilles; a great part of North America; and the Philippine Islands (fig. I.2).² Many of these images are the result of close collaborations between naturalists and artists who participated in four scientific voyages that the Spanish Crown funded to survey the natural history of its imperial territories: the Royal Botanical Expeditions to Chile and Peru (1777–88), New Granada (1783–1816), and New Spain (1787–1803), as well as the expedition to the Americas and Asia led by naval officer Alejandro Malaspina (1789–94).³ Additional illustrations arrived in Madrid from contributors throughout the empire, such as the Spanish botanist Juan de Cuéllar, who worked in the Philippines in the 1780s and 1790s. Botanical travelers were charged with surveying the flora of the Spanish Indies, exploring its economic potential, and gathering collections for Madrid’s Royal Botanical Garden and Royal Natural History Cabinet. In addition to pursuing these tasks, they focused on visual materials to a degree that may be surprising today. **They produced many more images than textual descriptions, specimen collections, taxonomic classifications, or marketable natural commodities.** The existence of this exten-

FIGURE I.1. (*facing*)
Botanical illustrations from
the Spanish natural history
expeditions (1777–1816).



FIGURE I.2. The Spanish empire, ca. 1770.

sive visual archive, the enormous efforts to which naturalists went to employ, train, and supervise artists, and their frequent discussions of natural history illustrations all suggest that images were of central importance to the exploration of American nature.

Yet these images have received scant attention. Historians of science traditionally have not considered images as central loci of knowledge production, and art historians have for the most part disregarded scientific illustrations.⁴

From the perspective of art history, these are minor works. To begin with, their subject matter is not exalted. As natural history illustrations, they do not belong to the artistic genres that held the most prestige in the period they were made, those of religious, mythological, or historical painting. Nor are they human portraits, the working painter's staple and the next genre in the artistic hierarchy. They are not even genre scenes or still lives. Their medium is likewise humble: they are watercolors and tempera paintings on paper rather than oil paintings. None of the artists who created them has achieved great fame over the centuries, and most of them are more likely to be viewed as trained artisans than skilled painters, if not dismissed altogether. In most cases, attributing a drawing or a painting to a specific hand is impossible, since few are signed works. To further confuse any desire to ascertain authorship, a painting often is not the work of a single artist but represents the collaboration of a workshop, each man—for as far as we know they were all men—specializing in a single step of a complex process. Though historians know that at least sixty artists devoted decades of their lives to creating these works, we know very little about most of them or about how exactly they participated in this vast enterprise. These images, many of them strikingly beautiful, have never formed part of the permanent exhibit of a major art museum. Most likely, they never will. As scientific illustrations, they tend to fall through the scholarly cracks, dismissed by most art historians and historians of science as neither great art nor important science. They are the type of image we tend to find in doctors' waiting rooms rather than in art museums, condemned to the lowly status of decoration.

And so, why devote a book to them? The dozens of neatly stacked archival boxes that preserve these paintings inside a temperature-controlled vault in Madrid's Royal Botanical Garden are the evidence through which we can trace two related histories that remain largely unknown: the history of Spanish scientific expeditions in the Enlightenment, which are for the most part ignored outside the Hispanic world, and the history of visual evidence in both science and administration in the early modern Spanish empire. Scholars have for the most part neglected these visual materials in their studies of the Spanish natural history expeditions, which they have approached in terms of political, intellectual, and economic motivations.⁵ While I also consider these aspects in my analysis of the expeditions, I use the impressive visual archive that they generated as my entry point into their story. After all, these illustrations mattered immensely to the naturalists and artists who traveled so far and worked so hard to make them, and to the naturalists and imperial administrators who eagerly awaited them in Europe. That value is reflected in the enormous investment required to produce such a corpus. In today's world of online databases, instant electronic downloads, and laser printers, it takes some effort to grasp the meticulous and dedicated effort it took to craft a single one of these paintings, let alone so many thousands. Every single illustration entailed multiple steps, and required the

coordination and close collaboration of large teams that included collectors, naturalists, and various artists. Each image embodies not only a plant but also multiple observations, decisions, negotiations, and types of expertise. The process of producing an illustration was laborious and time consuming, and in most cases took place under trying circumstances as artists and naturalists traveled together in difficult conditions.

Two of the travelers, Spanish naturalists Hipólito Ruiz and José Pavón, characterized their botanical exploration of Chile and Peru (1777–88) as the most brutal of pilgrimages. Only other voyagers, they claimed, could fully appreciate

how many and how great were the travails and dangers that we underwent in the eleven years during which we wandered through desert lands without roads: the heat, exhaustion, hunger, thirst, nakedness; the lack of every single thing; the storms, earthquakes, plagues of mosquitoes and other insects; the continual risk of being devoured by tigers, bears, and other wild animals; the threat of thieves and heathen Indians who lay in wait for us; the betrayals from our very own slaves; the falls from precipices, from mountains, and from the branches of the highest trees; wading through rivers and floods . . .

As if the hardships of travel were not enough, Ruiz and Pavón also suffered the death of one of their artists, a great fire that consumed the results of years of work, and the loss of many of the remaining materials to shipwreck.⁶ Despite these challenges, the naturalists delivered to Madrid a significant herbarium (collection of dried plants) and approximately 2,300 paintings of South American specimens. Back in Spain, Ruiz and Pavón labored for an additional fourteen years to publish a *Flora Peruviana*—an immensely challenging endeavor, as attested by the fact that this was the only one of the Spanish expeditions examined in this book that managed to produce a major publication at the time.⁷

The Spanish natural history expeditions were expensive undertakings, unpredictable and fraught with peril, yet they managed to produce a magnificent body of images that serves as a testament to the ambition and reach of the Spanish empire. These illustrations suggest that knowing and making visible were inextricably intertwined. This study is an attempt to understand not only the meanings of the images, written words, and collections that emerged from such travails, but also the reasons for their creation.

Visual Epistemology, Natural History, and Empire

This book uses the spectacular visual archive assembled by these Spanish natural history expeditions to explore the connections among natural history, visual culture, and empire in the eighteenth-century Hispanic world. I examine the

many ways in which an eighteenth-century expedition tried to know the world, which included images, collections, texts, experiments, observations, and correspondence networks, and present the manufacture and use of images as key techniques in the processes of investigating, ordering, explaining, and possessing—or attempting to possess—nature.

I began this project with a set of simple questions: What is this strange beast, the scientific expedition as artistic workshop, painting as exploration? Why did Hispanic naturalists and imperial administrators care so much about images—what work did visual materials do for them? What to make of these images, hybrids of art and science, and in some cases of European and American styles? I was also interested in methodological questions: How to approach a visual archive of this magnitude, and how to relate it to written sources and collections of objects? How can historians use these materials not only for visual analysis but also as historical sources, treating the visual archive as seriously as the textual archive? Simple as they may be, these questions have rarely been asked of these materials. Placing visual culture at the center of an analysis of these scientific voyages allows us to rethink the expeditions as well as to ask larger questions about the role of images and objects not only in constituting and communicating facts in the Spanish empire but also more generally in the production and circulation of knowledge across distances.

The Spanish eighteenth-century natural history expeditions, I argue, acted as visualization projects. One of their key goals was to make global nature visible across distances through images and collections. Visibility, in turn, would make imperial nature movable, knowable, and—ideally—governable. When I describe expeditions as visualization projects, I am not resorting to a figure of speech but to the very concrete ways in which they overwhelmingly privileged visual ways of knowing over other methods of inquiry, and visual statements over other research results. The Spanish expeditions shared this visual emphasis with many other voyages: almost without exception, European expeditions at the time employed artists (often many more of them than naturalists) and produced great numbers of illustrations. At home or abroad, European naturalists used images in their daily work and wrote abundantly about them in their journals and correspondence. Pictures deserved special mention in the inventories of collections shipped back to Europe and frequently received the most attention as crates were unpacked and unloaded. When traveling naturalists sought to honor a patron, scientific or administrative, or needed to ask a favor, images constituted the preferred instrument of persuasion. At a time when European powers undertook the exploration of distant natures as a matter of key economic, political, and scientific importance, the production of images represented a central practice for investigating imperial nature and incorporating it into European science. Thus, the importance of images to natural history is by no means an exclusively Spanish story, though as I will address the way in which these particular illustra-

tions interacted with an imperial project was distinctive to the Hispanic world.

My central concept for explaining why images mattered so greatly in eighteenth-century natural history is what I term “visual epistemology”: a way of knowing based on visuality, encompassing both observation and representation. Eighteenth-century European natural history—both in the Spanish empire and elsewhere—was a dominantly visual discipline, with a methodology based on acts of expert viewing. Naturalists developed specialized ways of seeing through multimedia training that involved plants, texts, and images. The work of natural history required carefully conducted and strongly enforced practices of observation and representation. Trained as observers and representers and working closely with artists, naturalists constructed a visual culture based on standardized ways of viewing nature and on pictorial conventions guiding its depiction. They resorted to images and visual metaphors in research and communication, be it published or manuscript. Going beyond sight, they aspired to insight.

For naturalists, images were much more than simple illustrations: they provided an entry point into the exploration of nature, functioned as a key instrument for producing knowledge, and constituted the foremost result of their investigations. Botanists’ work consisted in gathering plants, closely observing their flowering structure, and then collating this visual evidence against the illustrations and textual descriptions in published works in order to classify new specimens or rectify mistakes, in this way staking claims about the novelty and significance of their observations. Images operated at every point of a trajectory that moved from the collection of natural data to its comparison to its incorporation into a global inventory of nature through textual description and visual representation. Visual epistemology is what the philosopher Ian Hacking, with a nod to the art historical category of style, terms a “style of reasoning”: a specific way of knowing that has its own techniques, materials, questions, and answers. “Truths of certain sorts,” Hacking writes, “are what we obtain by conducting certain sorts of investigation, answering to certain standards.”⁸ Eighteenth-century naturalists thought visually, worked visually, and posed visual questions to which they offered visual answers.

Furthermore, the visual culture of natural history was global both in deed and ideology. Naturalists practicing European natural history, regardless of nationality and whether in Europe or abroad, understood their tasks in similar ways, consulted the same books, and looked at the same images. This is not to suggest that there existed a single viewpoint: differences of opinion were frequent and at times bitter. Nevertheless, most naturalists consulted the same titles, whether they agreed with them or not. This resulted in a large degree of consensus about what the critical issues were, as well as a distinct sense of the state of this constantly evolving field at any given moment. Furthermore, conceptual disagreements tended to be about systems and words, not modes of representation. There might have been competing theories and a multitude of methods, but there was basically a single pictorial idiom for natural history il-

illustrations, widely accepted and used. For this reason, European natural history had a highly regimented look, whether a naturalist was English, French, Dutch, or Spanish; whether he conducted observations in the British countryside or the Amazon; and whether his book was published in Vienna or Madrid. Naturalists agreed not only on their adherence to a prevailing iconography and style, but also on the value they assigned to the visual, the way in which they produced and used images, and the criteria they used to judge illustrations.

This shared visual language allowed naturalists to engage in what Lorraine Daston and Peter Galison have termed “collective empiricism.”⁹ Global natural history was a group practice, and naturalists used specimens, letters, and—above all—images to corroborate or challenge one another’s observations despite geographical distance. Visual epistemology was by no means a peculiarity of the Spanish expeditions or limited the Hispanic world; it was common to European natural history in general and to the domestication of foreign nature in particular. The manufacture and use of images was a central practice through which European naturalists investigated, explained, and attempted to possess nature, particularly foreign and exotic nature.¹⁰ Illustrations constituted both a vital technique and one of the more important results of natural history as a field of study.

What, then, did these images do? Why were they so crucial? Images allowed eighteenth-century natural history to abstract information, visually embody expert observations, and mobilize across distances plants that remained in crucial ways unseen and unknown, even three centuries after Europeans had first encountered New World nature. Naturalists moved constantly between the world of objects “out there” in the field and the world of objects “in here” in collections. Images bridged the gap between travel and stasis, the field and the cabinet, by providing a domesticated paper nature that was always and perfectly available for virtual exploration. Natural history illustrations offered flowers forever in bloom, fruits permanently ripe, animals caught in clarity and permanence.

While part of this story is one of a pan-European visual culture of natural history, another part is specific to the Hispanic world. In the Spanish empire, visual epistemology operated not only in natural history but also as part of an imperial apparatus that had a long-established tradition of using images as documents and of deploying visual evidence for administrative purposes. In the Hispanic world, images helped to discover, document, persuade, and make arguments. They had a privileged status for authenticating and communicating both locally and as part of the imperial project of governing at a distance. From the earliest days of exploration and settlement, the budding Spanish imperial administration requested images from its new territories, asking for maps and depictions of the peoples, plants, and animals of these new lands. Visual appetite came to characterize a Hispanic way of knowing the empire. The eighteenth-century natural history expeditions were but a portion of a much larger project of making the empire visible in order to know and exploit it, which involved a

varied cast of characters from the peninsula and the viceroyalties. For over three centuries, in a wide variety of contexts and for a huge range of purposes, the task of making the New World knowable and governable involved making it visible.

The naturalists in the Spanish expeditions therefore inhabited two overlapping domains in which observation and representation served as powerful epistemological tools: a scientific sphere and an imperial sphere. Both science and empire aspired to universality, and both found images important tools for extending their reach. Spain and its Indies were connected through a visual loop: images in various media traveled back and forth across the Atlantic and the Pacific, usually accompanied by words and often also by objects. If Spain repeatedly requested images from its territories, the viceroyalties produced visual materials not only in response to these demands but also of their own initiative and pursuing their own interests. The Hispanic world functioned as a visual machine, churning out a prodigious quantity of images that made this vast empire visible locally and across distances.

As part of my focus on the processes of observing, representing, and transporting imperial nature, I draw a distinction between making visible or visualizing, on the one hand, and seeing on the other. Very few eyes managed to examine the botanical illustrations I discuss in the period in which they were produced, in large part because the vast majority did not reach print at the time. But though questions of circulation and reception are undoubtedly important, they are not the focus of my investigation. Despite lack of publication, the fact that naturalists, artists, and administrators concurred on the importance of visual materials and that the expeditions produced over twelve thousand images are testimonies to the centrality of visual epistemology, and these illustrations remain valuable both as objects of study and as historical sources. Making visible was a process that involved not only the final viewing of an image but also, as importantly, the acts of observation and representation that yielded the illustration. Making visible had both pragmatic and symbolic dimensions, and was widely understood as an integral part of the processes of producing knowledge and enacting governance. Whether in the end images managed to be seen or not, whether they proved themselves useful or not, they had great epistemic and cultural value. Visual materials were considered necessary and created continuously, by multiple makers, for various purposes, and in astonishing numbers.

Visual History: Connecting the Histories of Science, Art, and Empire

Mining the visual archive that the Spanish natural history expeditions produced requires an interdisciplinary approach. In this book I have drawn on research in the histories of science, art and visual culture, and the early modern Hispanic world. My aim is not only to contribute to these various fields but also to bring them into conversation with one another. In a way, this book functions as the

type of cross-cultural visualization project it analyzes, seeking to make the cultural and social histories of science, art and visual culture, and the transregional Spanish empire visible to one another.

Methodologically, I pursue what can be termed “visual history,” exploring what history looks like when it is written using images not as mere illustrations and not always as the final object of analysis but also as historical sources. Historians tend to use visual sources in their publications, teaching, and public presentations for many of the same reasons that the historical figures who populate this book resorted to them: to communicate and convince, to help the memory, to make a point more vividly or clearly, to delight and entertain. But only rarely do contemporary historians treat visual materials with the same degree of rigor that we apply to textual documents, or for the same interpretive purposes. If as historians we insist on sensitivity to actors’ categories, on avoiding anachronism, and on the critical interpretation of texts in context, then we should apply these same principles to visual sources.¹¹

This book pursues visual history in five ways. First, through close and detailed visual analysis, since images themselves have much to tell us about the ways in which they were used, the work they did, and the approaches and expectations of those who made and saw them at the time. Second, by looking outside the picture frame to examine the processes of making and using visual materials, because these practices evince meanings that emerge only in historical context and cannot be deduced from images alone. Third, by connecting images to materials in other media, principally texts and natural history specimens. Fourth, by examining the various types of work that images performed, in different contexts and for different viewers. And finally, the book pursues visual history by examining an expansive range of visual materials that includes multiple media and genres, and by studying images that fall both within and outside the usual purviews of the histories of art and visual culture. What makes this exploration possible is the magnificent archive that the Spanish expeditions created: a visual collection of thousands of images; a rich textual collection consisting of manuscript journals, letters, scientific treatises, and administrative memos and reports, as well as printed sources; and a material collection composed of natural history specimens. The pages that follow examine this visual, textual, and material archive and track the day-to-day practices that produced it in order to tell the intertwined stories of imperial science and visual culture in the eighteenth-century Hispanic world.

A Guide to the Voyage

In the first chapter, I introduce the Spanish imperial natural history expeditions and outline their mode of work, explaining their joint pursuit of visuality and utility. I consider the expeditions as part of an ambitious program of

imperial science launched in the Hispanic world during the reigns of Charles III and Charles IV of Spain (1759–1808). This program pursued multiple and interconnected objectives, including taxonomic botany, economic botany, and collecting. It involved not only expeditions but also peninsular and viceregal institutions—most notably botanical gardens and natural history cabinets—as well as the recruitment of members of the colonial administrative network as scientific informants. This large-scale effort brought together European and American naturalists, artists, administrators, and various local inhabitants who collaborated to make imperial nature visible. Natural history, especially botany, promised to address Spanish concerns with utility, profit, and the search for renewed political and economic power both in the peninsula and throughout the empire. In the Hispanic world, Enlightenment renovation was framed not as a new development but rather as a way of restoring the empire to a more prosperous condition by reconnecting to past successes, particularly sixteenth-century achievements: a botanical *reconquista*. And, drawing on a long-established tradition of imperial information gathering, visual materials were central to investigating New World nature.

The second chapter examines the importance and operation of visual epistemology in eighteenth-century natural history. I discuss the specialized ways of looking that came to characterize naturalists at the time, and the process through which they trained their eyes as diagnostic tools. Books were indispensable for learning to observe like a naturalist, as well as for the everyday work of traveling naturalists. This was particularly the case for travelers investigating non-European territories, who carried with them as many illustrated books as possible and used them frequently in the field. To a large extent, their job entailed creating an inventory of the flora they explored and classifying it in order to help compile a global catalog of nature. Naturalists contributed to this collective project by correcting erroneous information or introducing new species. For this reason, they found it imperative to be aware of which plants had previously been described in publication and which had not. This involved comparative acts of multimedia seeing, with naturalists confronting newly collected specimens against printed images and texts in order to ascertain the novelty of their observations. Although all three media were necessary, visual materials had important advantages over words and things.

While traveling naturalists used printed images to interpret what they encountered in the field, some cabinet naturalists found that access to unpublished illustrations allowed them to bypass travel altogether. A naturalist in Europe, whether alone in his cabinet or surrounded by students at a botanical garden, depended on the voyager who had faced discomforts and dangers in order to obtain new data. This made the images from the Spanish expeditions particularly attractive to European botanists who used these paper floras to conduct long-distance observations of American nature from Madrid, Montpellier, and Geneva. Sometimes, the traveling naturalist and the cabinet naturalist consid-

ered one another collaborators. However, collective empiricism could also be competitive, with travelers worrying about losing years of work should someone else manage to beat them to publication. A heated debate between the Madrid-based botanist Antonio José Cavanilles and Hipólito Ruiz, one of the leaders of the Chile and Peru expedition, shows that cabinet and field naturalists vied for the right to claim authorship over observations, and that they framed much of that controversy in visual terms.

The third chapter offers a close look at the expeditions' botanical illustrations, discussing what they look like, how they were made, and how they were used in multiple contexts, most notably taxonomic identification and patronage in both scientific and courtly settings. Given the importance of visual materials, the expeditions' naturalists went to great efforts to hire artists. They turned to the Fine Arts Academies in Madrid and Mexico City and also to prestigious American workshops, and hired artists that they then retrained as botanical draftsmen. Given the specialized parameters of natural history visual epistemology, botanists worked extremely closely with artists, specifying what their works should include and ignore as well as what exactly these images should look like. José Celestino Mutis, director of the New Granada expedition, was especially devoted to the idea of painting as botanical exploration. He assembled a workshop unique in its size and productivity, and supervised his artists particularly fastidiously. The New Granada artistic workshop was the largest of any scientific endeavor anywhere in the world at the time, and yielded an unparalleled total of about 6,500 botanical illustrations. I provide a close analysis of images from this expedition in particular, focusing on the ways in which they adhere to and depart from European models. This is an important issue in the study of images and objects produced by non-European artists based on European models: how do we interpret the differences we often find between the two? Going beyond notions of original and copy, and the opaque catch-all of "hybridity," I argue through visual and textual evidence that in the case of the New Granada expedition these differences are not the result of the inability of American artists to reproduce European standards but rather of a conscious effort to develop a distinctive style that Mutis and his artists considered better suited to botanical illustrations.¹²

In chapter 4 I turn to metropolitan and viceregal attempts to locate and exploit valuable natural products like pepper, cinnamon, tea, and cinchona in the Spanish Indies. Naturalists and administrators alike hoped that these investigations would allow Spain to compete commercially with British, French, and Dutch trade in botanical commodities. Although naturalists used images in their efforts to establish taxonomic identities, these particular botanical goods required additional methods of investigation such as chemical analyses, thus showing the limits of the visual. Attempts to transport foreign plants to Spain in order to grow them in the peninsula also failed. The expeditions proved better at taxonomic botany than at economic botany, and while they succeeded in

producing an impressive visual archive they did not manage to make imperial nature profitable.

The chapter uses these experiments in economic botany to examine the geopolitics of natural history investigations in the Hispanic world, exploring the relationship between Madrid and the viceroyalties as well as those among imperial locales. My analysis of various viceregal initiatives refutes center-periphery models of knowledge production, demonstrating that the Spanish empire functioned instead as a network with multiple nodes and competing interests. Nor were the expeditions purely extractive projects: while they sent or took back to Spain both materials and information, they also created institutions, trained students, and pursued projects in the viceroyalties. As a result of their lengthy American stays, their members developed strong ties to both Iberian and local institutions and interests. In some cases, their involvement with local projects eventually competed with or even surpassed metropolitan agendas. Although Spain always remained the central reference point from which orders, funding, prestige, and even value emanated, the expeditions nevertheless set down deep roots in the Americas.

The final chapter expands my inquiry into the geopolitics of knowledge by turning once again to the visual record. I suggest that the Spanish natural history expeditions labored not only to make imperial nature visible, but also to make much of the empire invisible. Their images show isolated botanical fragments floating on overwhelmingly blank pages. This extremely selective pictorial approach erased geography, turning local plants into decontextualized natural specimens that could circulate globally. This was the manner mandated by European natural history, as evidenced by the published models that the expeditions used as well as by the allegorical frontispieces to these books.¹³ But this was not the only possible way of visualizing the empire. During the same decades in which the expeditions took place, artists working independently of one another in sites across the Hispanic world developed new types of paintings that focused to an unprecedented degree on the flora, fauna, and human types of Spanish American regions, insisting on their inalienable interconnectedness. The examples I discuss from this tradition are a series of six *cuadros de mestizaje* (miscegenation paintings) from Quito, casta paintings from Mexico, and a painting of the natural history of Peru. Despite the differences between these two modes of representation—one insisting on global white space, the other on profusions of local color—they were both premised on the value of visual materials for collecting, classifying, and transporting American nature, making it visible across distances.

In this book, I bring the histories of science, art and visual culture, and the Hispanic empire into conversation with one another. I trust that readers coming to this study from different perspectives will discover enriching insights arising

not only from the lines of thought that are familiar to them, but also from finding themselves in the company of authors and ideas that are new to them or not central to their own disciplines. As the Spanish eighteenth-century naturalists so vividly tell us, travel into foreign territories is as often fascinating and enlivening as it is uncomfortable, disconcerting, or even frustrating. Nevertheless, they never doubted the importance of pushing ahead in their explorations of lands that combined the familiar with the strange, for confusion often led to the excitement of new discoveries.



FIGURE 1.1. José del Pozo (Malaspina expedition), self-portrait drawing a Patagonian woman, [1790], pen and wash drawing, 7.1 × 9.4 in (18 × 24 cm). Location unknown. Reproduced from Carmen Sotos Serrano, *Los pintores de la expedición de Alejandro Malaspina*, 2 vols. (Madrid: Real Academia de la Historia, 1982), vol. 2, fig. 38.

A Botanical Reconquista



First Glance: Making the Empire Visible

In 1790, the Spanish artist José del Pozo drew a self-portrait in Patagonia, where he had traveled as a member of the Spanish scientific expedition commanded by naval officer Alejandro Malaspina between 1789 and 1794 (fig. 1.1).¹ This wash drawing is remarkable as a rare representation of eighteenth-century traveling naturalists and artists at work in the field. Pozo depicted three central figures in the foreground: himself in the center, surrounded by a Patagonian woman to the right of the image and the Guatemalan Creole naturalist Antonio Pineda to the left, literally looking over the artist's shoulder. Behind this group Pozo sketched three human figures surrounding two pack horses, emphasizing the itinerant character of the expedition. Despite the potential discomforts and distractions of this outdoor setting, so far from the classrooms of Madrid's San Fernando Royal Academy of Fine Arts where Pozo had trained, the drawing shows him working with rapt concentration. He has traveled far to depict this Patagonian woman from nature, a unique opportunity to come face to face with a New World population that was little known and much mythologized at the time. Pozo placed himself to the side of the composition, in profile, in this way allowing the viewer to look straight into the woman's eyes as the artist himself would have done to represent her frontally. By depicting not only the subject of his study but the very process of representation, Pozo transforms the viewer into a virtual traveler who can witness this American scene.²

The Malaspina expedition employed three naturalists and nine artists who, as the drawing suggests, worked closely together. This team created about a thousand drawings of various kinds intended for imperial administrators and institutions back in Madrid: botanical and zoological illustrations, city and coastal views, ethnographic portraits and scenes, and maritime scenes depicting the progress of the expedition's two ships, *Descubierta* (Discovery) and *Atrevida*

(Daring) (figs. 3.3, 3.4, 5.1).³ In addition to these visual materials that the team of naturalists and artists produced in collaboration, naval officers generated numerous coastal views, charts, and maps. The participation of so many artists in a scientific expedition and their prolific output are indicative of how eighteenth-century Spanish scientific expeditions sought to make the empire visible through observations and depictions.

This chapter discusses the ambitious program of imperial science established in the Hispanic world during the reigns of Charles III (r. 1759–88) and Charles IV (r. 1788–1808) of Spain. This scientific program included scientific expeditions, the creation of new institutions and renewal of existing ones, and the recruitment of the colonial administrative network as scientific informants. The goal was to uncover and exploit the natural riches of the Spanish empire, protecting it from incursions from European competitors and restoring it to a more prosperous state. Botany was particularly well suited to addressing Spanish concerns with utility, profit, and the search for renewed political and economic power, especially in trade with the Indies. And, drawing on a long Spanish imperial and colonial tradition, visual documents held privileged status as ways of incarnating and circulating information, helping to make the empire visible.

Natural History Expeditions in the Hispanic World, 1777–1816

In the fifty years between Charles III's accession to the Spanish throne in 1759 and the Napoleonic invasion of Spain in 1808, almost sixty scientific expeditions traveled through the vast Hispanic empire.⁴ These expeditions addressed scientific, economic, administrative, and political goals. Their varied tasks included investigating the viceroyalties' flora and fauna; exploring imperial frontiers; charting coastlines and producing maps, particularly of lesser known or contested areas; conducting astronomical observations and measurements; and reporting on the political and administrative state of the kingdoms.⁵

Amid this flurry of scientific activity, botanical expeditions held a privileged position. In 1777 a royal order launched the Royal Botanical Expedition to Chile and Peru (1777–88), led by Spanish naturalists Hipólito Ruiz and José Pavón.⁶ The document lists the various ways in which botanical exploration would prove useful to the Spanish empire. Charles pronounced the expedition

*advisable for my service and for the good of my vassals, not only to promote the progress of the physical sciences, but also to banish doubts and adulterations in matters of medicines, dyes, and other important arts; and to increase commerce; and in order that herbaria and collections of natural products be formed, describing and delineating the plants that are to be found in those fertile dominions of mine; [and] to enrich my natural history cabinet and court botanical garden.*⁷

Thus, the expedition operated in three interrelated domains: taxonomic botany, economic botany, and collecting. The first aspect, the “progress of the physical sciences,” refers to surveying and classifying specimens according to Linnaean taxonomy, a task accomplished through the accumulation and study of specimens, written descriptions, and illustrations of American flora. The expedition also actively pursued economic botany, seeking to solve controversies regarding naturalia with medical and industrial uses and to identify valuable natural commodities. Specific goals included fostering the exploitation of cinchona, a valuable febrifuge and a Spanish monopoly; exploring whether natural commodities held in monopoly by European competitors, such as coffee, tea, pepper, cinnamon, or nutmeg, existed in the viceroalties; and identifying potential replacements for such products. Finally, collections of objects and illustrations would enrich two recently established Madrid institutions, the Royal Botanical Garden (f. 1755) and Royal Natural History Cabinet (f. 1771), where they would not only serve as objects of scientific study but also bring prestige and renown to the royal collections.

During the following twelve years, comparable orders authorized two other royal botanical expeditions, to the New Kingdom of Granada (1783–1816) under the direction of José Celestino Mutis, and to New Spain (1787–1803) led by Martín de Sessé and José Mariano Mociño.⁸ In addition, the naval expedition led by Alejandro Malaspina (1789–94) employed botanists who pursued these same goals. These voyages did not arise or take place independently of one another; on the contrary, they were closely connected in a complicated tangle of emulation, cooperation, and competition. As a group, they employed more than fifteen naturalists and about four times as many artists, who worked in a sustained fashion over a period of thirty years on a global mission to investigate the floras of Spain’s vast overseas territories in the Americas and the Philippines (see the table, and fig. 1.2). Their work entailed conducting and recording observations; gathering and shipping collections of seeds, plants, insects, and animals; and producing thousands of illustrations. In this way, the expeditions captured and transported imperial nature in multiple media—words, things, and images.⁹

This large-scale investment attests to the promise that botanical exploration held for naturalists and administrators alike, who hoped that it would prove profitable and useful to the empire. Plants, animals, and minerals provided valuable commodities for use in medicine and industry, pitting European powers against one another. This climate of international economic and political competition created opportunities for naturalists to sell their services to interested patrons. Naturalists eagerly pursued the new patronage opportunities that botanical expertise presented—particularly if they were young and could travel, or if they resided outside of Europe and served as indispensable sources of information and samples. At the time, botany was big business and big science, and botanical expertise became a highly valuable form of knowledge.¹⁰

Natural history expeditions in the Spanish empire, 1777–1816

EXPEDITION	DATES	AREAS	NATURALISTS	ARTISTS	IMAGES
<i>Royal Botanical Expedition to Chile and Peru</i>	1777–88	<i>Chile and Peru</i>	<i>Hipólito Ruiz, José Pavón, Joseph Dombey + Juan José Tafalla (1784–1808)</i>	<i>José Brunete, Isidro Gálvez + Francisco Pulgar (1784–1797)</i>	~ 2300
<i>Royal Botanical Expedition to the New Kingdom of Granada</i>	1783–1808 (under Mutis), continued 1808–16	<i>New Granada (Colombia, Venezuela, Ecuador, Peru, Panama)</i>	<i>José Celestino Mutis + associates (including Diego García, Eloy Valenzuela, Francisco Antonio Zea, Sinforoso Mutis, and Francisco José de Caldas)</i>	~ 60 total, including Salvador Rizo and Francisco Javier Matis	~ 6500
<i>Royal Natural History Expedition to New Spain</i>	1787–1803	<i>Mexico, Guatemala, Cuba, Puerto Rico</i>	<i>Martín de Sessé, José Mariano Mociño, Vicente Cervantes, José Longinos</i>	<i>Atanasio Echeverría, Vicente de la Cerdá</i>	~ 2200
<i>Malaspina Expedition</i>	1789–94	<i>South America, Central America, North America, Australia, the Philippines</i>	<i>Thaddeus Haenke, Luis Née, Antonio Pineda</i>	<i>José del Pozo, José Guío, Juan Ravenet, Fernando Brambila, José Cardero, Tomás de Suria, José Gutiérrez, Francisco Lindo, Francisco Pulgar</i>	~ 1000

The expeditions functioned as large-scale international collaborations that brought together European and non-European naturalists, artists, and informants. The expeditions' members included not only Spaniards but also Frenchmen, Italians, a Bohemian, and a Tuscan, as well as Creoles and mestizos—that is, American-born people of European and of mixed European and Amerindian heritage—from Guatemala, Mexico, New Granada, and Ecuador. The international cast grows even larger if we take into account the many named and unnamed collectors, servants, aides, and informants that contributed to the expeditions through their labor and expertise—those all-important “invisible technicians” whose presence in the historical record can be limited to a brief and frustratingly inconclusive mention, if they appear at all.¹¹ This internationalism can easily be obscured when we refer to these as “Spanish” expeditions. Imperial history sits uneasily within the tighter parameters of national history, given the mobility of individuals across geographical and cultural borders.¹²

The expeditions were also international in terms of the practices and networks of natural history, understood as a collective cosmopolitan project that transcended national confines. The methods and practices that these travelers followed, as well as their double pursuit of taxonomic and economic botany, were common to British and French expeditions. Naturalists throughout and beyond Europe shared methodologies and materials, engaging in a common en-

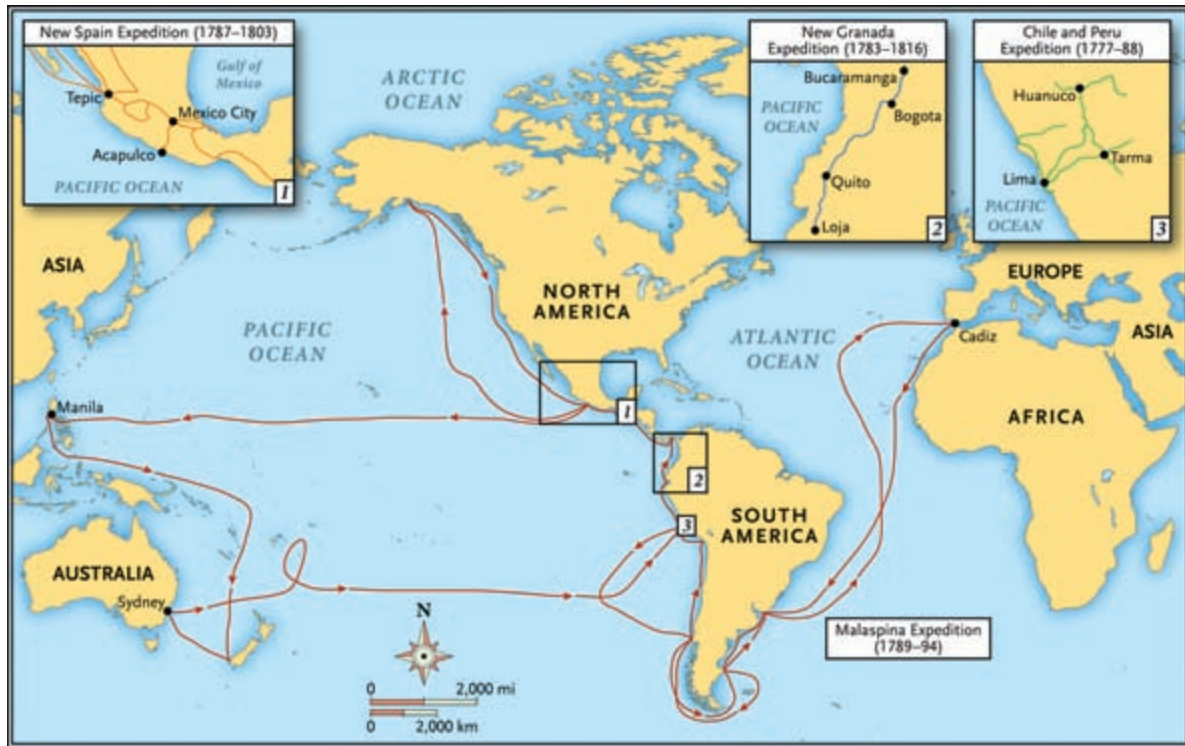


FIGURE 1.2. Natural history expeditions in the Spanish empire, 1777–1816.

terprise of collective empiricism at once collaborative and competitive. Spanish and American naturalists read the same books as their colleagues from Britain, France, Northern Europe, and elsewhere. They received similar training, followed similar methods, performed similar tasks, and agreed or disagreed over systems they all knew. Naturalists often corresponded with one another, and a flurry of multimedia exchanges took place within this far-flung international community. Mutis, for example, sent letters, specimens, and images from New Granada to Madrid and other Spanish cities, to many destinations in the Americas, and also to some select European correspondents, most notably Carl Linnaeus in Sweden. He regularly received letters and materials from multiple locations and was able to amass a magnificent library with 9,000 volumes, which contained natural history works published in England, France, Holland, and Vienna, all of them sent by correspondents. He was as attentive to what happened in Uppsala, London, and Paris as in India, China, and Indonesia.¹³

Despite their participation in global natural history, the Spanish expeditions differ in significant ways from contemporary British or French voyages. Most directly relevant to my argument about visual epistemology is their much larger visual production. Another key distinction is that for the most part the Spanish expeditions explored well-established imperial territories that went back over two centuries. Their objective was not discovery but rather rediscovery. A

third noteworthy difference concerns their duration. Most Spanish expeditions extended over a much lengthier period than the voyages sponsored by other European nations. The Malaspina expedition, which lasted only five years, is the one exception—it was inspired by Captain Cook’s voyages and followed this model closely. The other expeditions, however, are measured in decades, not single digits. Ruiz and Pavón spent eleven years in Chile and Peru (1777–88). When they returned to Spain they arranged for pharmacist Juan José Tafalla and draftsman Francisco Pulgar to continue their work; these two men investigated the flora of Chile and Peru for an additional twenty-five years.¹⁴ Mutis worked in New Granada for twenty years before the botanical expedition received royal approval in 1783; he then led a large team of collaborators until his death twenty-five years later in 1808, and the expedition continued for another eight years until the independence war brought it to an end in 1816. The New Spain expedition operated for sixteen years. As a group, the Spanish expeditions represent a sustained engagement with natural history exploration at a scale unmatched anywhere else in the world at the time, often blurring the line between expedition and institution.

The expeditions’ long duration had important implications. The extended time frame allowed naturalists to examine the regions they explored in minute detail, to benefit from exchanges with a large number of local experts as they developed relationships, and to work on thorny problems for as long as necessary to solve them. This privilege was rare: the vast majority of traveling naturalists tended to have much briefer encounters with the floras and faunas they explored. The few naturalists who preceded the Spaniards in their investigations of New World flora—most notably Hans Sloane, Mark Catesby, Charles Plumier, Louis Feuillée, and Nikolaus Joseph von Jacquin—spent much briefer periods in the Americas.¹⁵ Alexander von Humboldt, perhaps the best-known and most influential naturalist-traveler to the Americas in the period, zipped through much of the continent in only five years (1799–1804).¹⁶ Travelers with hastier schedules ran the risk of reaching erroneous conclusions about a species or a phenomenon, or even of missing it altogether if they happened to pass through a region at the wrong time—as the naturalists in the Spanish expeditions never tired of noting, with equal parts frustration and *schadenfreude*, when they found disparities between their own observations and their predecessors’ work. For instance, Luis Née, a naturalist in the Malaspina expedition, disagreed with the description of the “gaú-gaú” plant from the Marianas Islands written by Johann Reinhold Forster, a naturalist on Captain Cook’s second voyage (1772–75). “I doubt whether Forster saw this plant alive,” Née complained after encountering the plant himself. “I think he based his description on [Georg Eberhard] Rumphius’s, because I doubt that such an exact observer would have missed so many [botanical] characters. I don’t doubt that he found this plant in his travels, but perhaps not in such a way as to be able to describe it with exactitude.” The appearance of this

plant varied so much over time, Née explained, that he had begun his description in the Mariana Islands, continued it in the La Laguna province in the Philippines, and finished it at the botanical garden at Manila. Only this triple examination had allowed him to fully establish the various parts of the plant's anatomy. Forster's description, Née guessed, had either been based on specimens preserved in spirits or culled from Rumphius's posthumous publication, the *Herbarium Amboinense* (Amsterdam, 1741–50).¹⁷ To the naturalist who labored for decades in a single region, a voyage lasting a few years seemed woefully inadequate.

As they explored imperial nature over long periods, naturalists worked closely with members of the colonial administrative network and also capitalized on the availability of many other individuals who became engaged with their efforts. From town to town in the Americas and the Philippines, a wide range of local inhabitants collaborated with the travelers, including governors, treasury officials, administrators at all levels, physicians, surgeons, pharmacists, clergymen, young students, enthusiasts of natural history, and laborers. And as the expeditions traveled throughout the empire, a complex institutional apparatus in Spain and the viceroyalties mobilized continuously for decades, from the early days of organizing and funding the expeditions, identifying the appropriate personnel, and supplying them with all the necessary equipment, artists, and accoutrements, through many years of maintaining active correspondence, to welcoming both the travelers and the images and materials they sent or carried back with them so many years later. The expeditions did not function alone but rather worked in concert with imperial and colonial institutions and networks that sustained them both in the peninsula and throughout the viceroyalties. Expeditions, institutions, and administrative networks came together as parts of a complex “scientific colonial machine” for the exploration, rediscovery, and reconquest of the Spanish Indies.¹⁸

Bureaucratic Science:

Natural History, Institutions, and Administrative Networks

In Spain and the viceroyalties alike, old and new institutions strove to further the useful pursuit of the sciences, technology, and industry.¹⁹ Naval academies revamped mathematical and astronomical instruction, while army hospitals and pharmacies strengthened medical and surgical training. In Madrid, the San Fernando Royal Academy of Fine Arts (f. 1744), the Royal Botanical Garden (f. 1755), and the Royal Natural History Cabinet (f. 1776) worked especially closely with the expeditions.²⁰ Parallel institutions emerged in the colonies, including botanical gardens in Lima (f. 1778), Mexico City (f. 1788), Guatemala City (f. 1796), and Havana (founded in 1816 but with activities beginning in the early 1790s), all of which had direct contact with the expeditions.²¹

Madrid's Royal Botanical Garden was the most active institution in the project to rediscover and reconquer nature in the Hispanic empire. It directly helped to organize and staff the expeditions, trained many of its members, secured funding through courtly patrons, and supervised the naturalists as they traveled.²² It also received many of the specimens, manuscripts, and illustrations that the expeditions gathered or produced. The garden was initially established in the outskirts of Madrid in 1755, and in 1781 moved to a prestigious central location on the Paseo del Prado. The garden's directors and instructors carried out a major overhaul of Spanish botany, improving the garden's collections and reputation and training a new generation of botanists. This training centered on visual epistemology. The garden's instructors published translations and Spanish editions of major botanical works of the time, as well as their own botanical manuals; these publications often addressed the process of developing observational skills.²³ Many of the publications featured illustrations and visual descriptions. Most of the garden's students were physicians, surgeons, and pharmacists, as interested in the identification and classification of plants as in their practical uses. Under Casimiro Gómez Ortega's directorship between 1771 and 1801, the garden coordinated the botanical exploration of the Spanish empire.

The Royal Botanical Garden also served as a central node in correspondence between Spanish naturalists, their European counterparts, and New World collectors. Gómez Ortega and Antonio Palau, professor of botany from 1773 to 1793, enlisted contributors across the peninsula and the empire, sending them requests for samples and information and rewarding their collaboration with encouraging letters and the title of honorary or contributing member. They worked in direct emulation of the Parisian Jardin du Roi, whose head gardener André Thouin had established an impressive network of correspondents and whose efforts at colonial botany provided a model also for Kew Gardens.²⁴ A tally of the garden's new contributors between the years 1783 and 1794, many of whom received the honorary title of *comisionado*, totaled eighty-six men, sixty-three of them living in Spain, six elsewhere in Europe, and seventeen in the Indies. Many of these men were pharmacists, particularly in the viceroyalties; others were physicians and priests, and a few taught at universities.²⁵ These collaborators furnished the garden with live plants, seeds, and written information. For instance, three different *comisionados* in Puerto Rico sent seeds, crates of live plants, and lists of local plants that might interest the Madrid garden, such as wild nutmeg, guaiacum, cedar and other woods, cotton, cacao, indigo, ginger, and various edible and medicinal fruits.²⁶ Mariano Espinosa, a *comisionado* in Havana, dispatched crates of live plants including pineapple, tobacco, mamey, guava, peppers, and other tropical fruits every year between 1793 and 1796.²⁷ Colonial naturalists were able to parlay their access to rare specimens into relationships in which they exchanged these desirable samples for the credibility and prestige associated with collaborating with such institutions.²⁸ However,

the number of correspondents in the Indies was small when compared with those living in the peninsula—almost four times as many—particularly when considering the garden's much greater interest in these regions. This helps to explain the garden's multipronged approach of working with contributors and with traveling naturalists in order to maximize its access to information and specimens from the Indies.

The results of Palau and Gómez Ortega's efforts at establishing a network of contributors are reflected in the yearly indexes of seeds planted at the garden, which record both a growth in the total number of plants and in the proportion of them that came from outside Europe. In 1772, only 4 out of 650 species originated in the Americas, amounting to a mere 0.6% of the total.²⁹ By 1788, 262 of the 1,250 species growing in the garden were American—among them tamarind, vanilla, tobacco, potatoes, peppers, plantain, yucca, maguey, avocado, cotton, indigo, and sunflower. This represents 21% of the total plants and 43% of those newly planted over the previous year.³⁰ In other words, by 1788, one out of every five plants in the Royal Botanical Garden came from the Spanish Indies. The traveling naturalists yielded the garden the most foreign seeds. In 1781 alone, the garden planted 77 Peruvian seeds it received from Ruiz and Pavón.³¹

The other Madrid institution that participated so actively in the large-scale investigation of imperial nature was the Royal Natural History Cabinet, established in 1771 through the acquisition of a private collection belonging to Pedro Franco Dávila, an Ecuadorian Creole who had lived for almost thirty years in Paris. The collection opened to the public with great fanfare in 1776, and included all the items of a well-appointed cabinet of the time, among them antiquities, minerals and precious stones, fossils, preserved animals, and a particularly noteworthy inventory of shells.³² Over the following decades, it received rich shipments sent by the natural history expeditions and by contributors from all corners of the Spanish empire. The cabinet highlights the close relationship between natural history and art at the time, also evidenced in the expeditions' pictorial work. It was located on the top floor of a building that housed on its ground floor the San Fernando Royal Academy of Fine Arts, so that in the very same building in which young artists received training before joining the natural history expeditions to the Spanish Indies, years later many of the objects collected on these voyages would be exhibited in the cabinet directly above from where these men had studied. This cohabitation of the fine arts and natural history was not coincidental but rather the result of a Spanish Enlightenment understanding of the practical applications of art. An inscription in Roman script above the entrance to the building makes that point to this day, proclaiming, "King Charles III united nature and art under one roof for public utility."³³

In addition to working with the natural history expeditions, these new institutions also sought to benefit from the widespread imperial administrative network already in place, turning it into a system of collectors and informants.

In 1776 Dávila, in his role as director of the natural history cabinet, published a set of collecting instructions that were widely distributed throughout the peninsula and the viceroyalties. Addressed to administrative authorities at all levels of government, these guidelines described in considerable detail over twenty-four printed pages the appropriate manner in which to collect, cleanse, preserve, pack, and properly archive minerals, animals, and plants so that they could be transported to Madrid. The cabinet received a huge number of contributions from throughout the viceroyalties and Spain, some of which it displayed and some which it exchanged with other European collections.³⁴

Three years later Gómez Ortega published an “Instruction on the Safest and Most Economical Means of Transporting Live Plants by Sea and by Land to the Most Distant Countries.”³⁵ The document sought to enlist the eyes and hands of administrators and amateur naturalists throughout the Indies on behalf of the botanical garden through written instructions and an engraving depicting the custom-built type of crate they should use for transporting live plants (fig. 1.3). Culled largely from French instructions published twenty-five years earlier, the Spanish publication included an original section that detailed the most desirable plants expected in Madrid from the Indies and provided their Latin and vernacular names, known location, and properties.³⁶ The wish list included cinnamon, pepper, cloves, and nutmeg—Asian natural commodities that, according to Gómez Ortega, could surely be located in the Spanish Americas.³⁷

These printed guidelines from Madrid’s Royal Natural History Cabinet and Botanical Garden belonged to an existing genre of instructions and desiderata, sometimes printed but often manuscript, through which European naturalists and collectors attempted to obtain desirable specimens in suitable condition from contributors living in other regions—especially those stationed in outposts of empire.³⁸ In the Hispanic world, however, the Crown systematically distributed these instructions as part of its official imperial policy. The viceroys, governors, mayors, and *intendentes* of Puerto Rico, Santo Domingo, Havana, Louisiana, Yucatan, New Spain, Santa Fe de Bogotá, Peru, and Caracas received multiple copies of both *instrucciones* along with orders to pass them on to those individuals better suited to carry them out in the territory under their authority. Gómez Ortega’s *Instrucción* was reprinted and redistributed in 1787. Two years later, new royal orders required colonial administrators at every level to produce reports on potentially useful or valuable natural products in their regions and to send back to Spain both information and samples.

Colonial administrators quickly put these royal orders into effect, and responses flowed from points throughout the Spanish empire in the form of live and preserved specimens, drawings, and textual reports containing observations. The expeditions participated in this endeavor. In late 1789, only four months after the orders were issued, the viceroy of New Granada asked Mutis to furnish wood samples of all the useful trees growing in the kingdom, indicating their

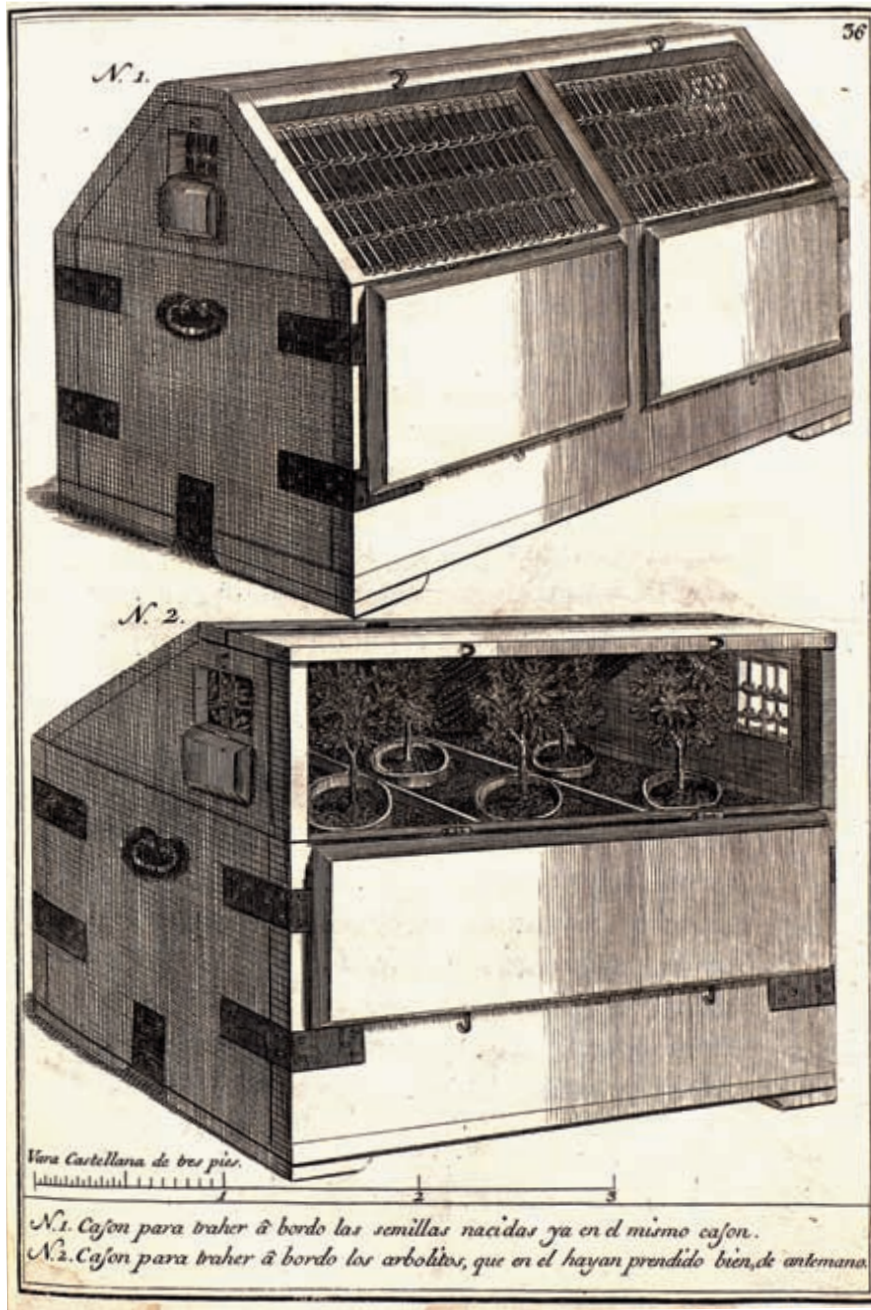


FIGURE 1.3. Crates recommended for the maritime transport of live plants across long distances, from Casimiro Gómez Ortega, *Instrucción sobre el modo más seguro y económico de transportar plantas vivas por mar y tierra a los países más distantes ilustrada con láminas. Añádese el método de desecar las plantas para formar herbarios* (Madrid: 1779). Biblioteca del Real Jardín Botánico (CSIC), Madrid.

names and all known uses. The viceroy requested that if possible Mutis include drawings of the leaves and fruits of the more rare and exquisite trees, indicating that administrators understood the evidentiary uses of images.³⁹

Other responses to the *Instrucción* came from men with no botanical train-

ing, who enthusiastically promoted their local flora but could not provide the type of specialized information that would have been necessary to the Botanical Garden. In Puerto Rico, a man named Tiburcio Rodríguez prepared a report describing local trees that could be used in industry, medicine, or dyeing, indicating for each the Spanish name, height, and diameter.⁴⁰ Some of the trees Rodríguez mentioned were well-known European species such as cedar and oak. More enticingly, he described a tree that produced “nutmeg,” a characterization he based on lay criteria such as the bitter taste of the fruit and its use for treating stomach ailments like colic and spasms. This would make his report of limited use without further research by a trained botanist. Rodríguez also included seven small drawings of trees he considered “strange,” among them the fig, guava, laurel, and soursop trees. It is significant that the instructions requested drawings of the natural specimens described, and that respondents often included them with their reports: images were an integral part of natural descriptions, especially when they introduced new or exotic plants.

Metropolitan administrators were aided in their work by local groups dedicated to promoting their own specific regions, the Sociedades Económicas de Amigos del País (“Economic Societies of Friends of the Country”). These voluntary civic associations started appearing in Spain in 1763 and in the viceroyalties in 1781.⁴¹ They encouraged the development of industry, agriculture, and technology, granting prizes to people who offered ideas for improving local manufactures. Their tasks were wide-ranging, and could include patriotic education; calculating the yearly worth of local industry in order to produce comparative charts; maintaining a local census; studying and improving agriculture, animal farming, fishing, factories, and commerce; and overseeing training in mathematics, machines, dyeing, design, and weaving. Ideally, each Sociedad Económica should have a natural history cabinet stocked with animals, plants, and minerals from the region, and use this collection to identify useful *naturalia* to exploit.⁴²

In the viceroyalties there was enormous enthusiasm for the Sociedades Económicas and their approach to local nature and industry. The first Sociedad Económica outside of the peninsula was founded in Manila in 1781, and was quickly followed by societies in New Granada, Santiago de Cuba, and Veracruz. There was a proposal for a Sociedad Económica in Merida in 1791, one was established in Havana that same year, and those of Lima, Quito, and Guatemala quickly followed in the early 1790s. In the early years of the nineteenth century, Sociedades Económicas were either proposed or successfully established in Buenos Aires, Santa Fe de Bogotá, Caracas, Puerto Rico, and Chiapas.⁴³ The members of these societies included the Creole intellectual elite, who investigated the natural history, history, and antiquities of their *patrias* (homelands), established drawing schools and encouraged art training, delved into the financial administration of their regions, and worked on the kingdoms’ public health. The societies’ members included many of the publishers and contributors to

the scientific-patriotic periodicals that emerged through the Spanish Americas at the time, among them Mexico City's *Gazeta de Literatura* (f. 1788), Lima's *Mercurio Peruano* (f. 1790), a new version of the *Gazeta de Guatemala* (f. 1797), and the *Papel Periódico de la Havana* (f. 1790).⁴⁴ The Sociedades Económicas of Mexico City, Guatemala, and Havana were also directly involved in the creation of botanical gardens.

The goal of this intensive natural history investigation through expeditions, institutions, the recruitment of the imperial administrative network, and the participation of civic associations and periodicals was nothing less than to rediscover and reconquer the empire at a time of intense crisis. Having fallen steadily behind England and France over the course of the eighteenth century, both within Europe and on the global stage, the Spanish Crown funded scientific expeditions and institutions in the hope of refilling the treasury's coffers and of improving the kingdom's economic and political standing, both at home and abroad. This push behind useful science must be understood within the context of new policies that significantly revised the relationship between the peninsula and the Indies, seeking to find the way out of present decadence through a renewal of earlier successes.

An Age of Renovation: New Policies, Old Glories

After Charles III succeeded to the Spanish throne in 1759, his government established a set of new policies to strengthen Spain and its American kingdoms. In the peninsula, the so-called Bourbon reforms established new financial policies, in particular with regard to tax collection and the customs system; restructured the administrative bureaucracy; reinvigorated the navy and army; transformed education through revised curricula and new institutions; improved public works; raised Madrid's profile as a major European capital; and fostered local manufactures, industry, and agriculture. These internal measures were matched by an equally strong interest in revising policies related to the Indies, specifically improving administration, strengthening military defenses against potential British attacks, and especially optimizing trade and rethinking natural resource exploitation. The language that government ministers used, however, did not refer to "reforms" but rather to renovation, renewal, or restoration. To save Spain from present ills, they sought to return to an earlier and healthier state.⁴⁵

The views of the economist and statesman Pedro Rodríguez de Campomanes (1723–1802) were particularly influential with regard to these new policies. He argued that Spain needed to follow the model of other European nations in the way it handled its empire, particularly when it came to commerce. While Britain, Holland, and France allowed trade and navigation to originate from any of their ports, since the sixteenth century Spain had concentrated imperial trade

in a single city—Seville until 1717, and Cadiz after then. Campomanes considered it imperative to put an end to the Cadiz monopoly and open up the Indies trade to all Spanish ports.⁴⁶ Between 1764 and 1789, the Crown issued a series of decrees transforming imperial trade. These *comercio libre* (free trade) laws granted certain American ports the right to trade their products internally with one another and to export merchandise in any Spanish ship, regardless of the company that owned it; lowered custom dues and abolished some of the charges that ships had previously paid upon departure, making transport more economical; and suspended for ten years the customs charges on essential articles produced in Spain and the viceroyalties, among them cloth, metal objects, and sugar.⁴⁷

Campomanes's ideas about imperial trade addressed the economic utility of botany and of natural history expeditions. He suggested that Spain transform its imperial exploitation of natural resources by moving away from its longstanding interest in New World precious metals, turning its possessions into renewable sources of raw materials for the metropole. This would allow Spain to improve its agriculture, raise capital, strengthen its industries, and, in general, obtain a greater yield from its Indies. Campomanes supported his argument by examining the ways in which other European nations ran their colonies, offering an analysis of British trade in tobacco, sugar, and cocoa as the most outstanding example of the potential gains to be had from botanical products.⁴⁸ Beyond this examination of well-known commodities, Campomanes was particularly eager to identify New World natural substances that could be exploited for profit. In a treatise on the Spanish trade with the Indies, he dedicated ten printed pages to describing the natural history of the Buenos Aires region, providing an impressive level of detail about local animals, birds, insects, and plants. In his view, this information suggested “the utility that natural history and Spanish botany would gain from having the aforementioned trees and plants transplanted to the King's Botanical Garden and the Royal Gardens.”⁴⁹ Campomanes considered scientific expeditions fundamental to the pursuit of profitable natural commodities, mentioning the travels of Pehr Loeffling, George Anson, and Charles-Marie de La Condamine as examples to follow, and reviewing the history of British expeditions in search of the northern passage as well as the general history of navigation in the southern seas.⁵⁰ Spain, he indicated, should be charting its own natural history expeditions.

Not surprisingly, naturalists enthusiastically agreed with Campomanes on the value of botanical exploration and the turn from precious metals to green capital. Gómez Ortega, a tireless promoter of botany, claimed in a 1770 speech that Spain, “examining its true interests, prefers to the laborious American gold and silver mines other fruits and natural products that are easier to acquire and no less useful in increasing prosperity and wealth.”⁵¹ Plants were not only easier to harvest than minerals, he explained in his 1779 instructions for collectors, they were also a renewable resource and one that could ideally grow locally in Spain

through transplantation, rather than necessitating import from overseas.⁵² “The vegetable riches of Spanish America . . .,” he explained, “have over the mineral ones the advantage that they can be propagated and multiplied ad infinitum once they are possessed and naturalized” in the peninsula.⁵³ Botanical exploitation, he noted the following year, would benefit both Spain and the Indies:

*It is useless to possess the most benign and fertile territories in the world, if we do not attempt to profit from the natural products that they grant us, extending knowledge and consumption of them within the country, and fostering their extraction through free trade [libre comercio]. Without these measures, the most expansive territories become sterile deserts, as useless to their colonists as to the metropole.*⁵⁴

The naturalists who participated in the Spanish expeditions shared this belief in the potential economic value and utility of colonial nature. And, like reform ministers, they saw new measures as a restoration of past glories. Mutis articulated these ideas very explicitly in two related proposals that he sent to Charles III in May 1763 and June 1764, just a few years after arriving in New Granada, in which he argued for the necessity of funding a natural history expedition that he would lead. Mutis framed the proposals in terms of botany’s imperial utility, listing in great detail the flora that could be newly or more efficiently exploited in America and mentioning valuable dyes for the textile industry, glues for producing paints, woods for making furniture and instruments, and *materia medica* (natural products with medicinal applications). He described at length the current practices regarding the exploitation of two valuable natural commodities, wild cinnamon and cinchona. Throughout the proposal, Mutis repeatedly alluded to the “utility,” “profit,” and “glory” that the expedition would bring. He presented the project not as a completely novel idea but rather as the continuation of an interrupted exploration of American nature that went back to the sixteenth century.⁵⁵ For Spain, botanical investigations offered not only the promise of economic profits and the potential to improve its geopolitical standing, but also the opportunity to reconnect with a glorious past when it had been more prosperous and more powerful.

Looking back to the early days of the empire, eighteenth-century Spanish naturalists saw themselves as latter-day botanical conquistadors. In 1777, as the first of the botanical expeditions set out to explore the flora of Chile and Peru, Gómez Ortega suggested to the minister of the Indies that sending twelve naturalists and as many chemists or mineralogists to investigate American nature would yield “a greater utility than a hundred thousand men fighting to add a province to the Spanish empire.”⁵⁶ Twenty years later Antonio José Cavanilles, his successor at the head of the Royal Botanical Garden, also presented botanical exploration in the language of conquest, writing: “Whether from the joy of Botany, or the conviction of the utility that it brings to States, each day new

supporters enlisted under her flags. Many of them, as conquistadors of vegetal riches, went forth to reconnoiter new countries braving risks and hardship. The celebrated Adanson took Senegal on his own; [Pehr] Loeffling, Spain and America; [Fredrik] Hasselquist, Palestine; and [Peter] Forsskål, Arabia.” Cavanilles depicted many of these valiant conquerors as martyrs who perished in the service of botany, with Hasselquist dying in Smyrna, Loeffling in South America, and Forsskål succumbing to pest in Yemen.⁵⁷

The connection between conquest and martyrdom extended the metaphor of the botanist as conquistador to that of the botanist as Christian missionary. This evangelical undercurrent is present also in Gómez Ortega’s recommendation to send twelve naturalists and mineralogists to the Indies. The Christian resonance is no accident. The notion derived in part from Linnaeus, who referred to the disciples he scattered around the globe as his “apostles.” However, in the Spanish context, the association of botanical exploration with missionary activity, and with the number twelve in particular, had an additional valence since it referred back to the earlier and more glorious days of Spanish ventures into the New World: the Christianization of New Spain had begun with the arrival of twelve Franciscan missionaries in 1524.

The associations between eighteenth-century imperial science and a glorious sixteenth-century Spanish imperial past were more than a metaphor. The Enlightenment botanical expeditions were not conceived as radically new ventures, but rather as continuing and extending the work of the humanist physician Francisco Hernández, who between 1570 and 1577 conducted the first European scientific expedition to the Americas. Hernández traveled to New Spain to gather information on New World medicinal practices and products, with a heavy emphasis on botanical medicine. In Mexico, Hernández consulted native healers, assembled collections, commissioned drawings of medicinal substances from native artists, and drafted a manuscript that he hoped would provide a complete natural history of the Indies, doing for the New World what Pliny had done for the Old.⁵⁸ Eighteenth-century Spanish botanists saw themselves as following in Hernández’s footsteps, especially after the discovery in the 1770s of a previously unknown copy of his manuscript at the Jesuit College in Madrid. Gómez Ortega used it as the basis for a new three-volume edition of Hernández’s work that he published in Madrid in 1790, returning full-circle to the exploration program undertaken two hundred years earlier.⁵⁹

Likewise, the role of imperial institutions in supporting scientific investigations and the appeal to colonial administrators for information were not Enlightenment novelties but rather extensions of longstanding Spanish imperial techniques.⁶⁰ In the sixteenth century, new Spanish institutions like the Casa de la Contratación (House of Trade, f. 1503) and the Council of the Indies (est. 1524) gathered information about the New World and stimulated natural history investigations and technological innovation in navigation, cartography,

and cosmography.⁶¹ In 1577, administrators throughout New Spain received a printed fifty-item questionnaire asking for information about the history, natural history, mineral deposits, trade and navigation routes, and landscape of their regions. Versions of these questionnaires, known as the *relaciones geográficas*, made their way across the Atlantic again in 1603, 1743, and 1777—the same year that the Royal Botanical Expedition set out for Chile and Peru, highlighting the continuity between early practices and Enlightenment imperial science.⁶²

The eighteenth-century projects also shared with their sixteenth-century antecedents a belief in the importance of visual materials. The *relaciones geográficas* questionnaires requested not only textual answers but also a painted map.⁶³ These illustrations transported the new territories across the Atlantic, placing them before the eyes of select government officials. And Hernández's manuscript on New World medicinal products contained not only his own written descriptions of 3,000 plants, over 500 animals, and about a dozen minerals, but also more than 2,000 illustrations he commissioned from Mexican artists. In a report to Philip II, Hernández wrote that "he had strived to paint and describe the natural things of that land," referring to the visual sources before the written ones even though he had not made them himself.⁶⁴ Clearly he was aware that his mission involved making the New World visible across distances.

Traditions of Visual Evidence in the Hispanic World

Spanish eighteenth-century natural history privileged visuality, in terms both of observation and representation. Although this was true for European natural history in general, the connections between exploration, visuality, and utility were particularly strong in the Hispanic world, which had a longstanding tradition of using images as evidentiary documents. From the earliest days of exploration, occupation, and settlement, the task of making the New World knowable and governable involved making it visible, both locally and across distances. Images helped to discover, to document and authenticate, to make arguments, and to mobilize information. They very quickly became privileged as evidence both within the viceroyalties and in trans-Atlantic exchange.

In the sixteenth century, the budding imperial administration requested images from its new territories, using visual documents in a wide variety of contexts. Explorers and settlers received orders to send not only textual descriptions but also maps, and conquistadors who wanted to establish *encomiendas*—claims to the labor and tribute of a certain Amerindian population—were required to send *pinturas* (drawings or paintings) as part of the documentation to support their request.⁶⁵ In early colonial Mexico, Amerindians and Spaniards shared a belief in the importance of images as evidence. The Amerindian tradition of pictographic writing, though quickly transformed in the new colonial context,

proved useful to Spanish rulers since codices documented existing tributary practices that they could continue to enforce. Conversely, pictorial codices could also serve to protest tributary requirements and often surfaced as legal evidence in trials.⁶⁶

Many visual documents were produced in the Americas expressly for export, to communicate information about the New World to Spanish viewers. Like the pictorial documents made for internal consumption, these traveling images served political aims. The famous *Lienzo de Tlaxcala* (Tlaxcala Canvas), made in central Mexico around 1552, provided a pictorial account of the conquest of Tenochtitlan from the point of view of the Tlaxcalans, allies of Cortés against the Aztecs. Through this painted document the Tlaxcalans argued that their vital role in the Spanish triumph thirty years earlier had earned them a privileged status that had been promised but not granted, and sought to improve their economic and political standing in the new colonial society.⁶⁷

It was clear to native populations that images had important and special meaning for Spaniards. This was dramatically manifested in the violent destruction of native idols and temples in order to replace them with Christian images and churches, as well as in the frequent recourse to visual materials in the process of evangelization.⁶⁸ The Inca ruler Manco Inca (d. 1545) concluded that the Spaniards “worshipped . . . some painted cloths, which they say are Viracocha [the Creator],” instead of the large idols or structures that the Incas revered.⁶⁹ Thus, Amerindians responded visually to the conquest and the new colonial regime not only in Mesoamerica, where a representational pictographic tradition existed previous to the arrival of Europeans, but also in the Andes, where it did not. By 1615 the importance of visual materials as documentary evidence was so well established that when the indigenous Andean author Felipe Guaman Poma de Ayala drafted a lengthy protest denouncing the abuses of local colonial administrators, he composed it in the form of an illustrated book. In his introductory letter to King Philip III, Guaman Poma explained that he was well aware of the king’s high regard for visual images. Although Guaman Poma was not a trained artist, he clearly understood the importance of visual evidence in Spanish imperial culture and hoped that it would make his petition more credible and persuasive.⁷⁰

Images embodied information not only in legal, administrative, tributary, and political contexts but also for the preservation and production of knowledge. As Amerindian communities transformed in the post-conquest world, and suffered devastating epidemics, there was an increasing interest in recording information about ways of life that were rapidly disappearing. In central Mexico, from the early 1530s the Franciscan Colegio de Santa Cruz de Tlatelolco proved particularly important in this regard. There, young men from the Aztec ruling class received a trilingual education in Spanish, Latin, and Nahuatl that concentrated on grammar, religion, and the Greco-Roman classics.⁷¹ At Tlatelolco,

native scribes working under the direction of friar Bernardino de Sahagún produced the Florentine Codex (ca. 1575–77), a twelve-volume pictorial encyclopedia based on interviews conducted with Nahua elders over a period of about twenty years (ca. 1547–68).⁷² This important document is one of the richest existing sources on pre-Hispanic Nahua life, the conquest of the Aztec empire from a native viewpoint, and Nahua life in the decades following the conquest (albeit as recounted in the colonial period). It is written in Spanish and Nahuatl, and contains numerous drawings done in a predominantly European style but including some indigenous elements. Some images act as illustrations to the text, while others supplement its content with additional information. The page layout used throughout the codex and the content and style of the drawings demonstrate the presence of European prints and illustrated printed books in New Spain, and how they were used by artists. The Florentine Codex forms part of the widespread practice of using visual materials as documents for collecting, stabilizing, and transmitting information in the Spanish empire.

Also at Tlatelolco, two Christianized Amerindians produced the earliest post-conquest botanical and medical treatise, which preceded Hernández's voyage by twenty years. The document also stressed visual communication. In 1552 Juan Badiano translated into Latin the information on medicinal herbs provided by the healer Martín de la Cruz. This illustrated manuscript, the *Libellus de medicinalibus Indorum herbis* ("Little book of Indian herbs and medicine") or Codex Badianus, consists of sixty-three folios of text and drawings organized into thirteen chapters.⁷³ Many of the pages in the codex contain large color botanical drawings in the top portion, with manuscript annotations underneath describing how each plant is used; some of the pages limit themselves to botanical drawings accompanied by the plants' names, without further commentary (fig. 1.4). While the majority of the text is in Latin, the plant names are provided in Nahuatl. In its botanical focus and its combination of word and image, it is a direct antecedent of the work of the late-eighteenth-century expeditions. However, the drawings are done in a predominantly native style, and the botanical and medical information comes from Aztec medicine.⁷⁴ The codex was commissioned by Francisco de Mendoza, son of the first viceroy of Mexico, Antonio de Mendoza (r. 1535–50), and intended as a gift to prince Philip II. To Europeans, this export work would register both as a repository of exotic and useful information from the New World and as a demonstration of the suc-

FIGURE 1.4. Plants used to remedy the loss or interruption of sleep. Martín de la Cruz and Juan Badiano, *Libellus de medicinalibus Indorum herbis* (Codex Badianus), ca. 1542, folio 13v. Biblioteca Nacional de Antropología e Historia, Mexico.



cessful Latinization of the indigenous elite, reflecting well on Mendoza and on the Franciscans who ran the college at Tlatelolco.

The importance of visual material for capturing and transmitting New World nature is also evidenced in the work of the early Spanish chroniclers. Gonzalo Fernández de Oviedo y Valdez noted in his *Sumario de la natural historia de las Indias* (Toledo, 1526) that some aspects of American nature were difficult to describe, and in those cases he had found it necessary to make drawings in order to communicate “by means of the vision what the language misses.”⁷⁵ Fernández de Oviedo’s more extensive *Historia general y natural de las Indias* (Seville, 1535) provided descriptions of the American landscape, of native customs and history, and of aspects of botany, zoology, and New World diseases. The manuscript for the *Historia* includes drawings of New World objects that he considered curious and interesting, which served as the basis for the woodcut engravings that illustrate the published book—among them a fire-drill, an Amerindian canoe carved out of a tree-trunk, and the first European representation of a pineapple (fig. 1.5). These images provide a powerful testament to the importance of visual materials in experiencing the New World and making it visible to others.⁷⁶

Even in the text of the *Historia*, Fernández de Oviedo repeatedly resorted to visual metaphors to communicate information about the Americas and to validate his authority as a credible source based on his own eyewitness experience, explaining in the prologue to the work that “the blind man cannot distinguish colors, nor can one who is absent bear witness to these matters like one who sees them.” He often compared the exotic natural world and inhabitants of the Americas to painting and other visual arts. According to Oviedo, the New World was home to people, animals, and trees that were so different from anything known to Europeans that they could be almost impossible to comprehend. “Without doubt,” he noted, “the eyes are a great part of our intelligence of these things.”⁷⁷ The New World needed to be seen to be believed.

Like Oviedo, the Dominican friar Bartolomé de las Casas—an early *encomendero* turned friar and “defender of the Indians”—also emphasized in his writings the importance of vision for knowing and understanding the New World. Las Casas based his critique of other authors on the New World and defended his own credibility and reliability in terms of personal experience, which he discussed in visual terms—autopsia, or eye witnessing. The word “historian,” he wrote following Isidore of Seville, “means ‘see’ or ‘know’; for no one among the ancients dared place himself in any position other than among those where he had been present, and had seen with his own eyes that which he had determined to describe.”⁷⁸ Las Casas evaluated experience in terms of visual epistemology, insisting that in order to write about the New World it was necessary not only to witness it personally but also to witness it appropriately. Thus, he dismissed other authors’ firsthand reports by claiming that, although they had been in the



FIGURE 1.5. Gonzalo
Fernández de Oviedo
y Valdés, drawing of a
pineapple, *Historia general
y natural de las Indias*,
1539–48, book 7, chapter 14.
Huntington Library, HM 177,
vol. 2, fol. 46 r.

New World, they had been blinded by greed and had not been able to comprehend what they had seen.

European interest in seeing the New World was not an exclusively Spanish phenomenon.⁷⁹ However, visual thinking was particularly important and strong in the Spanish empire, where it took root and developed to a degree and in a

variety of contexts that did not exist in English, French, Portuguese, or Dutch enclaves in the New World or Asia. From the early sixteenth century and for the next three hundred years, the empire functioned as a visual machine, churning out an enormous variety of images produced in diverse contexts, for different purposes, and for multiple audiences. Spain and its Indies were connected through a visual loop: images in various media traveled back and forth across the Atlantic and the Pacific, usually accompanied by words and often also by objects, with the aim of making this vast and growing empire visible locally and across distances.

It is important to note that at times these images reached only narrowly limited and highly specific audiences—for instance Guaman Poma wrote and drew his manuscript book expressly for an audience of one, King Philip III, and very few viewers had access to the images in the *relaciones geográficas*, most codices, or the original illustrations in Hernández's work. Some images were considered state secrets (*arcana imperii*) and carefully guarded from prying eyes; some were shelved or misplaced; some proved puzzling or of little use to their viewers (as was the case with many of the maps in the *relaciones*).⁸⁰ Other images were in wider circulation, copied again and again after they first appeared in print, as was the case with Fernández de Oviedo's work or various versions of Hernández's visual collection. Issues of circulation and reception are both critically important and extremely difficult to assess; nevertheless, my notion of visibility goes beyond the question of which eyes actually managed to view American images, how they interpreted them, and how or whether they put them to use. Making visible or visualizing are not the same as seeing. My point is that making visible—a process that involved not only the final viewing of an image but also the acts of observation and representation that yielded it—had both pragmatic and symbolic dimensions and was widely understood as an integral part of the processes of producing knowledge and enacting governance. Whether in the end images managed to be seen or not, whether they proved themselves useful or not, they carried enormous weight. Visual materials were considered necessary and created continuously, by multiple makers, for various purposes, and in astonishing numbers.

The rapid development of a rich visual culture in the Spanish viceroyalties encompassed manuscripts, drawings, paintings, and prints, as well as material culture including sculpture, architecture, textiles, ceramics, woodwork, and metalwork.⁸¹ This understanding of visual materials as the locus of epistemic certainty traveled across oceans. If Spain repeatedly requested images from its territories, the viceroyalties produced them not only in response to these demands but also of their own initiative, “to make themselves heard and seen.”⁸² Thus, eighteenth-century attempts to reform, renew, and rediscover the Spanish empire, in part through scientific expeditions that privileged visual communication, do not represent an entirely new project. Rather, the Enlightenment

natural history expeditions connect to a long history of utilitarian imperial exploration for purposes of research, administration, and commerce, and are the continuation of a longstanding tradition of using images as visual evidence in the Hispanic world.

Conclusion:

Utility and Visibility in Spanish Imperial Natural History

The eighteenth-century Spanish natural history expeditions arose from and operated within two related principles: visibility and utility. The case of José Celestino Mutis and the New Granada Botanical Expedition helps to illuminate the connections between these concerns. Born in 1732 in the southern Spanish city of Cadiz, Mutis studied surgery and medicine before moving to Madrid, where he worked as an instructor of anatomy and attended botanical lessons at the Royal Botanical Garden. In 1760 he crossed the Atlantic in the capacity of personal physician to the incoming viceroy to the New Kingdom of Granada, Pedro Messía de la Cerda (r. 1761–73). Although Mutis began natural history investigations immediately, he did not receive royal authorization to lead a botanical expedition until 1783. Upon launching the project, Mutis promised his patrons that it would promptly yield useful and valuable information in the form of natural commodities, which Spain could use to break the trade monopolies held by European competitors. To this end, he assembled a team composed of *herbolarios* (plant collectors), artists, and botanical contributors. Together, they diligently attempted to locate American varieties of cinnamon, tea, pepper, and nutmeg, as well as new types of cinchona. There is no question of Mutis's genuine interest in economic botany. He spent years studying different types of cinchona, and became embroiled in a heated priority dispute regarding a new variety of the plant.⁸³ He monitored European periodicals to keep track of British trade in tea, and located a South American plant he tirelessly—and unsuccessfully—promoted as a potential substitute, the so-called “Bogotá tea.” He also investigated American varieties of cinnamon and pepper.

But Mutis devoted enormous efforts to another end, one with less obvious economic or utilitarian applications: the production of visual representations of American plants. His expedition employed approximately sixty artists, about thirty of them working simultaneously at one point—an enormous size for an artistic workshop of any kind anywhere, and unheard of for one dedicated to scientific illustrations. Mutis hired artists from Bogotá, Madrid, Quito, and Popayán. He obsessed about how to train them and controlled their work, imposing a strict schedule based on a nine-hour day, six days a week, for forty-eight weeks out of the year. Some artists worked in the expedition for the entirety of their adult lives. Mutis had set ideas about both botanical and artistic aspects of the

illustrations, and got into monumental fights with those painters whose work ethic or results did not satisfy him. He recruited Spanish artists from Madrid's San Fernando Royal Academy of Fine Arts, only to later find that they actually had strong opinions about art and were not as malleable as he had hoped. After dismissing a particularly bothersome Spanish artist from the expedition, Mutis attempted to have him expelled from the kingdom altogether, writing to the viceroy that the man posed a threat to the social order. His solution to the problem of finding a large number of docile painters was to establish a free drawing school where prepubescent boys could be trained as botanical draftsmen.⁸⁴

Mutis's visual voracity is clearly reflected in the materials produced by his expedition. While he and a handful of botanical collaborators penned only about 500 plant descriptions, the much larger artistic team created a staggering total of almost 5,400 finished folio illustrations of plants and 1,000 detailed floral anatomies. Mutis's correspondence, personal and official, is dominated by his concern with the operation of the painting workshop, the quality of the images in relation to printed European botanical illustrations, and their value as evidence.

Visibility and utility connect to one another and form the spine of the Spanish expeditions.⁸⁵ On the one hand, naturalists and their patrons had high expectations for the economic and scientific benefits that natural history could bring: a renewed and more powerful empire, one that could hold its own on a fiercely competitive international stage. On the other hand, naturalists and patrons both understood the imperial project as fundamentally one of seeing. In this way, the expeditions were attempts to see local plants—cinnamon, pepper, tea—as useful and profitable global natural commodities, and to reimagine long-held dominions as bountiful paradises of botanical productivity and profit rather than as territories littered with depleted mines. They encouraged seeing across time, connecting the reigns of Charles III (r. 1759–88) and Charles IV (r. 1788–1808) to the glorious heyday of empire under Philip II (r. 1556–98), and linking the work of botanists like Mutis and his colleagues to that of earlier explorers like Francisco Hernández. They also encouraged seeing across space, using a few travelers as surrogate eyes for the many naturalists and administrators who remained in Madrid and images as paper avatars that allowed men scattered throughout the empire to examine for themselves distant, fragile, or impermanent floras. Through word, object, and—most importantly—image, these natural history expeditions functioned as visualization projects that enabled Europeans and Americans to see imperial nature, which in key ways remained little-known and little-seen even three centuries after Europeans first encountered New World nature.

For Spanish naturalists, visual epistemology was the shared language of imperial administration and of cosmopolitan European Enlightenment science. Mutis, like most naturalists at the time, did not consider observation merely something he did but part of who he was, a *habitus* and a way of life, a regime of constant attention and investigation that extended to all spheres. Mutis's fasci-

nation with images is a pointed example of the way in which eighteenth-century natural history, especially botany, privileged visibility. Given Mutis's extensive visual archive, the enormous efforts to which he went to employ, train, and supervise his painters, and the frequent discussion of the production and uses of natural history illustrations in his journals and correspondence, it is clear that images were of central importance to his expedition's exploration of American nature. Naturalists both in Spain and throughout Europe embraced imperial expeditions as opportunities to understand the natural world and to make a name for themselves. Visual epistemology would prove central to their project.



Natural History & Visual Epistemology



First Glance: The Naturalist as Observer

An unsigned portrait painted at the turn of the nineteenth century in the city of Santa Fe de Bogotá depicts the naturalist José Celestino Mutis in the act of conducting a botanical observation (fig. 2.1). The painting invites the viewer into Mutis's study, allowing us to witness him at work. Mutis is shown sitting at a table, deeply engaged in the pursuit of his scholarly craft. His focused gaze fixes on the viewer with weary patience, as if we had just burst into his study of muted grays and browns and interrupted his silent labor. He has lifted his head but his body remains hunched over in concentration, eager to resume the examination of the flower he holds up. A branch of the same plant lays ready to be pressed between sheets of paper and thus become a specimen in a herbarium or collection of dried plants. Books scattered around the table will help Mutis corroborate his description and classification of the plant. The books outline the task at hand: if the plant that Mutis examines has already appeared in a publication, he will determine whether it has been assessed correctly or whether the entry needs emendation. Any discrepancy between published materials and the specimen that Mutis observes will provide a chance to contribute to the literature with a correction. Even better, if the plant does not appear in any of the existing sources on South American flora, Mutis could describe it in publication and in this way become the discoverer of a new species.

The naturalist's job, the portrait claims, is to observe.¹ The magnifying lens that Mutis holds in his right hand serves as a symbol of the acute visual skills that characterize him as a botanist. A simple instrument, it suggests that the truly magnificent and sophisticated machinery at work is the naturalist's gaze.

FIGURE 2.1. (*facing*)
Salvador Rizo?, portrait of
José Celestino Mutis, ca.
1800, oil on canvas, 48.8 ×
36.2 in (124 × 92 cm). Real
Academia Nacional de
Medicina, Madrid.



FIGURE 2.2. Herbarium specimen of *Mutisia*, sent by José Celestino Mutis to Carl Linnaeus from New Granada. Linnean Society, LINN 1004.1 (Herb Linn). By permission of the Linnean Society of London.

FIGURE 2.3. Unsigned, *Mutisia*, undated, pencil drawing sent by José Celestino Mutis to Carl Linnaeus from New Granada. Linnean Society, LINN 1004.2 (Herb Linn). By permission of the Linnean Society of London.

This is not simple looking but rather expert, disciplined, methodical observing. And expert looking is connected to other activities: collecting, as evidenced by the plant, books, and herbarium; comparing and classifying, as signaled by the presence of books; and writing and drawing, as indicated by the pen in Mutis's right hand and the sheet of paper before him on the desk.

Mutis's portrait not only addresses the process of observation, but also hints at some of its goals and rewards. Like the magnifying lens, the flower that Mutis so attentively considers celebrates his work. It is carefully presented to the viewer, painted in a bright red that vividly stands out against the muted colors that dominate the portrait. This particular plant has a starring role in the canvas because it is a specimen of *Mutisia*, a new American genus. Mutis found the plant in South America and sent a pressed specimen and two sketches showing details of the floral structure to the famous Swedish naturalist Carl Linnaeus (figs. 2.2–2.4).² Linnaeus then established the plant as a new genus by comparing these three media—object, image, and word—to other specimens in his own herbarium and to published depictions of other plants in both textual and visual form. Some years later, when Carl Linnaeus the younger published the first description of this plant in the *Supplementum Plantarum* (1782), he named it after



Mutis. By calling attention to his namesake plant, the portrait celebrates Mutis's talents as a botanical discoverer and relates them to his capacities as an observer.

This chapter outlines the importance and operation of visual epistemology in eighteenth-century natural history. As Mutis's portrait suggests, observation and representation served as ways of knowing. For the Spanish naturalists, this in part derived from the longstanding Hispanic imperial tradition of resorting to visual evidence, but it also had deep roots in eighteenth-century European natural history practices. The two overlapping worlds that the Spanish naturalists inhabited—imperial administration and Enlightenment science—shared a visual lingua franca. Naturalists considered visual skill the defining trait of their practice and the basis of their method. Collecting and classifying, the twin obsessions of early modern natural history, were predicated on the ability of the trained eye to assess, possess, and order. The eye provided the instrument with which to approach the world as well as the means to discipline it. For this reason, the process of becoming a naturalist revolved around visual training. Naturalists' notion of sight went beyond the physiological act of seeing to involve an expert type of viewing that involved training and specialized practices of observation and representation—not merely sight but rather insight.

FIGURE 2.4. Unsigned, *Mutisia*, undated, pencil drawing sent by José Celestino Mutis to Carl Linnaeus from New Granada. Linnean Society, LINN 1004.3 (Herb Linn). By permission of the Linnean Society of London.

Second, this chapter addresses the crucial importance of books to visual epistemology. Novice naturalists trained their eyes through books, using them to learn how to look, what to look at, and what to look for. Traveling naturalists constantly resorted to books—movable repositories of collections and observations—to make sense of what they encountered in their voyages. Visual epistemology was a multimedia affair: the naturalist's eye, an appraiser's instrument, compared and contrasted drawn or engraved figures, specimens, and textual information in manuscript or print. While naturalists needed all three types of materials, in many cases they found that illustrations had advantages over things and words.

Finally, the chapter explores the crucial role that visual epistemology played in long-distance observation. Eighteenth-century natural history was a global pursuit, inextricably linked to European expansion. Visual epistemology bridged distances, transporting nature in multiple incarnations—as picture, specimen, or text—so that it became available to naturalists in different locations, allowing them to see at a distance and to collaborate with one another. However, long-distance seeing could at times pit naturalists who traveled to distant regions against those who did not, provoking controversies about who counted as the author of an observation, the field naturalist or the cabinet naturalist. This tension is tacitly presented in Mutis's portrait. Despite the fact that Mutis corresponded with European naturalists, the painting obscures the collective character of long-distance visual epistemology. It depicts observation as an individual, solitary act of concentration, a regime of attentiveness that requires withdrawal from worldly distractions: observation as observance. But the red flower links Mutis to a trans-Atlantic world that extended far beyond the darkened room, reminding us that he did not work alone but rather participated in global networks of knowledge production and circulation.

Looking like a Naturalist

Eighteenth-century natural history publications repeatedly proclaim that vision constitutes the best method for investigating nature and that images provide the preferred means of transmitting this knowledge. This remains true regardless of a book's specific subject matter, genre, intended audience, language, country of publication, or any other factor—including whether that book itself contains illustrations or not, a choice that often had more to do with the practicalities of book publishing than with an author's attitude towards images. The almost ubiquitous statements about the importance of vision for the examination of nature, when read carefully, reveal an awareness of two distinct modes of seeing: one based on nature as spectacle, and one dedicated to expert observation.³

The first is exemplified by one of the most successful popular natural his-

tory books of the century, Noël-Antoine Pluche's *Le Spectacle de la nature* (Paris, 1732). Soon translated from the original French into every major European language, including Spanish, the book was frequently reprinted and revised into as many as fifty-nine editions. It is structured as a series of instructive conversations about nature, understood as a spectacle that unfolds the works of God for contemplation before human eyes. "We all enjoy Sight," Pluche explains, "and are conversant with the external Part of Nature. This View of it is for us, and in confining ourselves to it, we, in every Part, sufficiently discover Beauty, Instruction, and Truth."⁴ Thus the word "spectacle" does not connote superficial entertainment: while amusing and pleasurable, nature is always instructive.⁵ For this and similar publications, the word "spectacle" refers to a mode of seeing predicated on notions of transparency and immediacy, a way of looking that was open to everyone, regardless of background, and required no specialized training or laborious toiling—the belief, in Barbara Stafford's words, "that one could inhale information optically, without taking any trouble."⁶

By contrast, naturalists proposed a specialized mode of viewing, insisting on the difficulties of seeing and the training that it required. Their goal was not simple, immediate looking but rather expert observation, going beyond superficial traits to focus on the significant.⁷ The conscious importance that naturalists gave to observation explains why the term appears, again and again, in the titles and subtitles of European natural history publications. These books frequently warn readers against the treacherously deceptive quick glance that might mislead them, in contrast to the careful, reflective, and comparative process of viewing that yields true knowledge. The very "art" of the naturalist, an author explained, consisted in the capacity to observe skillfully and to render the results of an observation in a suitable manner.⁸ Hence the use of the term "art" to describe seeing—a trained and skilled set of practices involving embodied knowledge, often laboriously acquired over a long apprenticeship and refined through practice and time, as in the crafts or mechanical arts.⁹

The importance of artful looking for scientific observation is evidenced also in Denis Diderot and Jean le Rond d'Alembert's *Encyclopédie*, a barometer of Enlightenment thought. The sizable entry on the word *observateur* explains: "To see well, or to observe . . . it is not enough to apply the senses ordinarily; it is necessary that the senses be well organized, well arranged not only by nature, but also by art and by habit, and that these application be made without passion, without interest, without prejudices."¹⁰ The passage identifies two significant traits of artful seeing. The first is experience. The distinction drawn between a skilled and an unskilled observer is not made in terms of the professional versus the amateur, but rather as one between the untrained and easily deceived ordinary viewer and the educated, expert observer. A learned eye would not suffice without the knowledge derived from repeated experiences over time. The second trait is a moralized ethos of objectivity embodied in the person of the

observer.¹¹ Looking must be done not only with *art & habitude* but also without passions, interests, or prejudices that might distort the view.

The popular Spanish book *Secretos raros de artes y oficios* (Madrid, 3rd ed, 1806) likewise moralized observation, claiming that the study of nature required three attributes: sagacity, patience, and courage, “in order never to lose nature from sight, despite the great care she herself continually seems to take to hide from our view; to follow her in her progress, which is always the same under the surface but rare and infinitely varied with regards to appearances; in brief, to understand her gradual differences and the scale of her variations, which often are imperceptible to the most penetrating gaze.”¹² The study of nature could be described as a process of discovering rare secrets through a type of observation that by necessity went beyond the penetrating gaze. Something more—something else—was needed to find what lay hidden, to peek behind the curtain to understand what otherwise appeared opaque.

Unlike the spectacular gaze, natural history observation was neither simple nor immediate, but rather a sophisticated technique requiring training. Specialized observation served to define a community of experts capable of evaluating the skill and talent of others. While the novice naturalist would at first depend on instructions to understand what he was seeing and train his eyes, over time he would come to rely on visual experience and talent rather than on rote procedure. As Mutis noted in his journal, the only way to tell apart distinct but almost identical-looking plant species was to survey them with “botanical eyes.”¹³ He praised the Swedish naturalists Carl Linnaeus and Peter Jonas Bergius for possessing the “delicate eyes” that characterized great botanists and made their observations trustworthy.¹⁴ Linnaeus himself went further in identifying the botanical eye as that elusive *je ne sais quoi* indicative of a talented naturalist. In a characteristically colorful aphorism, he explained: “An experienced botanist quite often distinguishes plants from Africa, Asia, America, and the Alps, but could not easily say by what feature. I do not know what is *grim, dry, and dark* about the AFRICAN plant’s appearance, what is *proud and exalted* about the ASIATIC; what is *glad and smooth* about the AMERICAN, or *compressed and hardened* about the ALPINE.”¹⁵ The naturalist’s gaze was not only capable of identifying all significant traits in their enormous variety and subtlety but could also function as an embodied visual intuition, capturing information about the whole that could not be deduced from the sum of the parts. Naturalists’ eyes could not only see both the visible and the invisible, but also encompass within them the whole world.

The process of becoming a naturalist revolved around visual training. Given that natural history education was not professionalized in the way that fields like medicine or pharmacy were, it relied heavily on printed books—particularly illustrated ones. Formal lessons in botany could sometimes be taken in botanical gardens, but even then instruction emphasized reviewing principles

outlined in publication and using them to observe both specimens and illustrations. The fledgling botanist, Linnaeus prescribed, “should make himself familiar with the *literary history* of botany; and the authorities on species of plants should be consulted in the first place.”¹⁶ One of Linnaeus’s early publications, *Bibliotheca Botanica* (Amsterdam, 1736), reviewed 557 different works. And the very first chapter of his primer, the *Philosophia Botanica* (Stockholm, 1751), addressed the importance of books in botanical training and listed the titles with which every botanist should be familiar—classified in a bibliographic taxonomy, as befits Linnaeus.¹⁷

Becoming a naturalist implied gaining familiarity with a rigorously defined series of texts that imparted a specific methodology, one that involved observing and describing in highly structured ways, as well as using books to connect and compare observations. This was particularly true with the ascendancy of the Linnaean taxonomic system, introduced in the *Systema Naturae* (Leiden, 1735) and soon followed by “practical courses” published in all the European languages, including Spanish.¹⁸ The *Systema*, well known for outlining the sexual system of botanical classification, also proposed a methodology based on observation. By looking at a plant’s flowering structure and answering a series of questions, the observer could classify any plant within one of the twenty-four classes Linnaeus proposed (fig. 2.5).

Linnaeus emphasized visual epistemology even more strongly the following year, when he hired the great botanical artist Georg Dionysius Ehret to create a pictorial table illustrating his system (fig. 2.6).¹⁹ The table includes twenty-four figures, one representing the distinguishing traits of each of the Linnaean botanical classes, which are characterized by the structure of the flower and seed. Figure A represents the first class, *monandria*, characterized by having one stamen; figure B shows the second class, *diandria*, with two stamens; figure F the sixth, *hexandria*, with six stamens, and so on through various combinations of stamens and pistils.²⁰ The shift from chart to table offered a different representational technique as well as a move towards making methodology invisible by internalizing taxonomic theory within the eyes of the naturalist. By eclipsing the interrogation procedure, the table promoted Linnaean taxonomy as transparent and suggested that all it required was visual training. In order to classify a plant, it promised, the botanist needed simply to look at a flower, count its stamens and pistils, and note their structural arrangement. Who could not do something so simple?²¹

Linnaeus’s *Philosophia Botanica* extended the visual glossary. Ten plates depicted the different possible structural variations of each part of a plant—starting with sixty-two leaf shapes in the first illustration—and correlated each to a Latin term (fig. 2.7). A final figure suggested the type of armoire in which herbarium specimens should be stored, with twenty-four compartments to organize them according to the twenty-four Linnaean classes (fig. 2.8).²² Linnaean observation

CLAVIS SYSTEMATIS SEXUALIS.

Flos est plantarum gaudium.

--- Sic planta propagat!

NUMERUS PLANTARUM
Alia generum nomina Regni Vegetabilis
Fungorum.

PUBLICÆ.
Nuptie eorum totum mundum
visibiles operi exhiben-
tur.
Flores utique visibiles sunt.

CLANDESTINÆ.
Nuptie clau occultan-
tur.
Flores, oculis nris nuda
vis conspicuntur.

MONOCLINIA.
Marti & Uteri uno enan-
que Thalamo graduat.
Flores omnes hermaphroditi sunt,
et femina cum pistillo in
eodem flore.

DICLINIA. à *du* bis & *stos* Latus, Thalamus.
Marti seu femine distincti
thalamus graduat.
Flores masculini vel feminini in
eodem flore.

DIFFINITAS.
Marti inter se non cognati
sunt.
Stamina nulli sub parte con-
ata inter se sunt.

AFFINITAS.
Marti propinqui & cognati
sunt.
Stamina collata vel inter se
vel altera aliqua sua parte,
vel cum pistillo.

INDIFFERENTISMUS.
Marti nullius subordinationem
inter se inveniunt differentia.
Stamina nullum accuratius pro-
portionem longioribus inter
se inveniunt habent.

SUBORDINATIO.
Marti certi reliquos preferen-
tur.
Stamina des super reliquis bre-
viora sunt.

MONANDRIA. à <i>mon</i> -d- unicus, & <i>du</i> g. uterius. Marti unus in eodem thalamo. Stamina unum in flore hermaphroditi.	I.
DIANDRIA. Marti duo in eodem conjugio. Stamina duo in flore hermaphroditi.	II.
TRIANDRIA. Marti tres in eodem conjugio. Stamina tria in flore hermaphroditi.	III.
TETRANDRIA. Marti quatuor in eodem conjugio. Stamina quatuor in eodem flore cum pistillo. Obs. si Stamina à proleptis breviora sunt, referantur ad Cl. 14.	IV.
PENTANDRIA. Marti quinque in eodem conjugio. Stamina quinque in flore hermaphroditi.	V.
HEXANDRIA. Marti sex in eodem conjugio. Stamina sex in flore hermaphroditi. Obs. si ex his Stamina à proleptis breviora sunt, referantur ad Cl. 17.	VI.
HEPTANDRIA. Marti septem in eodem conjugio. Stamina septem in flore cum pistillo.	VII.
OCTANDRIA. Marti octo in eodem thalamo cum femina. Stamina octo in eodem flore cum pistillo.	VIII.
ENNEANDRIA. Marti novem in eodem thalamo cum femina. Stamina novem in flore hermaphroditi.	IX.
DECANDRIA. Marti decem in eodem conjugio. Stamina decem in eodem flore cum pistillo.	X.
DODECANDRIA. Marti duodecim in eodem conjugio. Stamina duodecim in flore hermaphroditi.	XI.
ICOSANDRIA. ab <i>icos</i> viginti & <i>duo</i> . Marti viginti communiter, tunc plures, tunc pauciores. Stamina (non exceptu) nulli sunt inter se collata.	XII.
POLYANDRIA. à <i>poly</i> & <i>du</i> g. Marti viginti & ultra in eodem cum femina thalamo. Stamina à 19 ad vix in eodem, cum pistillo, sunt.	XIII.
DIDYNAMIA. à <i>du</i> , <i>bin</i> , & <i>duo</i> g. potentia. Marti quatuor, quatuor à longioribus, & 2 brevioribus. Stamina quatuor, quatuor à proleptis breviora sunt.	XIV.
TETRADYNAMIA. Marti sex, quatuor à longioribus in flore hermaphroditi. Stamina sex, quatuor à brevioribus, & 2 brevioribus brevioribus.	XV.
MONADELPHIA. à <i>mon</i> -d- unicus, & <i>adel</i> g. frater. Marti, ut frater, ex una basi proveniunt. Stamina filamentis in eodem corpore unita sunt.	XVI.
DIADELPHIA. Marti à duplici basi, nunquam à duplici fonte, oriuntur. Stamina filamentis in duo corpora unita sunt.	XVII.
POLYADELPHIA. Marti ex pluribus, quoniam duobus, multis uni sunt. Stamina filamentis in tria, vel plura, corpora unita sunt.	XVIII.
SYNGENESIA. à <i>syn</i> simul, & <i>genn</i> generum. Marti cum grandibus fadibus confusurum. Stamina nullius (non exceptu) in eodem thalamo.	XIX.
GYNANDRIA. à <i>gyn</i> femina, & <i>du</i> g. maritus. Marti cum femina mixtione coniuncti. Stamina pistillo (non exceptu) unita sunt.	XX.
MONOECHIA. à <i>mon</i> -ech- unicus, & <i>ech</i> domus. Marti habitus cum femina in eodem thalamo, sed diversis thalamis. Flores masculini & feminini in eodem planta sunt.	XXI.
DIOECIA. Marti & femina habitus in diversis thalamis & domesticis. Flores masculini in diversa planta, à femininis distincti.	XXII.
POLYGAMIA. à <i>poly</i> & <i>gama</i> Nuptia. Marti cum univitis & nuptia collatum in distinctis thal. Flores hermaphroditi & masculini & feminini in eodem specie.	XXIII.
CRYPTOGAMIA. à <i>crypt</i> occidui, & <i>gama</i> Nuptia. Nuptie clau occultantur. Flores intra fructum, vel parvitate oculis nris subterfuguntur.	XXIV.

ORDINES à Fenis seu pistillo, ut classis à Mathon seu feminibus, desinuntur; in Classi Syngenesia autem à ceteris partem differentia Ordines. e. gr.

MONOGYNIA. Digynia, Trigynia, Tetragynia &c. à *gyn* femina, proposita numeris gradus *mon*-d-, *du*, *tri*, *tetra*, &c. utique. &c.

1. e. Pistillum 1. 2. 3. 4. &c. Numerus his pistillis desinunt à *Basi* *poly*, *tri*, *tetra* autem desinunt, à numero trigynatium saltem *tri*.

MONOGAMIA. conflat multis nuptiis, conjugia parva contrahuntur.

1. e. multis masculinis feminibus & pistillis infertilibus. Flores copulandi maxime parum valde Complicati dicuntur.

POLYGAMIA. ubi thalamus vix nuptiarum dilectum occupat, & ambitus cingit thalamus meretricum mariti desinuntur, ut à mariti uxoreta fructulentur.

1. e. ubi masculini thalamus occupat, & meretricum elegans masculini feminibus desinunt, idque recipit modo:

α. **SUPERFLUA** dicitur, cum femina meretricum fertiles sunt, ut masculini propinquos quoniam, sed ut meretricum maxillam videntur superfluum.

β. **FRUSTRANEA** dicitur, cum femina meretricum fertiles sunt & speciem propinquos quoniam & meretricum maxillam ob deficiunt valere, veluti collata, impinguntur nequeunt.

γ. **NECESSARIA** dicitur, cum femina meretricum, ubi grandis idem & valde deficiunt fertiles, masculini propinquos nequeunt, meretricibus autem à mariti feminibus fructulentur, maxime locum supplenti-

bus, subleventque hanc propinquos.

1. e. cum flores hermaphroditi ob deficiunt masculini pistilli, femina profertur nequeunt, fertiles autem feminibus in eadem femina profertur preferuntur.

Clariss: LINNÆI, M.D.
METHODUS plantarum SEXUALIS
in SYSTEMATE NATURÆ
descripta



Lugd. bat: 1736

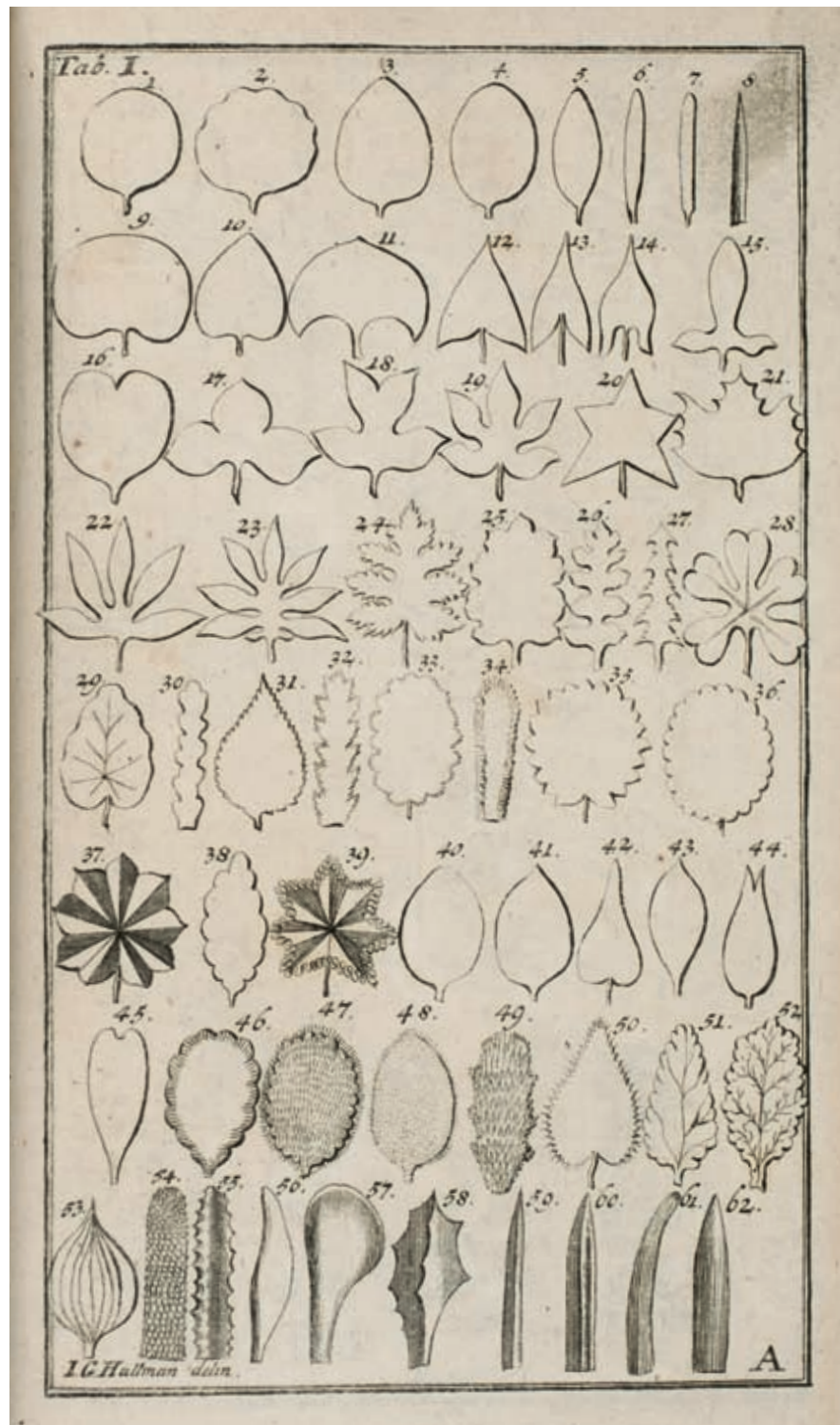
G.D. EHRET. Palat. heidelb.
fecit & edidit

FIGURE 2.5. (facing) Chart depicting the method for classifying plants using Linnaeus's sexual system, in Carl Linnaeus, *Systema naturae* (Leiden, 1735). Missouri Botanical Garden Library, www.mobot.org.

FIGURE 2.6. Georg Dionysius Ehret, pictorial table depicting the twenty-four classes of the Linnaean botanical system, 1736, engraving. The Hagströmer Medico-Historical Library, Karolinska Institutet, Stockholm, Sweden.

FIGURE 2.7. Carl Linnaeus, *Philosophia botanica* (Stockholm, 1751), plate 1. Courtesy of University of Southern California, on behalf of the USC Libraries Special Collections.

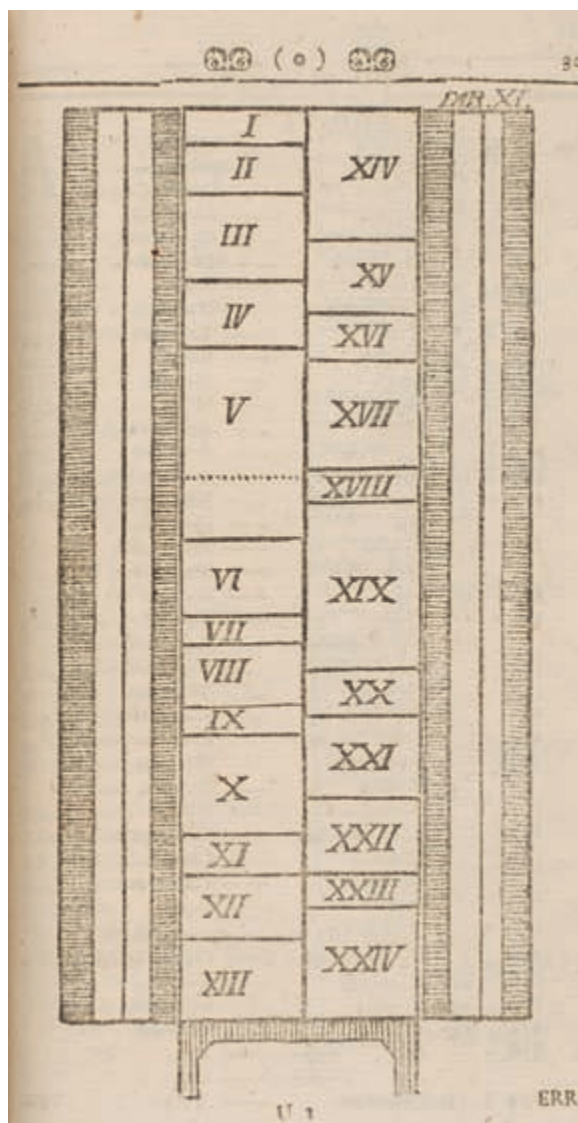
FIGURE 2.8. (facing) Carl Linnaeus, *Philosophia botanica* (Stockholm, 1751), plate 11. Courtesy of University of Southern California, on behalf of the USC Libraries Special Collections.



thus strongly linked vision and language, relating the act of observation to specialized terms for describing each part and ultimately for classifying and naming specimens based on this process.²³

Ehret's table and the plates in the *Philosophia* were copied or adapted in practically every botanical textbook of the time—including Antonio Palau and Casimiro Gómez Ortega's *Curso elemental de botánica*, used for instruction at the Royal Botanical Garden in Madrid, where many of the expeditions' naturalists trained.²⁴ The extensive reproduction of these illustrations contributed greatly to the popularity of Linnaean classification, making it appear simple, direct, and seemingly foolproof. In addition to enlisting recruits to the Linnaean ranks, they also shaped a shared visual and verbal vocabulary used by naturalists throughout and beyond Europe. Illustrations formed the basis of natural history visual training. A proposal to hire a full-time artist to work at the Spanish Royal Botanical Garden alluded to "the advantages that images, methodically arranged in the classroom, have for this field of study [botany]." The document elaborated: "Images must be considered the alphabet of science, since they bring before the eyes all the classes of plants, with their different genera and species, and allow them to be determined more quickly through demonstration in the classes given in that room."²⁵

More than books to read, the *Systema Naturae* and *Philosophia Botanica* were books to use. Botanical eyes and botanical memories were trained through laborious exercises in viewing comparatively and establishing correspondences. Linnaeus was proposing not only a taxonomical system and a methodology based on observation, but a specific type of observation in which objects were always seen against one another. For Linnaeus, the practice of natural history involved a constant triangulation among specimens, images, and textual information. He called this process of learned comparison "collation," a term with legal origins that describes the comparison of two versions of a document in order to identify any differences.²⁶ Mutis described this multimedia cross-referencing as one



of “confronting” the plants that his *herbolarios* collected, the many books in his library, and the images that the expedition artists produced—a word choice that reflects the challenging struggle of contrasting various materials against one another.²⁷ This process of collating different types of evidence represents an extension of philological scholarly traditions, and suggests that among naturalists the significance of books extended beyond their role as reference material. Natural history methods drew directly from those of reading and textual study, leading to bookish observation.

Observation in the Field: Bookish Travelers

Trained as expert observers, the naturalists in the Spanish expeditions investigated American flora through visual epistemology. They relied heavily on books, which were key instruments not only in educating botanical eyes but also in the day-to-day work of botanical exploration, providing reference points against which the Spanish naturalists considered and interpreted American nature. As naturalists traveled, they would observe a plant or an animal and then search the books they carried with them to establish whether it appeared in publication. If a specimen had been previously described, the naturalist would make a note to the effect that it was also found in that certain locality, or improve or correct the existing description if he considered it unsatisfactory. If the specimen did not appear in any text, then the naturalist would consider himself its discoverer and compose a detailed description—and, whenever possible, also prepare an illustration—hoping to be the one to introduce the new specimen into the European catalogue of nature through publication at a later date. For example, after Mutis arrived in New Granada in 1761, as he journeyed from the port of Cartagena to the viceregal capital of Santa Fe de Bogotá, he wrote down the names of the plants he saw, naming those that he considered “new” (that is, unmentioned in European natural history publications) and carefully recording discrepancies between the plants he observed and published descriptions.²⁸ As Mutis later explained to his collaborator Eloy Valenzuela, it was only by seeing the published illustration of a plant that he had mistakenly thought to be “new” that he had realized that it had in fact been previously described.²⁹

Not having the appropriate references at hand could leave the naturalist disarmed and unable to make sense of the specimens he saw or collected. Martín de Sessé, of the New Spain expedition, wrote repeatedly to Madrid requesting books he needed.³⁰ On one occasion, he sent a collection of zoophytes, lithophytes, and minerals to Spain without attempting to analyze them, explaining that he had not dared even “touch” these items “without discredit to the Nation” because he lacked the appropriate books with which to examine them.³¹ Luis Née, of the Malaspina expedition, declared himself unable to identify the

more than two hundred rare plants he collected on the Tunguragua volcano in Ecuador without consulting the works of Hipólito Ruiz and José Pavón of the Chile and Peru expedition, which were in preparation in Madrid at the time of Née's trip, for fear of wasting time repeating their work.³² To prevent this from happening, traveling naturalists needed to remain as up-to-date as possible with the state of botanical publication—something that could prove hard to do as they moved from place to place, making them dependent on their European correspondents for updates—and to communicate their findings back to Europe as rapidly as possible.

To prevent this observational paralysis due to a shortage of books, all the expeditions equipped themselves with as many publications as they could muster.³³ Their books can be grouped into two broad categories. The first is reference works about system and method, which addressed both the theoretical and practical aspects of natural history. Gómez Ortega's written instructions to Ruiz and Pavón as they departed on the Chile and Peru expedition specified that they should take with them Linnaeus's *Systema Naturae*, *Philosophia Botanica*, and *Amoenitates Academicæ* (Stockholm, 1756), as well as Marc Antoine Louis Claret de la Tourette and François Rozier's *Démonstrations élémentaires de botanique* (Lyon, 1766), Miguel Barnades's *Principios de Botánica, sacados de los mejores escritores, y puestos en lengua castellana* (Madrid, 1767), and his own translation of Henri-Louis Duhamel du Monceau's treatise on trees, *Tratado de las siembras y plantío de árboles* (Madrid, 1773).³⁴

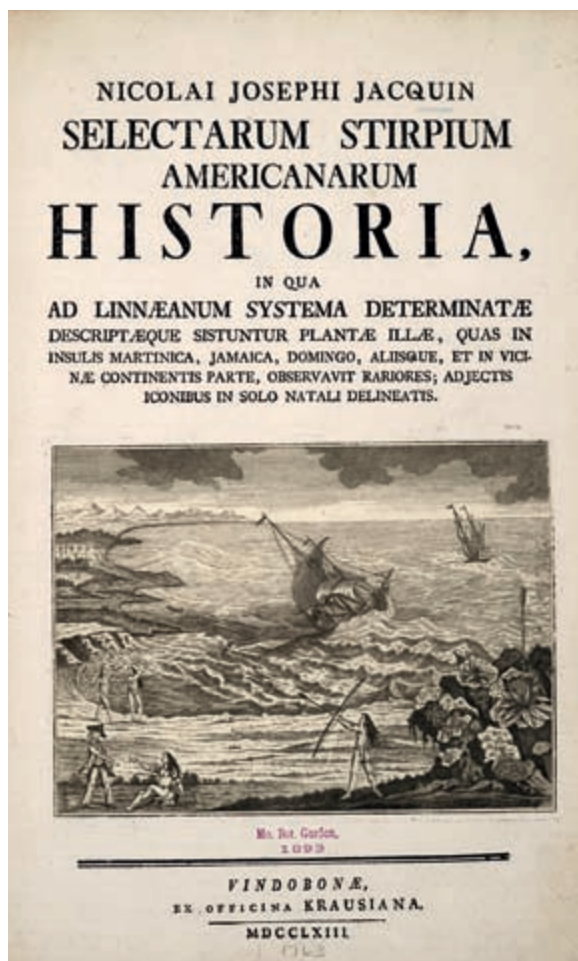
The second category of books that the Spanish naturalists used was compilations that were either geographical surveys based on an author's travels in a certain region or thematic collections of a type of creature. The expeditions' naturalists were particularly interested in texts that described the territories they would visit, such as Charles Plumier's *Description des plantes de l'Amérique* (Paris, 1693), *Nova Plantarum Americanarum Genera* (Paris, 1703), and *Plantarum Americanarum* (Amsterdam, 1755–60), Mark Catesby's *The Natural History of Carolina, Florida, and the Bahama Islands* (London, 1731–43), Hans Sloane's *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers, and Jamaica, with the Natural History . . . of the Last of Those Islands* (London, 1707–25), and Nikolaus Jacquin's *Selectarum stirpium Americanarum Historia* (Vienna, 1763). Familiarity with these books was a basic requirement for the traveling naturalist—Gómez Ortega's instructions for Ruiz and Pavón recommended that they review Linnaeus's list of authors who had written about America.³⁵ They also took with them encyclopedic inventories organized by subject, such as George Edwards's *A Natural History of Uncommon Birds* (London, 1743–51), Martin Lister's book on shells, *De re coquinaria* (Amsterdam, 1709), and Francis Willoughby's book on fishes, *Historia piscium* (Oxford, 1686).³⁶

The expeditions' bibliographic inventories included not only works on American nature but also studies on the natural history of other non-European

regions, such as Georg Eberhard Rumphius's *Herbarium Amboinense* (Amsterdam, 1741–50), Peter Jonas Bergius's *Descriptiones plantarum ex Capite Bonae Spei* (Stockholm, 1767), and Johan Frederick Gronovius's *Flora Orientalis* (Leiden, 1755). The presence of these titles underscores the comparative and global character of natural history at the time: naturalists used books as instruments for creating global specimens out of local nature. European naturalists were assembling puzzle pieces from every continent to form a picture of the whole world, so the study of American nature was continuous with the study of other regions. Travelers to the Americas compared the natural specimens they found with those described in books about other non-European regions, partly out of a concern to avoid duplicating observations or mistaking previously described specimens for undescribed ones. Thus, in the early days of the New Spain expedition, Sessé asked Gómez Ortega for the natural history publications of travelers to the Cape of Good Hope, Canada, and Virginia. He desperately needed these works, he claimed, because they contained descriptions of the majority of the plants that his team was observing in Mexico.³⁷

The ways in which the Spanish naturalists used their libraries can be deduced by examining a representative book, such as Jacquin's *Selectorum stirpium Americanarum Historia*. They found this work particularly useful, given that it described many plants that they themselves encountered and that it adhered to Linnaean taxonomic practices. The book is the product of Jacquin's travels in Jamaica, Hispaniola, Martinique, and the coast of present-day Colombia and Venezuela between 1755 and 1759. The title page to the first volume includes a copperplate engraving that depicts two ships tossed by the waves near the shores of a lush land populated by long-haired, barely clad inhabitants (fig. 2.9). This stereotypical composition alludes to well-established early modern tropes that European readers and viewers would easily recognize: the difficulties and perils of travel, the engorged overly fertile gigantism of tropical nature, the nakedness of its inhabitants, as well as their bows and arrows. The frontispiece to the second volume also partakes in the tropes of natural abundance offering itself to the European traveler—in this case, to the reader as virtual traveler (fig. 2.10). An indigenous man and woman, both of them long-haired and dressed in loincloths (he also carries a bow and arrow), present to the viewer an unfurling cloth that functions as a modified cornucopia, offering the map of the regions that Jacquin visited as well as some of the vegetation he encountered there. The scene is framed with a garland composed from enlarged American botanical specimens.

The content of Jacquin's book consists of a series of textual entries describing American plants, arranged according to Linnaean taxonomy—the book begins with monandrias and continues with diandrias, triandrias, and so on. Besides conveying the author's allegiance to a specific taxonomical camp, this arrangement facilitated the reader's task: the traveling botanist could observe a plant, categorize it according to the Linnaean system, and then search for it in the



appropriate section of Jacquin's book even if he ignored its name. Basing both botanical classification and bibliographical cross-checking on a plant's structure, and not its name, also promised to rid botany of replicated information.

Within a botanical class, each entry begins with the plant's name, followed immediately by a series of bibliographical references: first and foremost, to a Linnaean work (if the specimen appeared in one), and then to descriptions published by other authors. The entry on the genus *Ehretia*—named to honor the botanical artist—starts by citing Linnaeus's first publication of that plant, and then refers to Patrick Browne's and Hans Sloane's natural histories of Jamaica (fig. 2.11).³⁸ The plant's description follows, consisting of a list of the parts to be examined according to the Linnaean system (calyx, corolla, stamen, pistil, pericarp, and seed), with each part characterized by a series of adjectives denoting its physical appearance. Thus, each entry connects bookish learning and visual properties. Entries conclude with a note on the plant's overall aspect, including

FIGURE 2.9. Nikolaus Joseph von Jacquin, *Selectarum stirpium Americanarum Historia* (Vienna, 1763), vol. 1, title page. Missouri Botanical Garden Library, www.mobot.org.

FIGURE 2.10. Nikolaus Joseph von Jacquin, *Selectarum stirpium Americanarum Historia* (Vienna, 1763), vol. 2, frontispiece. Missouri Botanical Garden Library, www.mobot.org.

FIGURE 2.11. Textual description of *Ehretia* in Nikolaus Joseph von Jacquin, *Selectarum stirpium Americanarum Historia* (Vienna, 1763), vol. 1, p. 45. Missouri Botanical Garden Library, www.mobot.org.

PENTANDRIA, MONOGYNIA.

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2. BEURRERIA (*exsucca*) fructibus exsuccis, quadripartitis. TAB. CLXXXIII.

Fig. 17.

Arbuscula quindecimpedalis, interdum erecta, interdum vicinis arboribus se sustentans lentaque; cæterum habitu præcedentis. Folia ovata, acuta, glaberrima, alterna, petiolata, bipollicaria. Racemi subcorymbosi, subterminales. Flores leviter suaveolentes, præcedentibus multo majores; corollæ candidæ laciniis cordatis; antheris ovatis magnisque. Baccæ virides, tetragonæ, leviter quadrifurcatæ, in acumen definentes obtusum, pulpa farctæ nulla; tandem e nigro rufescentes, cumque ipsis in hærentibus seminibus quadrifariam secedentes, & diu adhuc in arbore persistentes. Rhamnus cumanensis Lætingii *hisp.* 182. omnino est hujus generis, & forte eadem cum hac species; quod asserere tamen non aſum.

Habitat frequens Carthagenæ in sylvaticis montosis. A Majo ad usque Augustum floret. Fructus Octobri matureſcit.

EHRETIA.

1. EHRETIA (*tinifolia*) inermis. *Lin. syst. A.* p. 936.

Ehretia arborea, foliis oblongo-ovatis alternis, racemis terminalibus.

Brown. jam. 1. p. 168. t. 16. f. 1.

Ceraſo affinis arbor baccifera, racemosa, flore albo pentapetalo, fructu flavo monoppyreno dulci eduli. *Sloan. hist. jam.* 2. p. 94. t. 203. f. 1.

CAL. Perianthium monophyllum, campanulatum, obtusum, erectum, semiquinquetidum, persistens.

COR. monopetala. Tubus infundibuliformis, calyce paulo longior. Limbus quinquefidus: laciniis subovatis, acutis, planis, reflexis, tubum leviter superantibus.

STAM. Filamenta quinque, subulata, patula, petalo paulo breviora, cujus fundo basi latiuscula inferuntur. Antheræ ovatæ, utrinque furcatæ, incumbentes.

PIST. Germen subrotundum. Stylus filiformis, superne crassior, erectus, longitudine staminum. Stigma subbiduum, obtusum.

PER. Bacca subrotunda, unilocularis.

SEM. quatuor, hinc convexa, inde angulata, paucissima pulpa distincta.

Arbor erecta, viginti vel triginta pedes alta, in comam abit oblongam densamque. Folia habet ovalia, obtusa, integerrima, glabra, alterna, breviter petiolata, circiter quadripollicaria. Racemi paniculati, oblongi, magni, terminales. Flores numerosi, parvi, candidi, subgraveolentes.

Habitat in Cuba & Jamaica. Florentem vidi Januario & Febuario.

its height, the features of parts that were relevant to botanists even if they were not taxonomically characteristic of the plant (such as the leaves and roots), and a note on where the plant grows and when it flowers. This textual description works in conjunction with an illustration of the plant—ideally, one that provides enough information to characterize the specimen. But because the practical aspects of botanical travel and publishing considerations so often intervened, the depictions accompanying many newly described species can be less than definitive. This is the case with the *Ehretia*: its illustration shows a single leaf, not a full figure, far from ideal according to natural history standards at the time (fig. 2.12).

Shortcomings, omissions, and mistakes were common in published books on American nature. This could prove frustrating to the Spanish naturalists. Antonio Pineda, with the Malaspina expedition, dismissed most entries on American birds and quadrupeds in Georges Louis Leclerc, Count of Buffon's landmark *Histoire naturelle, générale et particulière* (Paris, 1749–88) and Mathurin-Jacques Brisson's *Ornithologia* (Paris, 1760), concluding that the books could be trusted only with regards to species native to the Antilles and French Cayenne, from where Buffon and Brisson had received specimens.³⁹ Everything else, he complained, was incorrect or fragmentary. However, it was precisely such lacunae that provided the Spanish naturalists with opportunities to contribute to natural history through their own work.⁴⁰ Mutis realized this as early as his initial trans-Atlantic sea voyage in 1760. Having spent a whole day examining a flying fish caught by the ship's crew, he was unable to determine whether it constituted a new genus because his copy of Linnaeus' *Systema naturae* did not allow him to make a precise judgment.⁴¹ "My work," Mutis explained years later, "will not only cover that which is new, but will also serve to illustrate all that has been imperfectly announced by my botanical predecessors."⁴² Had books been perfect, there would have been little left for the Spanish naturalists to accomplish. This refurbishing spirit at times showed undertones of unsportsmanlike pride, as when Mutis's collaborator Eloy Valenzuela celebrated the former's concurring with his own analysis of a plant, writing that he was "enormously gladdened that you agreed to take Jacquin's *Coffea occidentalis* away from him, and to add it under a new genus."⁴³ Mutis himself seized upon the weaknesses he found in Hans Sloane's *Voyage*. "Having surveyed its plates more than four times," he rejoiced, "I find many plants that are common to that region and to this one, and almost all of them require a new plate with the proper illustration."⁴⁴ Given the desire for priority in discovery, botanical observation was a competitive practice.

In addition to using books to observe and collect, the Spanish naturalists also employed them when putting the fruits of their labor into circulation. The shipments they periodically sent back to Europe consisted of crates carefully packed with drawings, preserved specimens, and written descriptions. These descriptions adhered to the conventions established in the publications that the naturalists consulted, and also often referred to them. Thus, Sessé accompa-

Longinos, also of the New Spain expedition, refers to publications by Linnaeus, John Ray, Francis Willoughby, Bernhard Siegfried Albinus, George Edwards, Mathurin Brisson, Francisco Hernández, and Jacob Theodor Klein.⁴⁶

European naturalists used printed works both to interpret and capture nature in the raw as well as to communicate this information in a natural history lingua franca. Through this process, a plant or bird would be transformed into a natural history specimen and then into a known species. This process was a multimedia affair that created a close and interlocking relationship among things, images, and words—materials that were all necessary, but not equal.

The Materials of Visuality

Although specimens, illustrations, and textual descriptions were always used in reference to one another, they had different uses and carried different epistemic value. The Spanish expeditions, in their clear emphasis on producing illustrations over collecting specimens or writing descriptions, demonstrate the enormous importance that images had in visual epistemology. Naturalists tended to value pictures much more highly than words, maintaining that illustrations had a superior capacity to function as certain proof and as clear and persuasive means of communication. The celebrated British botanist Joseph Banks, who had traveled in Captain James Cook's first voyage (1768–71) before becoming director of the Kew Botanical Gardens, explained the advantages of images over words in his unsigned preface to the artist Franz Bauer's *Delineations of Exotick Plants Cultivated in the Royal Garden at Kew* (London, 1796):

*It will appear singular, at first sight, that engravings of plants should be published without the addition of botanical descriptions of their generic and specific characters; but it is hoped, that every Botanist will agree, when he has examined the plates with attention, that it would have been a useless task to have compiled, and superfluous expense to have printed, any kind of explanation concerning them; each figure is intended to answer itself every question a Botanist can wish to ask, respecting the structure of the plant it represents; the situation of the leaves and flowers are carefully imitated, and the shape of each is given in a magnified, as well as in a natural size.*⁴⁷

Spanish naturalists shared this trust in images as replacements for objects, and in their capacity to function without relation to texts.

Images had a more complex relationship to specimens. In Linnaean botany the taxonomic identity of a species always refers back to a single “type specimen” held in a herbarium. For that reason, while Linnaeus espoused the benefits of illustrations in botanical education, he considered that for the important task



of determining genera, images were insufficient on their own: it was always necessary to consult a specimen.⁴⁸ However, his recommendation was a best-case scenario that proved hard to follow for naturalists working on distant specimens, for whom images often were the best source available when not the only source altogether. Though privileged as the ultimate referent for classification, the very materiality of specimens presented significant challenges to naturalists.

A first challenge was their uniqueness. The fact that there is a single type specimen for each plant species implies that it is available for consultation only in the archive that holds it. As the naturalists in the Spanish expeditions traveled, when they wanted to ascertain whether a plant they observed was a known species or a new one, they did not have access to the type specimen back in Europe.

By providing multiple and portable versions of singular type specimens, botanical illustrations permitted movable comparative viewing.

Another problem that specimens presented was their great fragility. Pressed plants, stuffed animals, and dried insects tended to decompose or fall apart when they were not eaten by insects or invaded by mold. Traveling naturalists knew well the difficulties of preserving specimens. Humboldt and his traveling companion Aimé Bonpland, who voyaged through the Americas without the benefit of an artist, suffered the bitter consequences of this absence. “Alas! Almost in tears we open our plant boxes,” Humboldt wrote from Havana to his botanical mentor Carl Ludwig Willdenow, in Berlin. “Our herbaria have the same fate lamented already by Sparman, Banks, Swartz and Jacquin. The immense wetness of the American climate, the rankness of the vegetation, which makes it difficult to find fully grown leaves, have destroyed one third of our collection. Every day we find new insects which destroy paper and plants. Camphor, turpentine, tar, pitched boards, hanging boxes fixed on ropes in the open, all tricks devised in Europe fail here, and our patience has become tired.”⁴⁹

Images offered a sturdier way to capture natural objects in lasting form. Of the three varieties of the genus *Castilleja* that Mutis sent to Linnaeus, only the type specimens for *Castilleja mutisii* and *Castilleja integrifolia* remain in good condition in the Linnaean herbarium. The third type specimen, corresponding to *Castilleja fissifolia*, retains but a few fragments of the plant, most of which has disappeared from the page to which it had been adhered (fig. 2.13). This is very problematic, given that as a type specimen it should have served as the archetypal representative for the species. Since the type specimen’s value depends on its physical integrity, in its current state this one is rather useless. By contrast, the drawing of the same plant that Mutis sent to Linnaeus not only survived perfectly but also presented details that the dried specimen could never transmit (fig. 2.14). Thus, images not only transported paper versions of type specimens to the distant field, but also functioned as stabilized incarnations that conveyed new specimens back to European herbaria.⁵⁰ In a kind of botanical alchemy, pictorial representation transformed unique and fragile objects into multiple and sturdy illustrations.

This change in medium, from thing to picture, went beyond the practicalities of transportation. Images managed to convey “live” plants in ways that “dead” pressed specimens could never hope to, preserving their colors and freshness, condensing time, and combining the accidental characters of multiple specimens into an idealized perfect type. For instance, the pressed *Gustavia augusta* that Linnaeus received from Surinam is a perfectly good herbarium specimen; yet, as an incarnation of a live plant, it pales in comparison to the painting of the same species by artist Manuel Antonio Cortés Alcocer, of the New Granada expedition (figs. 2.15 and 3.37).

Discussions about the relative merits of images, words, and objects ulti-

FIGURE 2.13. (facing)
Castilleja fissifolia, pressed specimen sent by José Celestino Mutis to Carl Linnaeus from New Granada. Linnean Society, Linnean Herbarium, LINN 757.2. By permission of the Linnean Society of London.

FIGURE 2.14. (facing)
Pablo Antonio García (attr., New Granada expedition), *Castilleja fissifolia*, ca. 1773, pen-and-ink drawing. Item number 11 in *Icones Ineditae*, a collection of thirty-two drawings sent by José Celestino Mutis to Carl Linnaeus from New Granada. Linnean Society, MS BL 1178. By permission of the Linnean Society of London.



FIGURE 2.15. Herbarium specimen of *Gustavia augusta*, sent by Carl Gustaf Dahlberg to Carl Linnaeus from Surinam. Linnean Society, LINN 863.1 (Herb Linn). By permission of the Linnean Society of London.

mately revolved around the issue of how to best embody and mobilize flora. The practices and spaces of natural history related observation and circulation to collecting.⁵¹ The Spanish expeditions worked closely with the Royal Natural History Cabinet, and the traveling naturalists expected their journeys to furnish not only the pages of publications but also the drawers and walls of collections. Natural history books very often depicted items from cabinets. Whether at home or abroad, naturalists gathered, examined, ordered, and described objects. Naturalists actively exchanged samples they had collected or been given, creating networks of obligation that required the constant acquisition and circulation of specimens.⁵² Even theoreticians got their hands dirty: Linnaean systematics operated as a curatorial program organizing the tidy arrangement of specimens from around the world into conceptual categories and cabinet drawers (fig. 2.8). Maneuvering theoretical abstractions often implied dealing with physical objects.

Thus, seeing and handling were closely related as epistemological techniques.⁵³ Like naturalists, collectors were expert observers trained to identify objects accurately, distinguishing among very similar ones based on minuscule differences. This shared emphasis on visual epistemology is evidenced in the engraved portrait of Albertus Seba included in his *Locupletissimi Rerum Naturalium Thesauri* (Amsterdam, 1734–65), a landmark of eighteenth-century natural history collecting (fig. 2.16). Seba, a Dutch apothecary, owned a remarkable collection of natural history specimens and images that formed the basis of this



FIGURE 2.16. Portrait of Albertus Seba, copperplate engraving, in his *Locupletissimi Rerum Naturalium Thesauri accurata descriptio*, 4 vols. (Amsterdam, 1734–65). Missouri Botanical Garden Library, www.mobot.org.

publication. The portrait included in the *Thesauri* shows Seba holding in his right hand a glass jar with a specimen preserved in spirits, and pointing with his left hand to shell and mineral specimens that lie on the table next to an open book illustrated with images of insects and other animals. Seba's gaze, unremittably fixed on the viewer, forms the third point of a triangle: the eyes that observe, the hand that shows, and the hand that owns. Placing Seba between the objects and images slightly before him and the collection of jars behind him reinforces this depiction of him as an intermediary: with one hand he can reach forth to gather natural objects, with the other, he can reach back to place them within the ordered shelves of European science. In this way, Seba's portrait also reminds us of the importance of the collection, or the cabinet, as a repository not only of natural history in its various material incarnations—as specimens, books, and images—but also of colonial or commercial ventures that set these objects in motion across distances.⁵⁴

The circulation of knowledge was the goal and the reason for expert observation. Skilled eyes would have been unnecessary if naturalists worked in isolation. Because naturalists were in communication with one another, engaged in collective empiricism as they shared and compared their observations, they needed a common visual language. Linnaeus' process of "collation" depended on the exchange of "botanical goods"—that is, specimens, images, and written descriptions—among correspondents.⁵⁵ Visual epistemology provided naturalists scattered across the globe with a shared approach to the study of natural history, based on a method of comparative and evaluative observation that contrasted images, objects, and words. By articulating definite criteria for training naturalists' eyes and for their engagement with multimedia observations, visual epistemology turned multiple and far-sprung observers into instruments that worked in concert.⁵⁶

Long-Distance Observation

Given the global interests of eighteenth-century natural history, visual epistemology was a collective process that involved bridging distances. Trained observers voyaged to remote lands to gather observations and specimens, and in turn these stabilized incarnations transported distant nature so that it could be studied by observers who had not themselves traveled. At the core of the notion of observation lay an individualistic rhetoric of autopsy—the process of having experienced or witnessed oneself, with one's own eyes. However, observation was often a collective endeavor, one that drew on the firsthand analysis of secondary materials in various media, or on the firsthand observations of others. Juxtaposing Mutis's portrait at the opening of this chapter (fig. 2.1) to another painting produced by an artist from his workshop elucidates the long-distance

circulation of people, specimens, and images. This second portrait depicts the renowned Spanish botanist Antonio José Cavanilles (1745–1808), director of the Royal Botanical Garden of Madrid between 1801 and 1804 and Mutis's correspondent and supporter (fig. 2.17).⁵⁷ The two paintings have much in common. Both were produced at the turn of the nineteenth century in Bogotá, both emphasize the importance of visual epistemology in natural history, and both connect observational acuity to the honor of discovery. The paintings also allow us to reflect on the role of traveling images in allowing long-distance observation. Cavanilles's portrait shows him in profile, from the waist up, sitting before a work table. With his left hand, he points to a botanical illustration that he studies with unblinking attention. The image is clearly recognizable as one of the works produced by the New Granada expedition. Gazing attentively at the image, the botanist observes the various parts of the plant and immediately transforms his visual analysis into a textual taxonomic description, which he writes with a quill pen on a notebook that lies open on the table. Eye and hand work in coordination, image produces text. Set against a dark background and the lustrous velvety black of Cavanilles's priestly garments, the light-colored pages pop brilliantly. The botanical illustration is as much a protagonist of this painting as the man rapt in its study. It serves to connect the naturalist in Spain and the artist in America, erasing the distance between them. Although the portrait is unsigned and undated, the artist inscribed himself into the painting in a clever way. The name visible at top of the image, *Rízoa*, points to the identity of both a South American plant and a South American artist, Salvador Rizo (1762–1816), who was the expedition's lead artist and Mutis's second-in-command, and in that capacity directed the artistic workshop that produced illustrations exactly like the one Cavanilles is examining.⁵⁸ Through this painting, Rizo thanked Cavanilles for naming this American genus after him in an 1801 publication, which included an engraving of the plant that also corresponds to the illustration depicted in the painting (fig. 2.18).⁵⁹

Rizo's portrait of Cavanilles celebrates both artist and naturalist through a botanical identity, much like Mutis's portrait honored him through the *Mutisia*. The replacement of a botanical specimen with an image is significant because it demonstrates how Mutis and Rizo expected naturalists in Europe to use the expedition's illustrations. Mutis, based in South America, could observe multiple fresh specimens over the years and work with an artist to create an image that presented a composite result of all those observations. This would be impossible to achieve with a single dried specimen, which inevitably included accidental particularities—a leaf broken or damaged by an insect, a flower that had begun to wilt by the time the plant was collected, or a specimen gathered when the flowers had not fully bloomed. The picture, by comparison, incarnates not any one American plant but the multiple specimens and observations that allowed naturalist and artist to produce an idealized version of this type of plant.





FIGURE 2.17. (facing)
Salvador Rizo (attr., New
Granada expedition), Antonio
José Cavanilles, ca. 1800, oil
on canvas, 33.9 × 26 in (86
× 66 cm). Museo Nacional,
Bogotá, Colombia.

FIGURE 2.18. “*Rizoa
ovatifolia*,” copperplate
engraving by Tomás López
Enguidanos based on a
drawing by Antonio José
Cavanilles, published in
Cavanilles, “Descripción de
los géneros Aeginetia, Rizoa y
Castelia,” *Anales de Ciencias
Naturales* 3 (1801): 132–33,
plate 29. Biblioteca del Real
Jardín Botánico (CSIC),
Madrid.

This painted composite specimen, the result of Mutis’s travel to South America, makes it unnecessary for Cavanilles to travel, allowing him to sit at his desk in Europe and observe South American flora “firsthand,” using this rendition to classify and name it.

Manuscript evidence demonstrates that Mutis had precisely this use in mind for the illustrations from his expedition. In a letter, he articulated the po-

tential of images to allow long-distance knowing-by-seeing. Mutis explained:

*No plant, from the loftiest tree to the humblest weed, will remain hidden to the investigation of true botanists if represented after nature for the instruction of those who, unable to travel throughout the world, without seeing plants in their native soil will be able to know them through their detailed explanation and living image.*⁶⁰

Thanks to the shipments that the naturalist travelers sent to him, Cavanilles was able to publish the descriptions and images of numerous American plants without ever leaving Madrid.

He was not alone in his use of visual materials from the Spanish expeditions to conduct long-distance observations of American flora. Perhaps the most dramatic and explicit example of the way in which images preserved and transported nature across distances is provided by the afterlife of the botanical drawings from the New Spain expedition.⁶¹ When the expedition concluded in 1803, Martín de Sessé and José Mariano Mociño started working in Madrid towards the publication of the materials they had compiled in their travels. However, they never managed to publish a *Flora Mexicana*. Sessé died in 1808, the same year that the French army invaded Spain and Joseph Bonaparte was crowned king. Mociño continued working on the project during the French occupation, with support from the new administration. After Bonaparte's abdication in 1813, the return to Spanish rule brought political persecution of the *afrancesados*, those accused of having collaborated with the French government. Many of them, including Mociño, fled Spain fearing persecution. He crossed the Pyrenees into southern France, taking with him into exile the American materials on which he had been working for ten years: about 1,400 botanical drawings, a similar number of animal drawings, and their manuscript descriptions. In Montpellier, Mociño met the Swiss botanist Augustin Pyramus de Candolle (1778–1841), who held the chair of botany at the medical school. Candolle was extremely interested in the materials from the New Spain expedition, which he studied at length and annotated. He concluded that the collection included 110 new genera and 1,200 new species, and over the years described many of them in publication for the first time.⁶² He found the drawings extremely useful in his work, and with Mociño's permission arranged for the resident artist at the Montpellier botanical garden, Toussaint François Node-Véran (1773–1852), to copy some of them.

In 1816, when Candolle moved to Geneva to take a new chair in natural history, Mociño allowed him to take the illustrations with him. The following year, however, Mociño decided it was safe to return to Spain, and requested that Candolle return the drawings so that he could take them back to Madrid. Desperate to hold on to the botanical illustrations, Candolle obtained Mociño's permission to copy as many of them as possible, as quickly as possible, so that he

could continue to work on the description of American species. Over a hundred amateur botanical artists assisted Candolle in this task. About three-quarters of them were women, indicating both the popularity and the gendering of botanical painting as a polite pastime.⁶³ In less than eight days, this improvised team achieved impressive results, producing 860 drawings, which included all botanical details and color indications, and 119 sketches. These materials, combined with the 71 drawings that Node-Véran had made in Montpellier over the previous years and the 305 original duplicates from the expedition that Mociño gave Candolle as a gift, yielded a total of 1,355 drawings, with only 98 of the original images not copied.⁶⁴

Candolle found the expeditions' images much more useful to his taxonomic work than its textual descriptions. "The [written] descriptions," he explained, "were rather incomplete, be it because several volumes were lost, be it because those that reached me contained articles referring to designs that I lacked, be it because in those instances in which the travelers believed they had encountered a known plant, they failed to describe it, [or] be it because they had adopted a system of description that had unfortunately little detail."⁶⁵ By contrast, the drawings allowed Candolle to classify American plants in Europe. He did not take their veracity on blind faith, but rather ascertained it through a careful process of evaluative multimedia observation. Candolle worked in successive steps, each of them involving comparative viewing. First, he evaluated whether he could trust the images at all by assessing the way they depicted botanical structures and their relation to known families and genera. Once he ascertained that this was satisfactory, he checked each drawing of a known species against living plants and published plates and descriptions, consulting in particular the Lincei edition of Francisco Hernández's *Rerum Medicarum Novae Hispaniae Thesaurus* (Rome, 1651). He explained:

*These drawings . . . of plants that were already well known in Europe have been for me as valuable or even more so than those of new species, because they have served to demonstrate that I could consider the other [drawings] as faithful representations of objects that really do exist. . . . I insist on this point because without this trust on the truthfulness of the drawings, all my work would have been completely useless. I doubt that anybody who has seen them would hesitate to consider them as authentic and faithful.*⁶⁶

Candolle followed a process of evaluative comparative observation, based on a constant back-and-forth between new plants and previously known ones; texts and images; drawings and printed images; pictorial representations and live plants. And although naturalists compared and contrasted images, objects, and texts, they often found visual depictions most useful for conducting long-distance observations. However, the complex interdependence of traveling

naturalists and cabinet naturalists could provoke serious conflicts, particularly around priority and authorship.

Contested Authorship

While traveling naturalists and cabinet naturalists collaborated in collective empiricism, long-distance observation could provoke problems when it came to attributing credit for a finding. For traveling naturalists, the return to Europe did not signal the completion of their job but only of its first act; the second act involved reviewing the field notes, images, and herbaria, and comparing them to published information. The final object of natural history investigation was publication, and practitioners earned prestige within a global community of naturalists by circulating their own experiences and results through correspondence as well as through publication, feeding new specimens back into the bookish loop—hopefully before anyone else.⁶⁷

The earliest threat that the Spanish naturalists faced to their potential priority as discoverers of American flora came from Joseph Dombey, the French physician and naturalist who traveled with Ruiz and Pavón as part of the Chile and Peru expedition.⁶⁸ The very presence of a French naturalist working for the *Jardin du Roi* was a tense affair for Spanish naturalists and administrators. The instructions that Gómez Ortega prepared for Ruiz and Pavón repeatedly addressed Dombey's participation in the expedition and what was expected of the Spanish naturalists with regards to their French colleague.⁶⁹ From the early days of the expedition, Dombey's activities were carefully outlined and monitored so that he would not obtain sensitive information about profitable natural commodities. Given the fierce economic competition among European crowns over the economic potential of colonial botany, the decision to allow Dombey to participate in the expedition seems extremely questionable. Dombey returned to Europe in February 1785, after six years in South America. This was three years before Ruiz and Pavón's own return, and they along with Gómez Ortega worried that Dombey would not stay true to his promise not to publish any results from the expedition until the Spaniards had returned and the material could be accurately and fairly apportioned among the expedition's participants.⁷⁰ This matter preoccupied not only Ruiz and Pavón, who were clearly in direct competition with Dombey, but also Mutis, who feared that many of the species that Dombey had collected in Chile and Peru would make his own work in New Granada unoriginal. A mere four months after Dombey's return to Spain, Mutis had already hatched plans to beat him to publication. "Dombey has arrived in Europe," he wrote. "He will try to publish his work; but I hope to anticipate my discoveries to the public with a succinct memoir that I am preparing, which I intend to send to the Stockholm Academy." This academy suited his purposes because it

published its proceedings more frequently than other institutions, every three months. “This,” Mutis gloated, “will trip him up nicely.”⁷¹

The Spaniards’ worries turned out to be well-founded. Although Dombey kept his promise not to publish his findings before Ruiz and Pavón’s return to Europe, he made his results available to others who put them in print. Charles Louis L’Héritier, a wealthy member of the Académie des Sciences, published engravings of at least ten American plants whose seeds Dombey had shipped to the Paris botanical garden over the years.⁷² Buffon, who as director of the natural history cabinet was responsible for Dombey’s herbarium, gave it to L’Héritier and charged him with commissioning drawings of the most interesting plants, arranging their textual descriptions, and publishing a catalogue without delay.⁷³ Not only did L’Héritier disregard the existing publishing agreement between the Spanish and the French, he acted as if he were completely unaware of his own misconduct. In March 1786 he wrote to Ruiz and Pavón in Peru, requesting that they keep him up-to-date on their discoveries so that he could publish them together with Dombey’s work. One can only imagine the Spaniards’ fury at his promise, “I will see to it that the public is not unaware of how you have had a part in the work.”⁷⁴

Ruiz and Pavón returned to Spain in 1788 and set about ordering their materials for publication, a task that consumed the following fourteen years. An initial offering of their findings, the *Flora Peruviana et Chilensis, Prodromus*, appeared in Madrid in 1794, followed by a full-fledged *Flora Peruviana et Chilensis* in three volumes (Madrid, 1798–1802).⁷⁵ Given the long period between the expedition’s conclusion in 1788 and these publications, by the time the books came out many of Ruiz and Pavón’s findings had already been published by other authors, and the authors repeatedly had to revise their manuscript to account for this. A melancholy document entitled “List of the genera and species that from the time of our discovery, and a few years before then, the following botanists have already published,” kept track of the plants that Ruiz and Pavón could not claim as their own, and of the authors responsible for this loss—unfortunately for them, the list included nine different botanists.⁷⁶

Traveling naturalists were well aware of the possibility of getting preempted in publication, even by members of the other Spanish expeditions given that they at times visited the same regions. In March 1784, shortly after the official start of the New Granada botanical expedition, Mutis wrote to Gómez Ortega asking for news of the Peru and Chile expedition, inquiring about Ruiz and Pavón’s “new genera and species, and whether some of mine are showing up there.”⁷⁷ Mutis explained that he realized it might be difficult to adjudicate new discoveries when both expeditions concurred in their findings and that, while naming rights undoubtedly belonged to the first discoverer, priority might be hard to establish. His anxiety concerned not only future findings but also the possibility of having his work of the past two decades, from his arrival in New Granada in 1761 to the

official start of the expedition in 1783, invalidated by Ruiz and Pavón's observations, which would receive priority if published first regardless of whether they duplicated his own unpublished findings. Fearful of this possibility, Mutis offered to remit a historical catalogue of his observations, scrupulously documenting the date for each according to his personal journal; for future discoveries, correspondence would serve this role. Mutis had reason to worry, as eventually overlaps did happen: Cavanilles's *Rizoa*, published in 1801 on the basis of a drawing and a herbarium specimen he received from Née, is in fact the same plant that Ruiz and Pavón described in publication in 1794 as *Gardoquia*.⁷⁸

Priority disputes regarding authorship could arise even among the closest of collaborators. Madrid-based naturalists needed to protect their relationships with travelers through correspondence, books, and demonstrations of appropriate gratitude. All of the hundred new and rare plants described in Gómez Ortega's *Novarum, aut rariorum plantarum* (Madrid, 1797–1800), grew in the Madrid Royal Botanical Garden thanks to the correspondents who had sent seeds or live plants. Without them, there would have been no book, and Gómez Ortega acknowledged his debt by noting in the entry for each plant the name of the person who had sent it to him. The expeditions' naturalists were responsible for the vast majority of the new plants in the publication—especially Née—and they receive a prominent mention in the book's preface. Cavanilles acknowledged his correspondents in the same manner in his publications, and both botanists used naming as a strategy for rewarding contributions.

However, while traveling naturalists and cabinet naturalists depended on each other, their different vantage points could pit them in opposition. A heated published dispute between Ruiz and Cavanilles illustrates this tension. The disagreement concerned not only the priority of some discoveries, but also the very capacity of cabinet naturalists to accurately describe American species if they had not visited the region themselves. While Mutis, who never returned to Spain, was happy for Cavanilles to publish descriptions of American plants based on the expeditions' illustrations—as demonstrated by their paired portraits—matters looked very different to Ruiz, based like Cavanilles back in Madrid. Ruiz accused Cavanilles of stealing his and Pavón's work by publishing new types that they had labored to identify and collect in South America, taking for himself credit that was rightfully theirs. He claimed that they had shipped seeds and pressed specimens to Madrid so that, upon their return, they themselves could consult these materials as they prepared their publication, and not so that someone else would “profit from our work, publishing it as his own and with little exactitude.”⁷⁹ He criticized the observations that Cavanilles had performed in Madrid, noting that he had reached erroneous conclusions based on the examination of faulty herbarium specimens or of plants grown from foreign seeds in the Madrid garden, which had responded to the European soil and showed marked differences from their regular appearance in their home regions. Cava-

nilles had been unable to tell this because, unlike Ruiz and Pavón, he had never examined those plants in situ.⁸⁰ In any case, Ruiz reminded the reader, he and Pavón had already explained in publication that although many of the genera they had identified in America had already been published by other authors, most of these descriptions “were copied from imperfect descriptions, which also lacked plates, or were taken from plants grown from seeds spread through European gardens and thus degenerated, or from mere skeletons [herbarium specimens].”⁸¹ According to Ruiz, only the experienced naturalist and traveler could successfully and accurately describe American flora.

Cavanilles replied forcefully. He defended the use of dried herbaria as substitutes for live plants, pointing to the practical advantages they presented over travel. “As active as the botanist may be,” Cavanilles explained, “and even if he consume his life with travel, he will never be able to see more than a small portion of vegetables, compared to the countless number that exist, and in the end, to reach a deeper knowledge, he will resort to the *hortus sicus* or herbarium, which the princes of science acknowledged as useful and necessary.” Or did Ruiz presume to disagree with the verdict of the botanical royalty, such as Linnaeus the elder and the younger, Bernard de Jussieu, and Jean-Baptiste Lamarck, all of whom relied on fieldwork undertaken by others? Thus, if descriptions based on herbarium specimens had problems, the blame lay with the travelers who had collected them, not the naturalists who interpreted them.⁸²

Cavanilles’s defense of his method, especially of the validity of his authorial role based on collections rather than a voyage, turned into a disquisition on the fraught relationship between travel and empiricism. A voyager, he claimed, each day faced dozens of new plants to examine and describe on the go, on top of which he must direct the work of his artists. He simply was not in the best position to observe and reach conclusions. He recognized the work that Ruiz and Pavón had accomplished as voyagers, but criticized the conclusions of their observations, claiming that this invalidated their role as authors. Authorship, he argued, resulted from the correct taxonomic determination of a plant, and nothing else:

*It is a manifest mistake to think that someone who publishes the plants that others gathered but did not examine is appropriating their work, because he leaves them the portion of glory that they deserve for traveling and pressing plants, and takes for himself only the glory resulting from [the plants’] examination and [his] scientific works. The author is not the one who gathers plants and seeds and ships them without due examination: the true author of a plant is only the one who makes it known to the public, exposing himself first to criticism, as I have done with dried plants or with the many live plants that I have observed in gardens in Spain and other kingdoms. To be a traveler is not the same thing as to be a Botanist, nor to see plants as to be a competent Judge to determine their fructification, genus, and species.*⁸³

According to Cavanilles, paradoxically, travelers could not be the best observers of the regions they visited. Only by retreating into the controlled space of the cabinet—as depicted in his and Mutis's portraits—could a botanist observe properly. If distance was an obstacle to overcome, it could also prove necessary.

Conclusion: Seeing and Knowing

Eighteenth-century natural history was premised on a visual epistemology that allowed naturalists around the world to participate in collective empiricism and communicate with one another through images, objects, and texts. These materials brought traveling naturalists and cabinet naturalists into collaboration but could also provoke conflicts between them. The tensions between traveling and not traveling and the necessity and difficulties of collective long-distance observation are tacitly present in the portraits of Mutis and Cavanilles (figs. 2.1 and 2.18). Both depict naturalists inside completely enclosed studies, without even a window through which we might see the American landscape from which the plants were plucked, or the Royal Botanical Garden where Cavanilles worked in Madrid. Although Mutis made his career by voyaging to South America, he is depicted as an armchair or cabinet naturalist.⁸⁴ These paintings construct the production of scientific facts as a process privileging the intellectual and physical tasks of observing and classifying over the manual labor of procuring the specimens themselves, and the indoor cabinet over the outdoor field. This division between outdoors and indoors, showing and not showing, is the result of a tension between the two tendencies that characterized eighteenth-century natural history: on the one hand, an impulse to move, to know by traversing and experiencing, thus to know in a personal and embodied way; and on the other an impulse to stay put and have knowledge come to one and join the corpus of what is known, to examine multiple specimens and compare.⁸⁵ Natural history illustrations bridged the gap between these two impulses, bridging the distance between the cabinet and the field, Europe and the larger world. Images not only stood in for the objects they represented, but also supplanted the very act of travel for the vast majority of naturalists, who did not voyage themselves. In this way, illustrations erased both geography and distance.

The paired portraits of Mutis and Cavanilles also remind us that images had rich social lives, as objects circulating among the various participants in global networks of knowledge production, as gifts with symbolic value exchanged in patronage relationships, and as embodiments of the plants they represented. Images lived multiple and interconnected lives that depended upon these varied meanings to function. For natural history, images preserved the impermanent and transported the distant. More than mere illustrations, representations came to stand in for the objects they depicted, providing European naturalists with

visual repertoires that allowed them to gather and compare natural specimens from around the world within the enclosed spaces of their studies. The enormous importance that images held for eighteenth-century natural history explains why the members of the Spanish expeditions prized visual materials over specimens and textual descriptions. The next chapter examines the extraordinary investments the expeditions made to produce visual representations.



Meliconia

Painting as Exploration



First Glance: Paper Floras

Consider a representative botanical illustration from the New Granada expedition, which is in many ways characteristic of the Spanish expeditions' pictorial work in general (fig. 3.1). The illustration is painted with tempera on a large atlas-sized sheet of paper. It provides a close-up view of a portion of a plant from the genus *Heliconia*, as a label at the bottom of the page informs us. We do not see the entire plant, indeed, we do not even see most of it: stem and leaves absent, the image focuses exclusively on two segments of the distinctive and colorful composite flowering structure, arranged diagonally in opposite directions across the page. Each of the two structures consists of bright red waxy bracts (modified leaves). The inflorescence on the left side of the page has small yellow flowers peeping out from the bracts, while the one on the right has yellow and blue fruits. Thus, rather than providing the portrait of the entire plant, the image selects the portion that an eighteenth-century botanist would have considered most important for identifying and classifying it and offers views of that single critical portion at two different stages of the plant's life cycle, in flower and in fruit. Underneath these larger figures, smaller ones showcase magnified details. The floral anatomy provides various views in order to clearly depict the exact structure and number of the flower's stamens and pistils; the fruit details show both the external and internal parts. While the image is economic in its highly selective depiction of isolated segments of the plant, floating in the decontextualized white page, it is also stylized in its lush use of color, shape, symmetry, and directionality.

The more than twelve thousand images produced by the Spanish expeditions demonstrate the artists' mastery of standardized natural history pictorial conventions as well as the naturalists' intention of having the illustrations circulate within a dispersed community of expert observers who could interpret them

FIGURE 3.1. Unsigned (New Granada expedition), "*Heliconia*" (*Heliconia stiletoides*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 610.

through standardized modes of looking. The viewer of an image was expected to understand its iconographic vocabulary, to know that the plants depicted did not exist as such in the field, and to participate in active viewing, recomposing the depicted specimen mentally by turning leaves over, filling in gaps, expanding abbreviations, or connecting portions together in order to assemble the whole plant. The images are visual artifacts that embody a specialized botanical style of observation that required training to learn and vigilance to maintain.¹

This chapter offers a close look at the Spanish natural history expeditions' botanical illustrations: how they were produced, what they were for, and what they looked like. It first provides a detailed overview of the process through which the expeditions' naturalists hired, trained, and supervised artists. It then discusses the ways in which naturalists and artists worked together in carefully orchestrated duets, with botanical eyes operating in tandem with skillful hands. A third section discusses the social uses of images. While expedition naturalists and European cabinet naturalists used the illustrations as critical components in the creation of botanical knowledge, the images also possessed important social capital. The chapter concludes with a detailed analysis of the ways in which the New Granada expedition created an American style of botanical illustration, based on European conventions of natural history illustration but also modifying them.

Artists as Members of the Natural History Expeditions

The Spanish expeditions' illustrations are interesting and unique in part because they were painted directly in locations where the plants depicted grew—not in Europe. The great majority of early modern representations of the peoples and plants of the New World were the work of European artists with no personal experience of the territories, populations, and natural products they portrayed.² Depictions of historical scenes—such as Theodor de Bry's canonical engravings of Spanish atrocities against New World Amerindians, first published between 1590 and 1634 and frequently reproduced after that—derived from texts and functioned as illustrations or visualizations of a narrative.³ Early printed maps and city views combined firsthand observation, elements from textual narratives, and fantasy. After original publication they became stereotypes that were copied again and again, presenting unchanging representations that were frozen in time even as the lands they depicted evolved.⁴ Decorative and allegorical images also tended to merge fact and fantasy. But this was problematic for natural history illustrations, given their evidentiary uses. For eighteenth-century naturalists, who privileged firsthand information and depended on the image's indexical ability to convey precise information, securing acceptable illustrations of American naturalia was as important as it was difficult.

Faced with the challenge of visualizing global nature from a distance, European naturalists and artists used various strategies to produce images that could serve as evidence. Sometimes, artists created natural history illustrations based on the live or dead specimens found in European cabinets, menageries, and gardens—after all, it was often more feasible to transport selected specimens to Europe than it was to mobilize artists to distant lands. But, as we have seen, this worked only for the few specimens of plants or animals that managed to survive their journeys to European collections. In many cases, early modern European images of non-European nature derived from a lengthy multistep process: a person in a distant setting would either commission depictions of native plants and animals from local artists, or make their own drawings if they had the necessary skills. They would then ship these illustrations to Europe, where artists could use them—often in combination with dried herbarium specimens—to produce a composite portrait of the specimen.⁵

However, the provenance of natural history images was increasingly considered an important component of their truthfulness and value, which implied that images of non-European nature needed to be created *in situ*. Although naturalists often drew while conducting their expert observations, using the careful and considered process of setting pen to paper to help them look closely, they were often competent at best. They very rarely possessed drafting talents to match their expectations of what a finished illustration should look like. Over the course of the eighteenth century, the traveling artist became a key member of a scientific expedition and a determining factor in its success. As Alejandro Malaspina explained as he prepared to set out on his expedition, the artists would be “almost the soul of the voyage, because they will represent from the life those things that even the most skilled pen would vainly strive to describe.”⁶

The Spanish expeditions were unique at the time in their ability to produce extensive and systematic visual records of non-European nature, created by artists trained in European artistic conventions who worked in close collaboration with naturalists who were experts in European botany. While other expeditions also traveled with artists, none employed as many or had comparably lengthy stays, access to local expertise, or results in terms of the number of images they produced. The traveling naturalists and colonial administrators who worked with these artists realized that they provided a privileged opportunity for contributing to European natural history and—ideally—to the fortunes of empire.

Given that the expeditions functioned as visualization projects, the selection, training, and supervision of artists were important tasks to which naturalists and administrators devoted great attention. In Gómez Ortega’s initial memorandum recommending that the Spanish government sponsor the botanical expedition to Chile and Peru (1777–88), the earliest of these voyages, he pronounced it “absolutely indispensable” for two draftsmen to accompany botanists Hipólito Ruiz and José Pavón. He urged that the artists should be skillful,

“docile,” and “good tempered,” amenable to being directed by the botanists and to following their instructions in order to “copy nature exactly, without presuming to correct or adorn it in the manner of those draftsmen who add coloring and adornment from their own imagination.”⁷ Without question, artists were necessary for the expedition—but it was important to make sure that they were the right type of artists, with the right temperament and a willingness to work under the naturalists’ authority. The draftsman would act as the expedition’s hand, hired to produce the images that naturalists desired; the naturalist would serve as its eye, selecting the object to be depicted, indicating which traits to focus on and which to disregard, and imposing the particular vision with which to approach and represent nature.

Finding artists for the expedition was important enough to prompt José de Gálvez, one of the most important imperial administrators at the time and recently appointed as minister of the Indies, to contact the director of Madrid’s San Fernando Royal Academy of Fine Arts, Ignacio de Hermosilla. Gálvez requested that Hermosilla select the two artists himself.⁸ The desire to employ artists from the prestigious fine arts academy instead of hiring the craftsmen at work in the royal manufactures decorating tapestries and porcelain with images of plants and animals indicates that scientific exploration raised the status of illustrations of nature. Though flowers had been a key component of seventeenth-century still lifes and *vanitas*, the rise of the fine arts academy placed these genres at the bottom of a hierarchy headed by historical, mythological, and religious painting. As decorative objects, flowers were considered pedestrian and beneath the status of fine art. As scientific objects, they became worthy of the fine arts academy.

Hermosilla identified four students who were “single, skillful, and peaceful.” To compete for the positions, the young men were asked to draw flowers, fruits, and plants from life, and the academy’s professors reviewed their drawings. Based on this examination, Hermosilla recommended José Brunete and Isidro Gálvez for the expedition, praising their talents at drawing and using watercolors.⁹ The artists seem to have quickly realized their importance to the project because they petitioned to receive the same salary as the botanists under whose instruction they were to work, rather than half their pay as initially offered. This is an exceptional request, given that at the time naturalists always had higher status than their artists. However, the administrative memo that reviewed their request recommended fulfilling it, noting that the artists would have not only as many expenses as the botanists but also probably more work.¹⁰ The official proclamation authorizing the beginning of the expedition in 1777 granted an equal yearly salary of 1,000 pesos to both botanists and artists, underscoring the enormous value placed on visual epistemology in the Hispanic world.¹¹

As with the botanists’ charges, the artists’ contributions were clearly described and regulated before their departure from Spain. Gómez Ortega provided Ruiz and Pavón with detailed guidelines for supervising the artists. He

urged them to ensure that Brunete and Gálvez copied fresh plants showing their distinctive coloration, avoiding depictions of old, wilting, or damaged plants that would not provide a good idea of their “natural state.”¹² He moreover penned a separate set of instructions specifically for the artists.¹³ This richly detailed document is an extremely rare articulation of what exactly a naturalist desired from his artists, in part because the high degree of consensus regarding the appropriate content and the style of natural history illustrations at the time usually negated the need to articulate such assumptions, and in part because naturalists seem to have generally provided oral directions to their artists. For this reason, Gómez Ortega’s instructions offer valuable insight into late eighteenth-century attitudes to natural history illustrations.

Gómez Ortega’s instructions to Brunete and Gálvez consist of eight entries covering the content and style of the images, the organization of work, and the relationship between artists and naturalists. Botanical considerations mandated the content, style, and even the size of the image. Gómez Ortega began by insisting that the artists should copy nature faithfully, not adorning it with anything coming from their own imagination, and limiting themselves to drawing whichever parts the botanists indicated as important for “knowing and distinguishing” each plant. The desired images were botanical objects, not artistic creations, hence the insistence on depicting those characters considered important by the botanists and on avoiding a decorative painterly style. Gómez Ortega reiterated that only fresh plants should be depicted, and specified that each image should include both the plant’s portrait and the detailed anatomy of its fruit and flower. The botanists would decide the standard size to be used for all images and provide a model of the appropriate magnitude to the artists. This would ensure an overall coherence of the images as a series, and facilitate the quick and economical production of engraved plates when the time came for publication.

The instructions also imposed a working procedure that subjugated artistic process to the specific goals and operation of the expedition. In order to maximize productivity within the fast pace of travel, the artists should limit themselves to making pen-and-ink drawings and avoid spending additional time finishing each illustration in color. As long as artists recorded the plant’s structure in detail while traveling and enough information about color for later reference, the final image could be produced back in Spain. The artists received authorization to add color to the sketch only in those cases in which a plant had remarkably beautiful, attention-grabbing, or peculiar hues, and even then they were to color only a single flower, fruit, and leaf, which would serve as a model to complete the image’s illumination upon the expedition’s return. The instructions ended by mandating that the artists dedicate any spare time to botany, not art, by helping the naturalists in forming herbaria, organizing manuscripts, or other such tasks. Although Brunete and Gálvez had achieved economic parity with the botanists, they were clearly subordinate to them.

Later Spanish expeditions paid similar attention to procuring skilled artists, and possessed comparable resources to achieve this goal. Martín de Sessé, director of the New Spain expedition, was already in the Americas before the project began. He searched for artists directly in Mexico City through the San Carlos Academy of Fine Arts.¹⁴ Although in Mexico, as in Madrid, academic artists were not schooled in botanical illustration, he hoped that within two months as many as four of the academy's draftsmen could be trained to meet the expedition's needs. The academy's director provided a more conservative estimate of six months, citing the time it had taken for the San Fernando Royal Academy of Fine Arts in Madrid to train the artists who participated in the Chile and Peru expedition—a statement that indicates the close communication between the expeditions and the peninsular and colonial institutions that collaborated with them, as well as the fact that models were quickly established and followed. Sessé was initially disappointed in the work of these trainees, and requested to have Brunete and Gálvez transferred to his project.¹⁵ His request was declined, and in May 1788, the San Carlos-trained Mexican artists Atanasio Echeverría and Vicente de la Cerda officially became the expedition's painters. Despite their initial reservations, the naturalists soon came to consider the American artists satisfactory. Sessé praised Echeverría's talents in particular, and sent especially fine samples of his work to Spain (fig. 3.2).¹⁶

The artists in the Malaspina expedition, in contrast to the other voyages, created landscapes, city and coastal views, and ethnographic portraits in addition to botanical and zoological drawings (fig. 3.3). Naval officers also produced maps and nautical charts. The expedition employed nine artists at different points of the voyage. Dissatisfied with the work of the two original painters, over the years Malaspina experimented with Italian academic painters, Spanish and Spanish American academic painters, and even a sailor, José Cardero, when the naturalists noticed his talents. In addition to their depictions of the empire's plants and peoples, the artists also drew multiple city views that could later be used to produce copperplate engravings that would make visible for the first time to European audiences parts of the empire that had remained until then largely invisible (figs. 3.4 and 5.1).

But without question, it was the New Granada expedition that dedicated the most attention and funds to hiring and training painters.¹⁷ Mutis's expedition was unique among European natural history voyages in assembling a very large artistic workshop with fixed personnel who worked together for over three decades, and who had repeated access to a much larger variety of American plants that would be possible for any artist in Europe. Over the years, the New Granada expedition employed about sixty painters, with roughly thirty of them working together at one point. In contrast to the other expeditions, Mutis for the most part employed American artists educated outside of an academic tradition.¹⁸ Many of these artists had apprenticed in workshops that produced religious



paintings, portraits, or miniatures, all of which commonly included natural motifs of flowers and fruits, often with allegorical meanings. Thus, the practice of including botanical elements in Andean baroque art meant that Mutis had access to artists accustomed to depicting them, albeit in a particular style.¹⁹

Mutis began collaborating with the painter Pablo Antonio García shortly after his arrival in New Granada, about twenty years before the official start of the expedition in 1783. García made a group of nineteen botanical drawings in pen and ink, shaded in grey wash, which Mutis sent to Carl Linnaeus in 1773. Four years later Mutis sent Linnaeus thirteen additional drawings by García (figs. 2.14, 3.29, 3.31).²⁰ After seeing these drawings, the Swedish botanist Peter Jonas Bergius enthusiastically expressed his surprise at the excellence of this American painter, pronouncing him superior to his European counterparts and saying he had not seen comparable images in Europe.²¹ Mutis also sent a group of García's drawings to the Royal Natural History Cabinet in Madrid in 1777. When the expedition started in 1783, García continued to work for Mutis for another year and half.

Soon after the official start of the expedition, Mutis hired two painters who

FIGURE 3.2. Atanasio Echeverría (attr., New Spain expedition), *Erythrina divaricata*, watercolor, 9.5 × 13.6 in (24 × 34.5 cm).

Courtesy of Hunt Institute for Botanical Documentation, Carnegie Mellon University, Pittsburgh, PA. Torner Collection of Sessé and Mociño Biological Illustrations, 6331.1596.



FIGURE 3.3. Juan Ravenet (attr., Malaspina expedition), inhabitants of Manila, 1792, watercolor, 8.9 × 7.3 in (22.5 × 18.5 cm). Museo de América, Madrid, 02320.

remained employed throughout its duration and became central to its operation. Salvador Rizo (employed 1784–1812) became the expedition's *mayordomo*, in charge of daily operations and all practical arrangements, from buying provisions to overseeing the functioning of a large team of artists, collectors, support staff, and long-distance contributors. Rizo also organized and ran a free drawing school (*escuela gratuita de dibujo*) where he trained boys as young as eleven years old as botanical artists, following the model of apprentices in a painting workshop. Eventually, many of these young men produced botanical illustrations for the expedition. Francisco Javier Matis (employed 1783–1816) joined the expedition in its early years and, although he had no formal training in painting



or natural history, worked his way up through its ranks from apprentice painter to principal painter to second naturalist, in charge of conducting and drawing the floral anatomies included in each illustration and used to classify plants according to the Linnaean system (fig. 3.5). He was also involved in plant collection from time to time.²² Mutis's talents impressed Alexander von Humboldt, who described him in an 1803 letter to the German botanist Carl Ludwig Willdenow as "the top flower painter in the world and an excellent botanist."²³

In 1785 the expedition briefly employed Pablo Caballero, a renowned artist whose participation was secured through the intercession of Viceroy Caballero y Góngora (no relation). Mutis, however, found that this "American Apelles"—as he sardonically called him—struck the wrong balance between refinement and productivity: he painted only four images in his first month in the expedition, at which point Mutis promptly dismissed him. Mutis was also displeased with the two Spanish artists from the San Fernando Royal Academy of Fine Arts whom he employed in 1788 under pressure from the viceroy. After examining a sample from their work, an unconvinced Mutis grumbled to the viceroy that these artists might have been "schooling in artistic principles" but possessed no skills whatsoever as botanical painters, a genre that clearly was not properly taught in Spain. Their work, he claimed, lacked the "sublime degree of refinement" demonstrated by the expedition's artists, whose work could, unlike the Spaniards', compete with the most sumptuous botanical illustrations published in Paris and London.²⁴

FIGURE 3.4. Fernando Brambila (attr., Malaspina expedition), "Vista de la Ciudad de Manila y su Bahía (desde el Arrabal)," 1792, pen and ink with wash, 14.4 × 23.6 in (36.5 × 60 cm). Museo de América, Madrid, 02299.



FIGURE 3.5. Francisco Javier Matis (New Granada expedition), floral anatomies and leaf outlines, 1809, watercolor and pen and ink drawing, 31.2 × 22 in (43.2 × 31.2 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, M00181.

Mutis was especially unwilling to tolerate the challenges associated with hiring Spanish academic painters because he was having much better success with American artists. In 1787, Mutis wrote to Juan José de Villaluenga, president of the Quito high court (*audiencia*), requesting young artists from the city's renowned painting workshops. He would be happy with the young painters, Mutis explained, "as long as some of them are skilled in drawing and in handling

the brush . . . especially if in them, although beginners, one can glimpse genius and application.” Although he valued strong skills in oil painting, Mutis considered this a bonus rather than a requirement since all artists would be trained to work with tempera paints, the preferred medium for his expedition. Overall, artistic promise and malleability were the most important criteria: “It has been easier, and always will be, to manage people who are more docile, even if they are less skilled, because I provide through training the skills they lack at the beginning, and in this way I can compensate for the lack of docility of the Spanish artists, who always perform poorly in America.”²⁵ Mutis also calculated that the expedition’s funds would stretch much further if he hired American painters rather than Spanish ones, calculating that the salary paid to the two Spanish artists would cover five American ones.²⁶

Mutis hired five young artists from Quito in 1787, all of whom came from two important painting workshops: the brothers Manuel Antonio and Nicolás Cortés Alcocer had trained with their father, the renowned Quito painter José Cortés de Alcocer; while Antonio Barrionuevo, Vicente Sánchez, and Antonio de Silva had all worked in the workshop of Bernardo Rodríguez, perhaps the most celebrated *quiteño* religious painter at the time. Three years later Mutis hired five additional artists from Quito: Francisco Xavier Cortés Alcocer (brother to Antonio and Nicolás), Francisco Escobar y Villarroel, Manuel Roales, Mariano Hinojosa, and Manuel Martínez. These men had painted portraits and miniatures in oil, and were re-trained by Rizo and Matis to produce botanical illustrations using tempera. During the 1790s, Mutis hired ten additional New Granada painters: Félix Tello, Manuel José Xironza, Nicolás José Tolosa, José Antonio Zambrano, and Valencia (first name unknown) from workshops in Popayán, and José Joaquín Pérez, Pedro Advíncula de Almansa, José Camilo Quezada, José Manuel Domínguez, and Francisco Manuel Dávila from workshops in Santa Fe de Bogotá. In the following decade, the expedition also employed more than twenty *oficiales pintores principiantes*, young boys from New Granada taught in the expedition’s free drawing school. In this way, over the years Mutis assembled an incomparable artistic team, which accounts for his expedition’s extraordinary pictorial output.

The expedition spent its first seven years (1783–90) based in the town of Mariquita, employing eleven painters who produced a total of 600 images. Only Rizo and Matis worked for the entire period, and the workshop’s composition remained volatile until the arrival of the Quito painters in 1787. By comparison, after the expedition settled for good in the viceregal capital of Santa Fe de Bogotá (1790–1816), the artistic team produced more than 5,000 paintings. Mutis responded to Bergius’s surprise at the excellence of his painters with a proud statement that evidences the centrality of image making to his botanical work:

You are amazed that in America I have been able to find outstanding painters. So you should know that my plates [láminas] every day turn out more beautiful, if I

*am not deceived by my own opinion. I trained for this task several young men who already possessed at least the rudiments of drawing; I am present, I direct, I devote myself with such patience as it is not easy to grasp, and from this the result that here, where there was no idea of this kind of painting, where there were no models to imitate, we have opened new roads with intrepid daring, and with the happiest success.*²⁷

Mutis flaunted the talents of his artists—but he credited their success to the close supervision under which they worked.

Working Together: Natural Historical Duets

For the naturalists in the Spanish expeditions, hiring properly trained artists and instructing them on what to depict and how to depict it was the initial step in a process that continued throughout the duration of the expedition. Artists were not set loose to work freely once they arrived at their destination. Rather, naturalists supervised them very closely, looking over their shoulders as they drew (fig. 1.1). Draftsman and image ultimately depended on the naturalist's authority to specify what the illustration must look like and to infuse it with meaning as a scientific production.

The close and hierarchical interaction between naturalists and artists is spelled out in a letter Ruiz wrote in 1786, toward the end of his nine-year stay in South America. Authorized to hire a botanist and an artist who would carry on investigations after the expedition's conclusion, Ruiz worried more about finding the former than the latter. Ruiz was sure, he explained, that practically any artist would be able to produce a satisfactory drawing of whatever it was the botanist ordered.

*Since it is the botanist who carries the weight of the commission, if he is not appropriately appointed, it would be useless for the other [the artist] to trace a plant if he didn't have somebody to specify the precise requirements to compose a good drawing. Because making a perfect drawing is not a matter of representing the visible parts of a plant but of knowing which situation, direction, scale, and shape to give it, without adorning the drawing with suppositions, and without omitting anything in the plant, no matter how negligible it may seem, because the perfection [of the drawing] and the genuine knowledge of the plant depend precisely on these [details], which are the hardest to notice and draw.*²⁸

Naturalists considered themselves the true authors of the drawings, with artists as their needed but subordinate amanuenses.²⁹

Naturalists supervised and directed artists' work and use of time, regulated

their bodies by mandating where and when they should travel, and affected their productivity by allocating work supplies. They wrote about “directing” their work, evaluating whether a drawing qualified as finished and satisfactory or whether it needed emendation.³⁰ An illustration from the Malaspina expedition, for example, shows naturalist Luis Née’s correction to José Guío’s watercolor of a plant: “The fruit should be green, the painter is mistaken” (fig. 3.6).³¹ Written directly across the image, Née’s annotation cancels it by literally crossing it out. This type of attentive supervision from the naturalist is common to the working relationships between naturalists and artists in early modern botany and is recorded in illustrations from the other Spanish expeditions, many of which also include pencil annotations making corrections and requesting changes.³² A study sheet from the New Spain expedition, for instance, carries the comment, “The petals [should be] half as long as the calyx between ovate and oblong” on the center left side of the page, above the sketch of a flower, and, on the bottom right the comment “[the] stipules between the upper leaves, ovate-oblong, whitish” (fig. 3.7).

A botanical illustration emerged from carefully established procedures designed to ensure the consistency and reliability of the artists’ output. In the New Granada expedition, an artist would make an initial pencil drawing of a plant on a large sheet of paper, carefully noting the colors of each part. He would keep a plant specimen in water so that it remained fresh, and draw the initial sketch as quickly as possible to attempt to capture this freshness. At least on some occasions, the floral details would be left out to be filled in later. Over the course of a few days, an artist would flesh out this sketch in detail and illuminate it with tempera paints produced at the workshop using pigments made from local ingredients such as achiote, dahlia, saffron, indigo, and lichens. While one artist composed the plant’s portrait, another conducted floral dissections using magnifying glasses or a microscope and drew the floral anatomy on a separate sheet of paper. Yet another artist would then use this anatomical miniature to complete the plant’s portrait with details of the floral structure, and ideally also copy the magnified parts of the flower one by one at the bottom of the page. A rare unfinished image from the expedition sheds light on this process, showing the color portrait of an orchid, almost completed, with blank white spaces left to be filled out later on with the details of the floral anatomy (fig. 3.8).

The final step to complete an illustration was to write the plant’s name at the bottom of the page if it was known, and at times to trace a frame around the image (fig. 3.9). Sometimes, the artist would sign the plate in the lower left corner of the page (as in fig. 3.9) but this was somewhat infrequent, with only 1,565 signed works out of the 6,000 or so total full-sized finished illustrations.³³ Once the team finished an image, other artists would make two monochrome copies of the color version, one in black and one in sepia ink, that could serve later as the basis for the engravings in Mutis’s planned (but never produced) publication, a sumptuous *Flora de Bogotá* in multiple folio-sized volumes, each with a

FIGURE 3.6. José Guío (Malaspina expedition), *Rubus radicans*, 1790, watercolor, 19.3 × 11.8 in (49 × 30 cm). A manuscript annotation by botanist Luis Née indicates: “The fruit should be green, the painter is mistaken” (*El fruto ha de ser verde, se equivoca el pintor*). Archivo del Real Jardín Botánico (CSIC), Madrid, VI, 40.

FIGURE 3.7. (facing; top) Unsigned (New Spain expedition), study sheet with sketches of “*Rea acuminata*, *Diodia*, *Vandelia*, *Tillandsia longifolia*, *Mussaenda terniflora*,” undated, pencil and watercolor with ink annotations, 9.25 × 13.6 in (23.5 × 34.5 cm). Courtesy of Hunt Institute for Botanical Documentation, Carnegie Mellon University, Pittsburgh, PA. Torner Collection of Sessé and Mociño Biological Illustrations, 6331.163.

FIGURE 3.8. (facing; bottom) [Juan Francisco] Mancera (New Granada expedition), untitled drawing of an orchid, undated, watercolor, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 319.



FIGURE 3.9. [Antonio] Barrionuevo (New Granada expedition), “*Myrodia globosa*,” undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Real Jardín Botánico, Madrid, ARJMB, III, 2169.



hundred images and botanical descriptions in Spanish of American plants previously undescribed, not well determined, or not previously illustrated (fig. 3.10).³⁴

The expedition's procedure changed only on special occasions, when the *herbolarios* (plant collectors) gathered so many plants that it became necessary to work more hurriedly. In these situations, artists would quickly sketch a plant



FIGURE 3.10. [Manuel] Martínez (New Granada expedition), “*Myrodia globosa*,” undated, ink drawing, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 2169a.

in pencil, and fill in with color only two leaves: one showing the front and the other the back. In situations of extreme time pressure, they would skip this last step. After producing this incomplete image as rapidly as possible, the artists would take their time to draw the floral anatomy in detail, since this was the crucial part of the image for taxonomic purposes.³⁵

Mutis worked extremely closely with his artists, as multiple journal entries and letters document. On one occasion, he worried in his journal about the difficulties presented by an aquatic plant: “I am concerned about the depiction of this genus, given the immense labor necessary for the draftsman to understand what this plant is like in its natural setting.” The plant looked “natural” when immersed in water but collapsed onto itself when taken out of it, the flowers drooping and leaning on the stalks and making it impossible to “gather a truthful understanding of their direction.” Mutis instructed the artists to base the illustration on two specimens: one, immersed in water, would allow them to see the “natural disposition of the leaves”; the other, in open air, would provide them with “its true figure and size.”³⁶ Ten days later, a satisfied Mutis noted in his journal that the final painting showed every part of the plant in its appropriate position.³⁷ Another entry in Mutis’s journal notes that a plant had been presented to the artists with the leaves folded onto each other and close to the branch. Mutis, however, remembered having seen the plant in the field with the leaves wide open and stretched from the branch. Concluding that the collected plant was temporarily dormant, he warned the artist against depicting the plant in its current state. Later in the day the plant opened up, as Mutis had predicted, and was fit for drawing.³⁸

When the only specimen of a plant available for copying was an imperfect one, rather than “copying conjectures” Mutis preferred to postpone the drawing until a better sample could be procured, even if the plant would not be in flower again for many months.³⁹ Such perfectionism was possible partly because Mutis had a great advantage over most other European natural history expeditions: time. He had lived in New Granada for twenty years before the expedition started in 1783, and thus knew whether a specimen was representative or not. The fact that this expedition extended over several decades allowed artists to wait until they had perfect specimens before starting on their work, and to revise these illustrations as further plants were collected over the course of many years. Naturalists could also refine their observations and revise early conclusions that were at times erroneous.⁴⁰

Despite the efforts made by naturalists and artists to be rigorous, the accuracy of pictorial and textual inscriptions often depended on accidents of timing and luck. On one occasion, for instance, Mutis requested that an artist draw the illustration of a plant showing flowers on either side of the branch. The painter copied some of the flowers collected on the left side of the image, and others on the right side. Since the left side depicted only closed buds and no fully open flowers, Mutis requested that more flowers be gathered and added to the painting. The artist included these new flowers on the left side of the image. Later on, after the floral anatomy, Mutis realized that in fact this species had separate female and male plants. The flowers of the female plants produced seeds that germinated, and the flowers of the male plant fertilized the female flowers

but did not produce seeds themselves. By chance, the existing drawing visually separated the two flower types, showing female flowers on the left side of the page and male flowers on the right side. This was fortunate: if male and female flowers had been mixed on the page, the image would have been useless, making it necessary to start anew.⁴¹ Naturalists with less time or local expertise had to surmount additional hurdles.

The issue of familiarity and the pressures of time were keenly felt by the naturalists in all the Spanish expeditions. Often, travelers were not able to copy all the plants in a region, or to produce finished works. For this reason, Sessé suggested in the early days of the New Spain expedition that Mexican plants that had been transplanted to Madrid's botanical garden could be drawn directly there, allowing his draftsmen to concentrate on plants that were not available elsewhere. He also requested information about the work of Mutis in New Granada and Ruiz and Pavón in Chile and Peru: if plants common to the various regions had already been depicted, it would be unnecessary for his own artists to work on them.⁴² As the expedition traveled through Mexico, it soon became apparent that naturalists and artists worked at different paces, the former collecting much more quickly than the latter managed to draw. For that reason, Sessé explained in 1790, he decided that only previously undescribed plants would be depicted, particularly if they promised to have medicinal or commercial applications—there simply was not enough time to draw other plants, even if they were rare or beautiful.⁴³

Artists developed artistic strategies to deal with the issue of time. As Gómez Ortega suggested, one option was to leave field sketches unfinished and fill in the color upon the voyage's completion. The major problem with this approach was the difficulty of indicating precisely how to color the image later. Words were notoriously inexact when it came to specifying shades. One time-saving device to deal with the problem of clearly communicating exact shades of colors consisted in preparing a color chart with samples of an artist's hues, each labeled with a number. Drawings produced in the field would include handwritten annotations providing the numbers that could later be used to color and complete the image. The Bohemian naturalist Thaddeus Haenke, member of the Malaspina expedition, traveled with a complex color chart of this type to assist him in recording color on the move (fig. 3.11).⁴⁴

Echeverría and de la Cerda, the artists in the New Spain expedition, produced many images that were only partially colored (fig. 3.12). Similarly, the illustrations created by Francisco Lindo for the Malaspina expedition are routinely unfinished, and often include the initial pencil sketch, portions where this outline has been traced over in ink, and color fragments. The fact that incomplete illustrations make up a significant proportion of the artistic production of many expeditions suggests that these were not truly unfinished sketches but actually finished, if incomplete, works. Since naturalists planned to have these

FIGURE 3.11. (*next spread*) Thaddeus Haenke (Malaspina expedition), two pages from a sixteen-page color chart, ca. 1789–94, watercolor on paper, 23 × 19.3 in (38.4 × 23 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, VI, 3, 2, p3 and p11.





FIGURE 3.12. Unsigned (New Spain expedition), "*Hedysarum grandiflorum*," 1787–91, drawing in watercolor and wash, 9.6 × 6.4 in (24.4 × 16.3 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, V, 99.

men. Early in the expedition, he considered in a journal entry whether a recently collected plant might be a new species, noting: "I will endeavor to have it drawn promptly, and then I will place it under examination once again."⁴⁵ This examination would address both the plant and its representation, showing the close relationship between the two. An entry penned on the following day confirms that Mutis routinely used illustrations instead of plants as the basis for his observations. Mutis "confessed" in his journal that he had composed the description of a plant without having examined the flowers—a shocking misdeed for a Linnaean. This omission, he explained, had been unavoidable because "only the fruits were included in the illustration, and I could not examine its flowers"—indicating that Mutis based his description on an examination of the illustration rather than of the live plant that had served to produce it.⁴⁶ Mutis frequently compared plants and images as equivalent objects, not making distinctions between a natural "original" and a paper "copy." In his journal Mutis contrasted, for instance, the large size of a plant's seeds with the size shown in the painted specimen.⁴⁷ On another occasion, he disagreed with a floral description in Nikolaus Joseph

drawings engraved and printed, the function of the incomplete images was not to stand alone, but only to provide all the information needed for the publication of a completed image. With efficient minimalism, artists omitted extra information that could be extrapolated from depicted elements.

The Uses of Images

Natural history illustrations were important instruments for knowledge production—not only when they acted as visual avatars for those who did not travel, transporting non-European plants to Europe, but even for traveling naturalists to use in the course of an expedition. In addition to their uses in botanical work, images had many other functions for naturalists in and outside Europe, roles that also had to do with their value in social networks.

Traveling naturalists used their images not only as records of what they had seen, but also as tools for classification. Mutis frequently resorted to images when classifying plants, at times basing a classification on an image rather than on a specimen.

von Jacquin's *Selectarum stirpium Americanarum Historia* (Vienna, 1763), noting that he had not been able to observe a single instance of the phenomenon Jacquin described "in the branches of the drawing."⁴⁸ Images not only served as substitutes for specimens, but also constituted natural objects in themselves.

Images formed an archive that permitted naturalists to make comparisons across time and space, allowing them to confront live specimens with illustrations produced earlier or elsewhere to ascertain whether a recent collection was a new species or had been previously examined.⁴⁹ For Mutis, the first step when confronting a new specimen often consisted of checking it against the pictorial archive from his expedition in order to judge whether it needed to be drawn.⁵⁰ Strikingly, he often chose to compare not the new plant itself but its freshly painted illustration against the archive of older images. Such analysis, for instance, allowed Mutis to determine that a variety of *cinchona* that the expedition encountered was the very same plant that his contributor Eloy Valenzuela had previously described. As Mutis explained in a letter to Valenzuela, the new plant was "painted in order to compare it with the [earlier] illustration."⁵¹ The comparison between earlier and present observation and the introduction of the new variety all took place through images. On another occasion, preparing to send images and pressed flowers to Linnaeus, Mutis recorded in his journal that the dried specimens had been arranged "in imitation of what was drawn on the illustration."⁵² This choice reflects the expeditions' working processes: the illustration was drawn from live flowers posed as herbarium specimens, which were then pressed and dried. It also shows that for Mutis images, not fresh or dried specimens, provided the frame for viewing a plant. Illustrations constituted the dominant form of a plant, to which any other configuration or media was secondary—even the plant itself.

But images had additional uses beyond taxonomy. Drawings could be persuasively deployed as highly valued and powerfully symbolic gifts to solicit funds, to reassure an anxious patron of the progress made by an expedition, or to flatter a correspondent or powerful figure. In 1777, a year after the Royal Cabinet of Natural History was founded in Madrid, Mutis sent its director forty-five botanical drawings in black ink and wash by Pablo Antonio García. These stunning works were meant to persuade the Crown of the great potential of the expedition that Mutis had unsuccessfully proposed in 1763 and 1764. Pictorial gifts were exchanged not only in courtly patronage, but also to bolster relationships among naturalists. On several occasions over the years, Mutis sent Linnaeus illuminated images and dried herbarium specimens.⁵³ And when Alexander von Humboldt visited Mutis in July 1801, he received a gift of over one hundred illustrations by the expedition's artists.⁵⁴

Often, traveling naturalists sent their patrons an image as a symbolic substitute for a plant named in their honor. Ruiz and Pavón thanked Minister of the Indies José de Gálvez for his patronage by naming a previously undescribed

South American plant after him. When Gómez Ortega wrote to Gálvez to present the gift, he announced that he would be sending not the plant, which at this point could only be found across the Atlantic, but its drawing. The image had a practical role, serving as a substitute for the plant until it could grow in Spain, but was also considered a valuable gift in itself, one with greater presence and more easily deployed at court than a pressed herbarium specimen or even a plant itself.⁵⁵ In 1785 Mutis named a plant *Caballeria* in honor of Archbishop Viceroy Antonio Caballero y Góngora, his champion at court, and promised him that a “beautiful plate . . . will preserve Your Excellency’s name among the savants of all nations.” Mutis had no intention of delivering a sample of the actual plant to the viceroy, even though they both lived in New Granada: it was the honorific naming, and even more so the plant’s image, that he offered as a gift to his patron.⁵⁶

The symbolic power of images served not only to flatter patrons but also to appease their anxieties and secure continued financial support. In 1787, Sessé sent Gómez Ortega nine drawings in order to demonstrate the advances that the painter Vicente de la Cerda had been able to make after receiving high quality paper and appropriate color pigments. He implied that the expedition’s pictorial success depended on being well provisioned, using the drawings to document its need for further materials.⁵⁷ In 1783, in the early days of the New Granada expedition, Mutis presented drawings for the approval of Viceroy Caballero y Góngora and *regente* Juan Francisco Gutiérrez de Piñeres, who praised them profusely.⁵⁸ Six months later, Mutis complained in a letter that the viceroy had kept him busy all morning, “reviewing my natural history oil paintings in the presence of Crown officials and other people of taste . . . at the [Viceregal] Palace.”⁵⁹ Mutis complained that this courtly exercise through which the viceroy fashioned himself as a patron of the arts and sciences had distracted him from his correspondence. But he was also aware of its importance and was pleased that at the gathering “all applauded this great work.”⁶⁰ Two years later, Mutis wrote to the Count of Floridablanca, another important patron in Madrid, that he had named a plant in his honor and that its illustration was included in a “bouquet” of images he was sending to the King to demonstrate the expedition’s progress.⁶¹

Throughout the years, Mutis recurrently used illustrations to request additional funds to hire more painters and to reassure increasingly impatient patrons that work advanced. By October 1789, the court was impatient to see results. Minister of the Indies Antonio Porlier asked the new viceroy José de Ezpeleta to ship sample images from the *Flora de Bogotá* and ordered that the expedition return from Mariquita to Santa Fe de Bogotá so that its progress could be closely monitored and expedited. Porlier alluded with displeasure to Caballero y Góngora’s promise, made in mid-1786 and unfulfilled three years later, that the first three volumes of the *Flora de Bogotá* would be completed within a few months.⁶² Mutis astutely transformed this reprimand into an opportunity, arguing immediately after the move that in order to hasten work he needed to hire four natu-

ralists and five new painters—a request that was granted.⁶³ In 1793, with the expedition in its tenth year and still no signs of completion, Pedro Martínez was commissioned to assess its progress: it was the illustrations that captured his attention and earned his praise. And three years later, outgoing viceroy José de Ezpeleta wrote to his successor Pedro de Mendinueta that the expedition was greatly advanced, basing this claim on the beautiful and numerous illustrations it had produced.⁶⁴ After thirteen years of work, the New Granada expedition showed no sign of completing its exploration of South American nature. As the eighteenth century drew to a close, no one could know that Mutis, his natural history collaborators, and his artists would continue to work for another decade and a half on this project. They not only created the largest collection of New World botanical illustrations anywhere, but also developed a distinctive style that departed from the European models that had originally guided them, proposing a unique vision of American nature.

The Development of an American Style

Since the Spanish naturalists intended the expeditions' images to circulate, they directed their artists to produce illustrations that could be easily incorporated into European science. For the most part, the expeditions' twelve thousand botanical illustrations adhere to the tightly codified conventions of natural history illustration at the time, demonstrating the artists' fluidity in this pictorial language. However, the New Granada expedition gradually developed its own conventions, resulting in a distinct American style.

Eighteenth-century European botanical illustration was highly standardized. Images were not meant to function primarily as individual works but rather as modular parts within a series, adhering to rigid conventions that would permit comparison and identification—a kind of botanical mug shot or passport photo. This would allow the viewer to look at an image on its own and also to compare it against other illustrations. The paintings depict only certain features, and always in a specific manner, adhering to the strict grammar of eighteenth-century botanical illustrations.⁶⁵ As the example of the *Heliconia* in the introduction to this chapter shows (fig. 3.1), images tend to focus on a selected portion of the specimen rather than on the whole plant, depicting a single branch with leaves and flowers and including the detailed floral anatomy and fruit at the bottom of the page. The illustrations present a nature that is always green, always in flower, static in its lushness, decontextualized geographically on the white page. This decontextualization can be interpreted as more than a simple iconographic tradition: it represents the end point in the process through which nature was domesticated, rejecting the outdoors in favor of the indoors, the field in favor of the page.



FIGURE 3.13. Unsigned (New Granada expedition), untitled (*Stilaginella*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Real Jardín Botánico, Madrid. ARJB III, 803.



FIGURE 3.14. Unsigned (New Granada expedition), “*Dolichos*” (*Dioclea megacarpa*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, IIII, 2744.

The images were not realistic depictions of any specific living specimen but rather idealized representations, indicating what a certain kind of plant would look like in general.⁶⁶ The expedition’s artists deployed standardized iconographic strategies that allowed them to combine multiple specimens and to compress space and time so that the images included the information that botanists desired. Artists would, for instance, compress time by showing different stages in the life of a plant in a single imaginary specimen, presenting the viewer with little buds, mature flowers, and fruits in different stages of maturation, as well as green and yellowing leaves, to indicate all the possible states of that type of plant (fig. 3.13). If a single imaginary specimen did not combine the various stages of a plant, then two different stages—for instance, the plant in flower and in fruit—could be depicted in a single page (figs. 3.1 and 3.14). Artists could also compress space, chopping a plant into segments in order to display them side-by-side (fig. 3.15), or splicing and then bending a tall reedy plant into sinuous curves in order to squeeze it into the page (fig. 3.16). Frequently, leaves curl over so that both their top and bottom surfaces can be clearly seen (fig. 3.17, which depicts another developmental stage of the orchid depicted in fig. 3.15).



FIGURE 3.15. Unsigned (New Granada expedition), "Maxillaria" (*Lycaste longipetala*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 447.

FIGURE 3.16. Unsigned
(New Granada expedition),
untitled (*Cyperus prolixus*),
undated, tempera on paper,
21.5 × 15 in (54 × 37.5 cm).
Archivo del Real Jardín
Botánico (CSIC), Madrid,
III, 170.





In many of the illustrations, selected leaves will appear to have been eaten away in order to make space for other parts of the composition or so that another leaf can fit in the page (fig. 3.14). While some images present torn leaves almost realistically, as if depicting a damaged plant, in general the paintings tend to truncate them selectively and to highlight the artistic manipulation by pointedly snipping off every other leaf in a branch and leaving behind a little tell-tale fragment that functions like the ellipsis in a quote, indicating that something has been left out because it was not necessary in order to preserve the complete meaning of the statement, but signaling the omission to the viewer as a proof of trustworthiness (fig. 3.18).

European conventions of natural history illustration mandated not only what an image should show, but also the style in which it was produced. A flower depicted in a certain manner was appropriate for decorative or ornamental use in textiles or furnishings, while if represented in another style it became a scientific object fit for inclusion in a botanical text. The prevailing style of European botanical illustration insisted on naturalistic verisimilitude—what Martin Kemp has termed “the rhetoric of the real.”⁶⁷ This naturalism is different from realism,

FIGURE 3.17. Unsigned (New Granada expedition), “*Maxillaria*” (*Lycaste longipetala*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 448.

FIGURE 3.18. Unsigned (New Granada expedition), “*Cerbera thevetia*,” undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1358.

FIGURE 3.19. Unsigned (New Granada expedition), untitled (*Aphelandra alexandri*), tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1679.



since images tended to present idealized composites rather than reproduce actual specimens as they existed in the world. One stylistic result of this aim was a preference for volume over flatness: in general, European botanical illustrations strive to suggest live plants, not pressed specimens.

Among the botanical illustrations produced in Mutis's expedition, we find images that adhere to this convention. However, a great number of the expedi-



FIGURE 3.20. Unsigned (New Granada expedition), “Bignonia” (*Amphilophium paniculatum*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1701.

tion’s paintings depart significantly from the European model. The New Granada images generally show a stronger penchant for symmetry (figs. 3.19 and 3.20). Many of them depict plants in a style that might best be described as “flat”: they eschew volumetric naturalism, as if representing pressed herbarium specimens rather than live plants (figs. 3.21 and 3.22). In addition, colors are usually denser and more opaque as a result of the medium used—tempera instead of

FIGURE 3.21. Francisco Escobar y Villarreal (New Granada Expedition), “Ruelia” (*Ruellia ischnopoda*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1671.



watercolor, which was more common among European artists. Often, the New Granada paintings push the conventions of European natural history imagery to extremes: while it was usual for botanical illustrations to chop a plant up into segments or to present it curving or folding in order to fit it within the page, Mutis's artists could take this practice to unprecedented degrees (figs. 3.23 and 3.24).

The compositional and stylistic differences between the expedition's images



FIGURE 3.22. Unsigned (New Granada expedition), "*Cinchona lanceifolia*, Icon. XV. A.," undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 2862.

and European illustrations have remained unexplored by scholars, perhaps because it has been assumed that they can be subsumed under the general category of colonial Spanish American art, which at times tended towards the use of flat shapes, dramatic delineation, sharp contours, and large blocks of color. Flatness is also a trait that these images share with contemporary natural history illustrations produced by non-European artists from various colonial territories, such



FIGURE 3.23. Unsigned (New Granada expedition), untitled (*Renealmia cernua*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 596.



FIGURE 3.24. Unsigned (New Granada expedition), untitled (*Scleria macrophylla*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 186.

as the collection of eighty botanical images purchased by Spanish botanist Juan de Cuéllar in the Philippines between 1785 and 1794 (fig. 4.1), the 722 pictures drawn by Indian artists for the French doctor Nicolas L'Empereur ca. 1690–1725, or Chinese and Japanese botanical watercolors in a Western style.⁶⁸ These and other similar natural history images were export art, produced outside Europe by local artisans trained to depict flowers and plants within decorative traditions that differed significantly from the European conventions prevalent in natural history texts.⁶⁹

It would therefore be tempting to understand the “flat” images produced by Mutis’s workshop as examples of syncretic art, produced by artists who combined European and non-European artistic vocabularies into a hybrid patois in their depictions of human figures, plants, and animals.⁷⁰ However, the category of “hybridity” can be both useful and extremely problematic for the study of colonial Latin American art, often hiding as much as it reveals.⁷¹ The botanical images from New Granada were not produced by painters encountering a new pictorial regime, as Nahua scribes had done in the mid sixteenth century, but centuries into a well-established colonial regime by painters who belonged to

that tradition themselves, who had been trained in it and considered it their own. Unlike early Spanish conquistadors or Enlightenment British or French expeditions exploring new lands, the New Granada expedition visualized a long-held imperial territory, a kingdom with a strong Creole identity and local interests and traditions.

The New Granada expedition evolved a strongly defined style that consciously departed from European models. It was the only Spanish expedition to do this: the work of the artists in the Chile and Peru, New Spain, and Malaspina voyages adheres much more closely to the standard conventions of European botanical art. This is because Mutis was alone in employing such a large artistic team over so many decades, in establishing a regional painting school, and in consciously setting out to innovate upon the existing pictorial idiom. In the images produced by the artists employed by Mutis, flatness and symmetry were conscious choices, guided not by artistic traditions or shortcomings but by botanical considerations and a search for change.

There is both visual and manuscript evidence to support this claim. The fact that flatness was the result of a strategic choice rather than evidence of an artistic impediment can be demonstrated by a series of four images depicting the same genus. The color tempera painting is a good example of the expedition's standard image, flat and symmetrical on the blank page (fig. 3.25), as is a second image, a monochrome ink drawing that would be used to make an engraving for the planned *Flora de Bogotá* (fig. 3.26). But there are two additional images, which are extremely unusual for the expedition. One is a drawing in ink and wash of the same plant, with a single flower illuminated pink in watercolor (fig. 3.27). This sketch is much more naturalistic than the previous two illustrations: the plant is modeled with greater volume than usual, with a more three-dimensional result. The composition is also somewhat different from the expedition's conventions. This image shows that the painters in Mutis's workshop were quite able to produce a "European" style of image, and strongly suggests that they chose to represent plants in a different way. The fourth image in this series represents a middle-point between the conventional European-style illustration and the flat style normally preferred by the Mutis workshop (fig. 3.28). It is clearly a work in progress; the figure and the coloring are not completed and it is more flattened than the previous image, but it still has more volume than the finished pictures in color and in monochrome ink.

Further evidence for the evolution of a particular style is provided by a juxtaposition of two series of illustrations produced at different moments in the expedition. The earlier images are from 1777, from a set of forty-five botanical drawings in black ink and wash by Pablo Antonio García that Mutis sent to the recently established Royal Cabinet of Natural History. Years later, the expedition's workshop depicted some of the same plants again. The stylistic differences between the earlier and later illustrations are striking, so much so that for a long



FIGURE 3.25. Unsigned (New Granada expedition), “*Lobelia*” (*Centropogon cornutus*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1196.



FIGURE 3.26. Unsigned (New Granada expedition), untitled (*Centropogon cornutus*), undated, drawing in black ink, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1196b.

time García’s drawings were misattributed to the Malaspina expedition—they simply do not look like they belong to the New Granada expedition, whose style is so distinctive.⁷² To give but one example, one of García’s 1777 drawings depicts an *Alstroemeria* curving gracefully across the page in a semicircle in a very decorative arrangement (fig. 3.29). The modeling, the volume, and the vividness of the picture all adhere to European conventions of botanical illustration. In contrast, a picture of the same genus produced years later by the workshop departs from European botanical preferences in favor of those established by the expedition (fig. 3.30). Another image from the 1777 set shows the same plant at a different stage, presenting considerable depth and shading and portraying its tendrils in a naturalistic fashion, quite uncombed and disorderly (fig. 3.31). When the very same plant was drawn years later, the seed sacks were portrayed much more flatly, less shading was used, and the composition was much more symmetrical. Following another stylistic preference of the workshop, the tendrils were stylized, turned into neatly combed curling strings (fig. 3.32). There is also a striking final version of the image, in full show-stopping color (fig. 3.33).

Although Mutis alluded frequently in his correspondence to his artists and



the images they produced, he wrote much less regarding specific stylistic decisions. However, in an entry for 21 January 1785 in his observation journal, Mutis indicates that two years into the expedition botanical representation was not standardized but was still being explored and decided on a case-by-case basis. Faced with a specimen of a *Besleria*, Mutis expressed doubt as to the relative merits of having the plant depicted in a frontal or dorsal view, and in the end had Rizo draw both views on a single page—a very unusual choice for both European iconography and the expedition's own later conventions (fig. 3.34).⁷³ His artists were also carrying out experiments with the manufacture of tempera paints, exploring different compositions of the base.⁷⁴ Thus, while the artists of the New Granada expedition used European botanical prints as models for their own work, they did not slavishly reproduce existing conventions but rather adapted them. As Carolyn Dean has argued, European images and symbols did not remain intact after migrating to the Americas. In the New World, artists, patrons, and viewers refashioned, localized, and renewed Old World images.⁷⁵

Mutis's writings demonstrate his proud awareness that the workshop's images constituted innovations on European models. In 1785 he explained, "Per-

FIGURE 3.27. Unsigned (New Granada expedition), untitled (*Centropogon cornutus*), undated, drawing in ink and wash with watercolor, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1196a.

FIGURE 3.28. Unsigned (New Granada expedition), untitled (*Centropogon cornutus*), undated, drawing in watercolor and pencil, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1196c.



FIGURE 3.29. (left) Pablo Antonio García (attr., New Granada expedition), untitled (*Bomarea frondea*), undated (1777?), pen and ink drawing with wash, 16.6 × 10.6 in (42.2 × 26.8 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, VI, 276.

FIGURE 3.30. (right) [Francisco Xavier] Matis (New Granada expedition), “*Alstroemeria multiflora*,” undated, pen and ink drawing with wash, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 288.

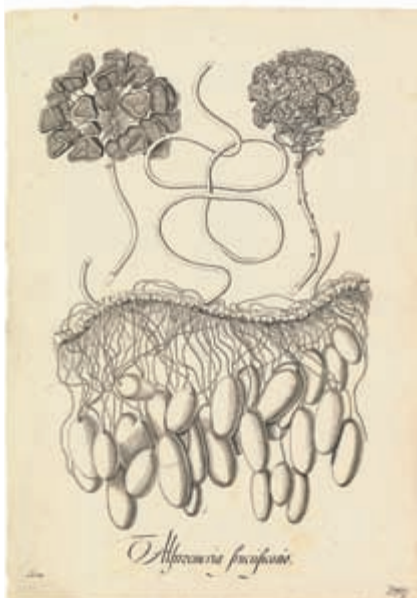


FIGURE 3.31. (above; left) Pablo Antonio García (attr., New Granada expedition), untitled (*Bomarea*), undated (1777?), pen and ink drawing with wash, 16.6 × 11.1 in (42.2 × 28.3 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, VI, 277.

FIGURE 3.33. (above; right) [Francisco Xavier] Matis (New Granada expedition), "*Alstroemeria multiflorae fructificatio*," undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 288c.

FIGURE 3.32. (left) [Lino José de] Azero (New Granada expedition), "*Alstroemeria multiflorae fructificatio*," undated, pen and ink drawing with wash, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 288e.



FIGURE 3.34. Salvador Rizo (New Granada expedition), “*Besleria*” (*Lycoseris mexicana*), undated, tempera on paper, 27 × 19 in (68.5 × 48 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1151a.

haps the method we have created is new, since we have not imitated any [existing one] because it was necessary for us to break free and go down new roads.” With satisfaction, he noted that “each day my plates achieve greater perfection.”⁷⁶ This search for a new and distinctive style of botanical illustration is evidenced in a 1786 letter to Viceroy Caballero y Góngora in which Mutis summarized the expedition’s progress, noting that his painters were experimenting with two competing styles. Mutis explained: “The delicate and fine nature of the two sublime styles in which my images are produced are a competition between its two inventors, since one belongs to Don Salvador Rizo, and the other was invented by me and executed by Don Francisco Matis.” He went on to explain that, after comparing the images produced by his workshop with the printed illustrations in Jacquin’s *Selectarum stirpium Americanarum Historia*, he concluded that the pictures “produced in America under my direction have pointed advantages compared to anything that has been published in Europe to this date.” Mutis claimed that this was not just his own personal opinion: the three small

plates he had sent to the Stockholm and Uppsala academies had “excited the impatient curiosity of those savants.”⁷⁷

Mutis’ poor opinion of most existing natural history illustrations, whether drawn, painted, or engraved, led to the development of this new style. Though Mutis considered Mark Catesby’s *Natural History of Carolina* “a treasure for illustrating my *Flora*,” he nevertheless found Pablo Antonio García’s drawings far superior to Catesby’s engravings.⁷⁸ He expressed dissatisfaction with the engravings in an unnamed book by the French author Duhamel de Monceau, complaining that the great majority were “imperfect,” and was similarly critical of the accuracy of Jacquin’s print of a passion flower, which he found inaccurate in its details.⁷⁹ Although Mutis considered Jacquin’s work “without a doubt the best that has been published,” he found his expedition’s paintings superior to any European print and confessed to being vain about them.⁸⁰ He bragged that the images by García and Matis that he sent to Spain “will cause our Spanish draftsmen (*dibujantes*) to faint, since they are mere draftsmen and not [truly] painters.”⁸¹ Mutis explained that his painters had laughed at the images in his copy of Jacquin’s *Hortus Vindobonensis*—with good reason, he thought, given that they themselves illuminated printed engravings in a far superior manner.⁸²

A comparison of a *passiflora* engraving in Jacquin's *Selectarum stirpium Americanarum Historia* and a painting of a *passiflora* from the New Granada expedition suggests that Mutis's workshop was engaged in a competitive exercise in pictorial one-upmanship (figs. 3.35 and 3.36).

Mutis deplored European images of American flora not only for their lack of accuracy but also for their style. He wrote:

Without diminishing the glory owed to Hernández, Plumier, Sloan, Catesby, Barrier, Brown, Jacquin, and lately the tireless Aublet, all of their works need to be retouched (except, usually, those of the illustrious Jacquin). Their extremely imperfect plates do not satisfy today's sublime taste for Iconism. Its renowned promoters Oeder, Jacquin, and Miller encouraged it, and now they have been surpassed by Raignault, Curtis, Bulliar, L'Héritier, giving the immortal Linnaeus well-founded reasons to regret and almost take back his old warning about the lack of usefulness of Iconism. In effect, if current botanical luxury proves amply the need for a certain degree of luxury, provided it does not degenerate to the extent of one [author] copying the other, and if plants from the Old World—which have been seen and examined for hundreds of years—are illustrated with increasing frequency, how much more important is it to work out well, once and for all, the never-ending botany of the New World in all its parts? If I am not deceived by my own passion . . . I can promise myself that any image coming from my hands will not need any retouching by those who come after me, and any botanist in Europe will find represented in it the finest characters of fructification, which are the a-b-c of science—of botany in the Linnaean sense—without the need to come see them in their native ground.⁸³

Mutis's term "iconism" merged notions of content and style: it refers to the practice of using botanical images to classify plants, to the information that illustrations should contain to permit such classification, and also to the style best suited to the task. Mutis believed that the images that his artists produced so carefully and laboriously would constitute the definitive embodiment of the plants they depicted, providing accurate information in such a way that—unlike existing European illustrations—they would not require retouching or correcting later on. The New Granada paintings would allow for long-distance knowing by seeing, as suggested by Rizo's portrait of Cavanilles (fig. 2.17), and for this reason Mutis considered the illustrations his expedition's most valuable work.

Mutis's proud assertion of his workshops' excellence, and its implications regarding the self-perceived status of the expedition's naturalists and artists as local experts in comparison with their European counterparts, was articulated not only in writing but also visually. A painting of a *Gustavia augusta* shows the work of the expedition's artists at its best (fig. 3.37). The careful treatment of the flower, the depth provided to the leaves, and the skillful rendition of white petals upon white page all contribute to its visual impact. This picture demonstrates





FIGURE 3.35. Copperplate engraving of a *passiflora* in Nikolaus Joseph von Jacquin, *Selectarum stirpium Americanarum Historia* (Vienna, 1763), vol. 2, plate CXLIII. Missouri Botanical Garden Library, www.mobot.org.

FIGURE 3.36. Nicolás Cortés Alcocer (New Granada expedition), “*Passiflora*” (*Passiflora adenopoda*), undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 2043.

FIGURE 3.37. Manuel Antonio Cortés Alcocer (New Granada Expedition), “*Gustavia augusta*,” undated, tempera on paper, 21.5 × 15 in (54 × 37.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 2673.

the artist's confident mastery of the techniques and conventions of European botanical illustration, which he has appropriated to articulate an artistic and botanical statement. Captured by the power of the image, it is easy to miss a telling detail. In the bottom left corner, the painter noted: "*Cortes M. Americ pinx.*" (Cortés the American painted this). Other signed images from the expedition also carry this statement. By not only signing his name but also pointing out his origin, and by extension the image's and the plant's, the painter shows how the American artists who participated in Mutis's expedition appropriated and reinterpreted European botanical illustration.

Conclusion

The Spanish eighteenth-century natural history expeditions functioned as visualization machines that captured imperial nature in effigy, producing an incomparably rich corpus of twelve thousand botanical illustrations that is unique among European explorations of global nature. Given the importance of pictorial depictions to the task of exploring imperial nature, naturalists went to tremendous efforts to hire, train, and supervise their artists, establishing carefully regimented work procedures. The naturalists' expert eyes worked in tandem with the artists' skilled hands. Despite their apparent simplicity, natural history illustrations are carefully and laboriously composed records that embody numerous observations of multiple specimens. These images also had rich social lives, working not only as scientific evidence but also in patronage settings. And although the Spanish illustrations are fluent in the taxonomic and pictorial languages of eighteenth-century botany, the New Granada expedition responded to the conventions of European natural history illustrations by developing a style that was not only unique but also insisted on its superior capacity to provide enduring incarnations of American plants.

In the Hispanic world, seeing and knowing were closely connected. However, while imperial administrators and naturalists agreed on the importance of visual epistemology, ultimately images proved better suited to some of their expectations than to others. Naturalists cared deeply about contributing to the global taxonomic project of European natural history through observations and representations, and visual epistemology served them well in that regard. Imperial administrators, however, were much more interested in the economic potential of botanical exploration—for them, taxonomy was relevant inasmuch as it helped to identify new natural commodities that could be profitably exploited. The next chapter explores the limitations of visual epistemology in fulfilling economic aspirations: if seeing led to knowing, it did not always lead to owning.

Economic Botany & the Limits of the Visual



First Glance: Useful Visions

Two images of cinnamon were painted in the Philippines in the 1780s: one depicts the full tree growing in the ground, with details of its leaf and flower amplified in the foreground; the other shows its flower and fruit (figs. 4.1 and 4.2). The Spanish pharmacist and botanist Juan de Cuéllar commissioned these paintings from men he described as “amateur indigenous painters” at some point between 1786, when he arrived in Manila from Spain, and 1789, when he mentioned them in a fifteen-page manuscript “Manifesto, or brief discourse on cinnamon from the [Philippine] Islands, compared to that of China and Ceylon.”¹ Cuéllar presented this manuscript to his employer, the recently formed Philippines Company, and also sent it to two important men in Madrid, Prime Minister José Moñino, Count of Floridablanca, and Antonio Porlier, a member of the Council of Indies.

Cuéllar’s Manifesto sought to establish that the plant locally known in the Philippines as “cinnamon” was actually the same plant described on page 528 of Carl Linnaeus’ *Species plantarum* (Stockholm, 1753), which grew in Ceylon (now Sri Lanka). He claimed that this could be readily proved by collating (*cotejar*) the drawing “illuminated from nature” that he had sent the previous year to Madrid’s Royal Botanical Garden and Royal Natural History Cabinet with the published writings of Linnaeus and other European naturalists.² As Cuéllar’s use of visual evidence suggests, the best way for European naturalists and merchants to compare two non-European plants growing in different regions was to evaluate how closely their visual and textual representations matched. Cuéllar provided both types of evidence, presenting the drawn image, the written mem-





oir, and a Linnaean taxonomical “Description of the tree that produces Philippine cinnamon.” Linnaeus had established the identity of cinnamon through a textual description against which the undetermined Philippine plant could be judged. Cuéllar offered his illustration as ineluctable proof that the two were in fact identical. His interest in images went beyond their evidentiary value in addressing the question of cinnamon: over the years, he sent to Madrid 80 drawings depicting Philippine plants, as well as 980 Chinese botanical watercolors.³ Although Cuéllar had traveled to the Philippines without a botanical artist, he understood well that Madrid expected its Indies to produce and send images.

Cuéllar provides an example of natural history investigations initiated in the viceroyalties, not Madrid, as part of the widespread exploration of imperial nature. His work in the Philippines was closely related to that of the naturalists in the Spanish expeditions. His botanical investigations were also premised on visual epistemology and practices of multimedia comparison that privileged visual materials and adhered to Linnaean taxonomy. And like them, he pursued economic botany, seeking to make imperial nature profitable. Thus, Cuéllar’s attempts to classify Philippine cinnamon were not a purely academic matter. In order to compete with the Dutch cinnamon trade, the Philippines Company had found it necessary to hire a botanist to certify its crops.⁴ It was by no means uncommon to find different plants being sold in Europe as a single product, particularly if they had been imported from distant lands and were marketed in dried or powdered form. Cuéllar’s mission was to establish Philippine cinnamon as a product equal to the varieties sold by competing European powers, and in this way secure rich benefits for Spain at an imperial level and for the Philippines at a local one.

But while observations in pictorial and textual form could establish a taxonomic identity, additional means of investigation were necessary to assess the properties of a potential natural commodity. Cuéllar asked Madrid’s Royal Pharmacy to compare the relative distillation yield per weight of Philippine, Chinese, and Ceylonese cinnamon. It was crucial for the Spanish to establish that these were cultivars (varieties of a single species) and not different species, even though identical quantities of each yielded different amounts of oil. To this extent, Cuéllar described at length a series of experiments that he himself had

FIGURE 4.1. (facing)

Unsigned, cinnamon tree (*Cinnamomum zeylanicum*), ca. 1786–94, sent by José de Cuéllar from the Philippines to Madrid, drawing in ink and watercolor, 17.1 × 10.8 in (43.5 × 27.5 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, X, 2.

FIGURE 4.2. Unsigned, cinnamon flower and fruit (*Cinnamomum zeylanicum*), ca. 1786–94, sent by José de Cuéllar from the Philippines to Madrid, drawing in ink and watercolor, 3.7 × 10.9 in (9.5 × 27.7 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, X, 46.

carried out, through which he concluded that the difference in yield between Ceylonese and Philippine cinnamon could be attributed to a variety of accidental factors such as whether the samples had come from young or old trees, which part of the tree had been used to prepare the extract, or, most crucially, the freshness of the material used. When it came to economic botany, visual epistemology alone was not enough.

This chapter discusses metropolitan and viceregal efforts to locate, exploit, and promote valuable flora throughout the Spanish empire. I first examine botanists' efforts to publicize and identify in the viceroyalties natural commodities that would allow Spain to compete commercially with other European nations: pepper, cinnamon, and tea. I then discuss attempts to transport foreign seeds and plants to Spain, with the hopes that they could be grown locally. These searches brought into collaboration European and Spanish American naturalists, as well as administrators and institutions across the empire. They used manuscript and printed images to communicate their observations and promote new products. But it turned out that visual epistemology was better suited to taxonomic botany than to economic botany. When it came to cultivating, exploiting, transporting, and marketing natural commodities, pictorial efforts needed to be coupled with considerations of large-scale cultivation, transportation, distribution, chemical analyses, and acclimatization projects. The visual culture of natural history could make the empire visible, but it proved ineffective at making imperial nature profitable.

As the Spanish experiments with pepper, cinnamon, and tea demonstrate, it was tremendously difficult to translate colonial investigations into imperial successes. In a third section of the chapter, I assess the geopolitics of natural history knowledge produced in various points of the Spanish empire, focusing particularly in the relationship between Madrid and the viceroyalties, and between various imperial locales. To concentrate exclusively on the movement of information and specimens from the viceroyalties to the metropole misses an important part of the story. Trajectories were not only imperial but also colonial; initiatives originated not only in Madrid but also in the Philippines, Santa Fe de Bogotá, Lima, and Mexico City. Throughout the kingdoms, governors and administrators sponsored investigations with an enthusiasm that suggests that they had their own reasons to be interested in natural history, beyond their duty to ensure the prompt fulfillment of orders from Madrid. They actively encouraged the exploration of nature, hoping to identify products that would boost the regional economy by securing profitable trade with the metropole. Distance from Madrid—in space, time, experiences, and local interests—granted naturalists considerable autonomy. Over time, naturalists established closer relationships locally than across the ocean. The relevance of Madrid to their daily work changed, their priorities and allegiances shifted, and they subtly and gradually turned away from the distant metropole to face much more immedi-

ate and present concerns. Naturalists working in the colonies became nodes of a truly global network in which center and periphery were far from clear or stable categories.

Unfulfilled Promise: The Hunt for Natural Commodities

Spanish efforts to deploy natural history in the service of the State focused on the identification, analysis, and circulation of information and natural commodities. In terms of taxonomic botany, the expeditions were enormously successful, producing tens of thousands of images as well as new plant identifications. As economic botany projects, however, they were less successful.

This was not for lack of trying. The naturalists in the Spanish expeditions frequently mentioned natural products with commercial, medical, and industrial applications in their correspondence and manuscripts. Hipólito Ruiz and José Pavón, of the Chile and Peru expedition, reported the existence of saltpeter mines and local plants with medicinal or industrial uses, such as a *cascarilla* (a potential substitute for cinchona), *tragacanta* gum, or the *yerba del Paraguay*.⁵ Martín de Sessé, of the New Spain expedition, identified another febrifuge *cascarilla* in the southern coast of Mexico and, back in Spain, he administered it in trials to patients in the Royal Hospital at El Escorial.⁶ He and his colleague José Mariano Mocino also sent samples of thirty precious woods and a report on the medicinal properties of another tree bark.⁷ Luis Née, with the Malaspina expedition, prepared upon return to Spain a memoir describing the useful and precious woods he had found during his voyage.⁸ Yet none of these findings met the Spanish Crown's hopes for commercial success.

Spanish expectations of the way in which economic botany would smoothly unfold are exemplified by the case of the *malagueta* or Tabasco pepper (*Capsicum frutescens*). In 1777, as the first of the botanical expeditions readied for departure to Chile and Peru, Casimiro Gómez Ortega presented José de Gálvez with a report in which he outlined a full-blown strategy for exploiting this American plant, long-known but until then not commercially pursued. His plan entailed publishing a memoir advertising its wonderful properties in order to create expectation and demand for the product in Spain and throughout Europe. Gómez Ortega promised that this publicity, in conjunction with the recently established free trade policies, would encourage the cultivation of *malagueta* throughout the empire and its export to Spain, where consumption could be promoted by selling it at a lower price than the eastern pepper marketed by the Dutch.⁹ Three years after this report, Gómez Ortega published a thirty-four-page memoir entitled *Historia natural de la Malagueta ó Pimienta de Tavasco* (Madrid, 1780) (fig. 4.3). The treatise functioned as a combined advertisement, propaganda piece, and botanical flag in the sand. It combined natural history information about exotic and

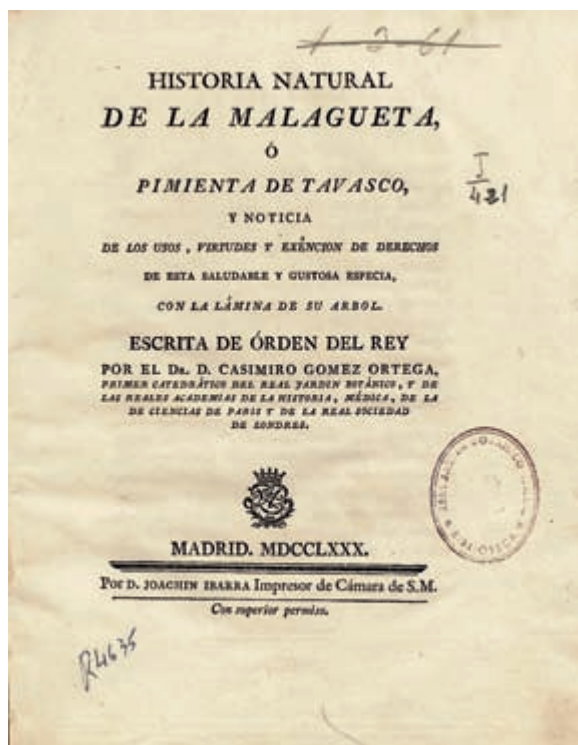


FIGURE 4.3. Title page to Casimiro Gómez Ortega, *Historia natural de la Malagueta ó Pimienta de Tavasco* (Madrid, 1780). Biblioteca del Real Jardín Botánico (CSIC), Madrid.

FIGURE 4.4. Engraving of malagueta or Tabasco pepper, in Casimiro Gómez Ortega, *Historia natural de la Malagueta ó Pimienta de Tavasco* (Madrid, 1780). Biblioteca del Real Jardín Botánico (CSIC), Madrid.



novel plants with commercial advertising, and made pointed reference to the malagueta's potential for encroaching on the trade of European competitors.¹⁰

Gómez Ortega's memoir opens with an engraving showing a branch of the malagueta tree and details of its leaves and fruit (fig. 4.4). In keeping with the high value given to visual information, this illustration was commonly bound facing the title page so that it would be the first thing that a reader encountered upon opening the pamphlet. The illustration serves both rhetorical and evidentiary purposes, making the plant more tangible to the reader. This is a common strategy in works introducing and advertising a new plant, whether manuscript or printed—as for instance with Cuéllar's memoir on cinnamon, Martín de Sessé's claim to have located nutmeg in Mexico, or the descriptions of many new plants identified by the traveling naturalists in the Americas, the Philippines, and the South Pacific that Antonio José Cavanilles published in the *Anales de Historia Natural* (Madrid, 1799–1801) and *Anales de Ciencias Naturales* (Madrid, 1801–04).¹¹

The first two chapters of the memoir focus on taxonomy, describing American pepper in great detail and documenting its characteristic appearance, color, and smell, as well as its various names in the Americas and Europe. Gómez Ortega then provided a meticulous description of the entire tree based on the reports of writers who had seen it in its natural environment, and painted a

textual portrait detailing the tree's height; the appearance of its trunk and bark; the size, color, and smell of its leaves; and what the flowers and fruit looked like. Gómez Ortega noted that the tree was known to grow in Tabasco, Chiapas, and Puerto Rico, and indicated the time of year when it flowered. Such a level of detail should serve to fix the identity of this spice beyond any potential doubt or confusion, and would hopefully allow both naturalists and nonexperts to identify the tree in the viceroyalties and also prevent fraud in the marketplace. Aside from these practical motives, Gómez Ortega used these details rhetorically, to arouse interest in malagueta through a publication that was in equal parts news and propaganda.

The second part of the pamphlet focused on economic botany. A chapter entitled "Means of exploiting malagueta" devoted as much attention to the collection of the spice from the tree and its preparation for trade as it did to introducing a note of urgency by referring to British cultivation of a pepper tree in Jamaica. Gómez Ortega sought to alarm and entice his reader in equal measure, pronouncing it "very worthy of admiration" that the British had reaped great profit from the growth and traffic of Jamaican pepper while the Spanish had failed to do the same with malagueta.¹² His description of British efforts made the exploitation of this spice sound extremely easy: slaves, he claimed, simply needed to shake the tree to make the fruit fall and then dry it in the sun for ten to twelve days. With that, the pepper would be ready for export. Given the level of detail that Gómez Ortega provided in his taxonomic description of the malagueta tree, his vagueness about the details of implementing economic botany are illuminating. Although he noted that it remained unclear whether Tabasco and Jamaica pepper were actually the same plant, he glossed over this point, and focused instead on the importance of competing with British trade and the economic potential of malagueta. He did not, however, provide any suggestions as to how this would be achieved. Gómez Ortega ended the chapter by indicating the price that the colonists obtained per pound of Jamaica pepper, in this way underscoring the profit awaiting both future planters in the Spanish viceroyalties and merchants in the continent. For Gómez Ortega, the plant represented such a great opportunity that it was practically a national duty to exploit and consume it.

After such convincing arguments for the importance—even the necessity—of aggressively exploiting malagueta, the publication concludes with a discussion of the likelihood of cultivating the tree domestically in Spain. According to Gómez Ortega, domestic cultivation would be the best way of ensuring the availability of malagueta and increasing its production. Since Spain was blessed with a variety of climates, he explained, it would be hard to find a plant anywhere in the world that in the end could not be cultivated in the peninsula. Should Spanish winters prove too cold for malagueta trees, they could spend the season in hothouses. In addition, plantations would be protected from cold and extreme

heat during the first years. After that introductory period, the trees should become stronger and better used to Spanish climate, and the trees would grow in their new home without any problem. Transplantation and acclimatization, according to Gómez Ortega, would be a simple matter. He referred to the illustrious example of the sixteenth-century Sevillian botanist Nicolás Monardes, whom he described as having used his hands to spread both news of American plants through his writings and their seeds through cultivation. Gómez Ortega saw himself as that same kind of patriotic diffuser, and used his publication for two related purposes: introducing malagueta as a botanical specimen and a natural commodity, and providing practical information and advice that might make the spice more available in Spain.¹³

To encourage the importation of malagueta to Spain, Gómez Ortega provided his readers with specific recommendations. He advised against sending seeds to the Royal Botanical Garden, requesting instead that correspondents ship small trees in large pots with plenty of soil. They should also sow seeds in these pots immediately prior to their transportation, so that they sprouted during the voyage. Should they find it unfeasible to send trees in pots, Gómez Ortega suggested packing them in fresh moss, a method that he had used successfully to exchange plants with correspondents in Holland. Timing should also be taken into account: since plants in Spain grew better in the autumn than in the spring, malagueta trees should be shipped to arrive in the peninsula in October, November, or February, never waiting for the spring. The memoir ended with an appeal to the viceroys and local governors of Mexico, Guatemala, Puerto Rico, and Cumaná (in present-day Venezuela) to write to the Ministry of Indies with details about the conditions under which malagueta trees grew in the territories they governed, noting that in this way they would serve the country and prove their love of king and homeland. For more information on how exactly to supply malagueta, Gómez Ortega referred his readers to the *Instrucción* with guidelines for contributors that he had published the previous year.

Gómez Ortega's memoir gives the impression that the relationship between taxonomic and economic botany is a very simple matter—that if one is able to identify an American plant, then it should not be much trouble at all to grow it locally in the New World or to transplant and acclimatize it to Spain, and then somehow cultivate, distribute, and market it. This would prove a gross oversimplification for the malagueta as for other natural commodities. Gómez Ortega's publication appeared in print at a moment of great optimism in the economic potential of botany, but it did little beyond serving as propaganda for Spanish botany itself. It did not lead to the development of pepper plantations in the Spanish Americas, or of a Hispanic pepper trade. Its only impact was to help Gómez Ortega secure funding for his large-scale project of imperial botany over the next twenty years. But at the time it appeared, it served as a tantalizing example of one of many profitable natural commodities that awaited exploitation

throughout the empire, promising that the Spanish botanical expeditions would contribute to both European science and Hispanic coffers.

The failure to translate taxonomic identity into successful economic botany is illustrated by the Spanish experience with American cinnamon, a vexing case of a profitable plant whose suspected potential had not been fulfilled. Knowledge of the existence of cinnamon in the Americas dated back to the late 1530s, when the conquistadores Sebastián de Benalcázar and Gonzalo Pizarro identified it in the Quito *audiencia*, in the territory of present-day Peru. The plant was also found some years later in New Spain, where the local government engaged in some trade.¹⁴ All the major chronicles and natural histories of the New World from the sixteenth and seventeenth centuries describe American cinnamon, among them Gonzalo Fernández de Oviedo y Valdez's *Historia general y natural de las Indias* (Seville, 1535), Francisco López de Gómara's *Historia general de las Indias* (Zaragoza, 1552), Nicolás Monardes's *Historia Medicinal de las cosas que se traen de nuestras Indias Occidentales* (Seville, 1565–74), and the Inca Garcilaso's *Comentarios reales de los Incas* (1609–16).¹⁵

Nevertheless, for about a hundred and fifty years, American cinnamon constituted little more than an interesting detail in the natural history of the New World. It was largely ignored as a commercial product because it turned out to be of noticeably lower quality than Ceylonese cinnamon, which was sold with enormous profits in Europe first by the Portuguese and later by the Dutch. The Spanish found little need for American cinnamon during the sixteenth and seventeenth centuries. The Treaty of Zaragoza, signed with Portugal in 1529, granted Spain full powers over the Philippine archipelago, while the unification of the two kingdoms between 1580 and 1640 ensured Iberia's dominance of the eastern trade.¹⁶ Thus, with a heavy flow of spices coming from the East and a torrent of precious metals pouring in from the West, the Spanish had little reason to pursue American cinnamon. However, after the foundation of the Dutch East India Company (VOC) in 1602, Dutch merchants took over the eastern spice trade in cinnamon, pepper, and nutmeg. At the same time, Spain's fortunes from American mines waned. The emergence of the Netherlands as a global colonial power during the seventeenth century went hand-in-hand with the decline of the Spanish empire.¹⁷

Ignored in part due to Spain's greater interest in mining, American cinnamon long remained poorly understood and cultivated. By the eighteenth century, Spanish naturalists and administrators feared that a potentially valuable commodity withered away in the viceroalties while cinnamon consumption continued to enrich the Dutch at the expense of Spanish pockets. Spanish naval officers Jorge Juan and Antonio de Ulloa, in a series of texts on the political state of Peru written after their American travels with the La Condamine expedition (1735–45), critiqued Spanish and Spanish American attitudes towards New World cinnamon. They described a destructive loop of negligence: if only cin-

namon cultivation were promoted in the viceroyalties, then the product would be more widely available in Spain and would surely come to replace eastern cinnamon; this success, in turn, would encourage even greater cultivation. No other nation, they claimed, showed such a cavalier attitude towards natural commodities. They cited France as an example of more desirable and astute policies:

*The French [nation], [being] very passionate about coffee, and seeing that it lost considerable sums in bringing it from Asia, decided to take its plants to the islands of Martinique and Saint Domingue, and in a few years the plantations there have grown so much that with the coffee production from these two islands there is a crop perfectly sufficient for consumption there [in the islands] and for the growing one in France. And when they decided to prohibit completely the entry and sale of Eastern coffee, they did not object to the great difference that exists between one and the other, since they were unable to make coffee from the islands as good as the other. If this nation [France] had a tree as esteemed as cinnamon in the countries that it owns, it would create a high level of trade, and would invest heavily in cultivating and propagating this species in order to increase its utility. So, why should we [Spaniards] show ourselves so careless in profiting from the riches provided lavishly by the extensive forests of Peru?*¹⁸

In 1780, the Real Sociedad Económica de Madrid calculated that Spain purchased 600,000 pounds of cinnamon from the Dutch every year, with the same amount consumed yearly in the Americas.¹⁹

As Ruiz and Pavón set out for Chile and Peru in 1777, Casimiro Gómez Ortega prepared a report to the Crown discussing the likelihood of breaking the Dutch monopoly on cinnamon and cloves with American substitutes from the Quito region, which the naturalists would be surveying.²⁰ Replacing eastern cinnamon with an American variety would benefit both the viceroyalties, which would sell the product to Spain, and the metropole, since Spain would profit from marketing this commodity domestically and internationally. For this reason, both the expeditions' naturalists and the metropolitan and viceregal administrators were eager to foster cinnamon cultivation and improve the quality and yield of this natural commodity.

Perhaps the biggest problem that American cinnamon posed was that, more than three hundred years after it had first been discovered, it remained unclear whether the product was in fact the same species as eastern cinnamon from Ceylon and China or a different species altogether. Advocates of American cinnamon maintained that whatever differences could be observed between the varieties were due to the deteriorated state in which the American product arrived in Europe due to poor cultivation and shipping conditions. Establishing that American and Asian cinnamon were the same proved difficult, however, since the trees from different regions were not available for comparison in Europe, where



the product arrived as a dried branch or its bark. In order to prove the quality of American cinnamon, Spanish naturalists and administrators set about obtaining samples of regional varieties. Their methods were manifold, and involved the participation of various institutions. The Royal Botanical Garden attempted to establish the taxonomical identity of the varieties by comparing dried herbarium specimens and images, and the Royal Pharmacy performed chemical analyses of infusions, distillations, and oil preparations from bark samples.

The expeditions to Chile and Peru and to New Granada and the Malaspina expedition all operated in the cinnamon-growing regions of the Viceroyalty of Peru, offering the Spanish naturalists an excellent opportunity for establishing the taxonomic identity of American cinnamon. A drawing attributed to José Guio, of the Malaspina expedition, depicts an American cinnamon tree from Ecuador with details of its leaf and flower, while manuscript annotations provide detailed information (fig. 4.5). Joseph Dombey, the French naturalist who traveled with Ruiz and Pavón between 1777 and 1784, sent Gómez Ortega samples of cinnamon bark from Quito and Santa Fe de Bogotá.²¹ Unfortunately for the Spanish, Dombey later concluded that the two types of cinnamon were in fact different species from Ceylon cinnamon.

FIGURE 4.5. Unsigned (attr. to José Guio, Malaspina expedition), drawing of a cinnamon tree with details of the leaf, flower, and seed pod and manuscript annotations, ca. 1789–94, pen and ink drawing with traces of pencil, 7.5 × 11.2 in (19 × 28.5 cm). Museo de América, Madrid, 02362.

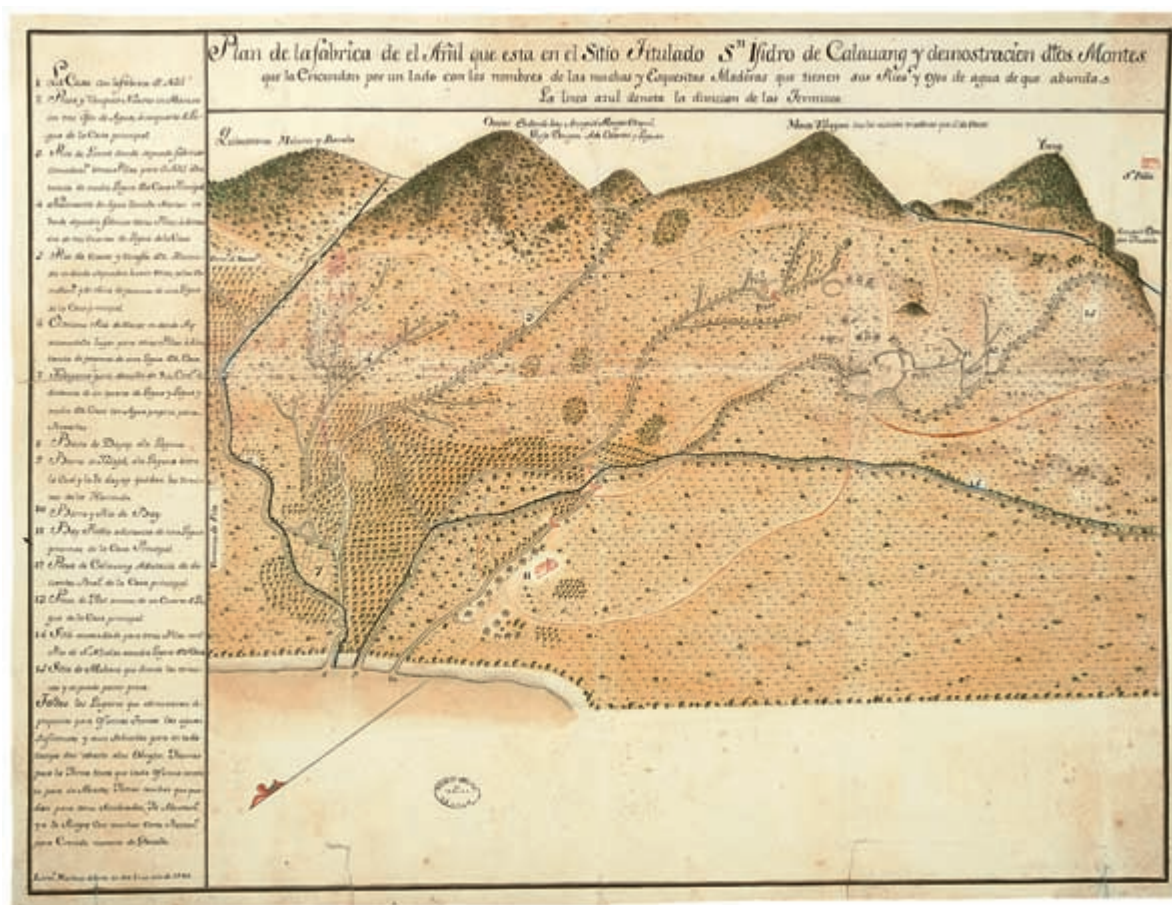


FIGURE 4.6. Map showing indigo cultivation in the Philippines: “Plan de la fábrica de el añil que está en el sitio titulado Sn. Isidro de Calauang . . .,” 1783. Gobierno de España. Ministerio de Cultura. Archivo General de Indias. MP, Filipinas, 122.

José Celestino Mutis shared this opinion. When his botanical contributor José Eusebio Ramos reported finding cinnamon trees in the Bee Mountains in October 1783, Mutis immediately dispatched a collaborator to the region to corroborate this claim.²² Within a couple of months, Mutis received samples of the tree’s leaves, flowers, and bark for his analysis.²³ In a report to Viceroy Caballero y Góngora, Mutis announced that the plant in question was not cinnamon but rather a new genus that he himself identified and had drawn in 1772, sending this information to Carl Linnaeus in Sweden the following year.²⁴ Eventually, American cinnamon was classified as *Laurus cinnamomum*, a different species and genus from Ceylonese cinnamon (*Cinnamomum ceylanicum*) and Chinese cinnamon (*Cinnamomum cassia*).

However, the fact that American cinnamon was not the same plant as eastern cinnamon did not necessarily mean that it had no value or potential. If its quality could be improved, it might be able to compete successfully in the European market. By 1786, Mutis had received from his correspondent Diego Gar-

cía twenty-two cinnamon trees from the Andaquies region, eleven of which he managed to keep alive in his garden in Mariquita. He successfully petitioned Caballero y Góngora for funds to establish a larger-scale plantation, arguing that it would be more efficient to tend it than to send commissions to gather the product from the Andaquies.²⁵ In letter from 1802, Alexander von Humboldt described Mutis's plantation in Mariquita as considerably productive.²⁶ However, despite Mutis's efforts and similar ones in Quito, American cinnamon was never cultivated, distributed, or marketed at a sufficient scale to play a major role as a global commodity.²⁷

Meanwhile, the Philippines Company hired Cuéllar to explore the possibility of propagating Ceylonese and Chinese varieties in the Philippines.²⁸ Cuéllar's reports describe searching for lands suitable for cultivating pepper, coffee, cocoa, cinnamon, indigo, and white mulberry trees (the leaves of which were used to feed silkworms). He applauded the efforts of the Spanish colonist Don Francisco Xavier Salgado, who cultivated indigo and cinnamon in his hacienda in San Isidro de Calavan (fig. 4.6).²⁹ Salgado's cinnamon, Cuéllar reported to José de Gálvez, was not at present suitable for large-scale cultivation and commerce since it proved excessively biting, astringent, and viscous in comparison to the Ceylonese product marketed by the Dutch. Cuéllar believed he could remedy this problem by performing "the experiments that good principles of agriculture and industry consider convenient for improving the quality of cinnamon." He also suggested a formal method of plantation, proposing that each inhabitant (*vecino*) should be responsible for providing a yearly amount of specified natural products in his own field, or work in a communal field. Such plantations, according to Cuéllar, would prove beneficial both to the Crown and to the native inhabitants of the region (*naturales*). Sale of natural commodities would result in monetary gains for both, while mandatory labor would help to improve character by "imperceptibly banishing the idleness and other vices that seem to overpower these Natives, and endearing them to work."³⁰ The system would be monitored and enforced by an appointed *visitador* who would travel throughout the colony and impose fines on those whose participation was considered inadequate. For Cuéllar, the solution to botanical problems was administrative. Gómez Ortega, evaluating Cuéllar's shipment and proposal in 1788, was excited about the botanical findings but noncommittal about implementing the enforced large-scale plantation system that Cuéllar proposed.³¹

Cuéllar took charge of Salgado's cinnamon plantation, sending new samples for assessment to Spain once a year over the next three years.³² A 1789 report of their analysis showed promising results, noting that the quality of cinnamon from the plantation had improved over the years and suggesting that Philippine cinnamon could eventually seriously compete with the Ceylonese variety.³³ In a 1792 analysis, Juan Díaz, head of the Spanish Royal Pharmacy, compared new cinnamon and nutmeg samples from Salgado's plantation to the products avail-



FIGURE 4.7. Four leaf samples from cinnamon trees cultivated in Francisco Xavier Salgado's plantation in San Isidro de Calavan, the Philippines, 1792. Gobierno de España. Ministerio de Cultura. Archivo General de Indias. MP, Ingenios, 180.

able on the Madrid market (fig. 4.7). He concluded that the Philippine samples were of inferior quality but that some Chinese cinnamon trees that had been transplanted to the islands were much more promising, and recommended fostering this latter variety.³⁴

In the late 1780s and early 1790s, Cuéllar labored to improve the quality of Philippine cinnamon and to enlarge the size of Salgado's plantation at Calavan. He claimed to have sown an astonishing total of 402,828 cinnamon seeds in Salgado's hacienda in the first six months of 1791 alone.³⁵ The plantation's youth, however, meant that its productivity was not yet assured: 150,879 specimens that Cuéllar had planted the previous year had rotted; a similar fate might await many of the younger trees. Furthermore, the long-term survival of the plantation depended on the presence of a significant number of trees mature enough to yield seeds, at least thirteen-years old. In 1791, only 385 of the almost 600,000 trees in the hacienda had reached that age. Nevertheless, Cuéllar demonstrated great optimism in his figures projecting the plantation's growth over the next six years. He also expected to improve cultivation of nutmeg and coffee, which had at that point

reached 184 trees and 2,580 shrubs respectively.³⁶

But these efforts came to naught. Cuéllar was unable to improve Philippine cinnamon to make it an acceptable substitute for the Ceylonese and Chinese varieties, or to cultivate Chinese cinnamon in a scale sufficient to be competitive. He was seriously underfunded, receiving few monies from the Philippine Company and none from the Spanish Crown, and depended on Salgado's rapidly diminishing personal funds. Finally, the drastic reorganization of the company and the suppression of the Manila governmental council between June 1793 and March 1794 put an end to his project, with the termination of Cuéllar's employment by June 1795.³⁷ As a trained botanist, Cuéllar was capable of determining a plant's Linnaean taxonomic identity. However, successfully developing a large-scale global commodity was outside his purview, and would have required much more serious investment in funds, personnel, and administrative energies at both colonial and imperial levels. The Spanish experience with cinnamon shows that, despite Gómez Ortega's promises, the transition from plant identification to commercial exploitation was far from simple. While naturalists proved

competent at taxonomy, when it came to economic botany, the Spanish colonial scientific machine failed to deliver results.

Although the Spanish natural history expeditions had greater resources and institutional support than Cuéllar, they did not fare much better in their efforts at economic botany. Mutis, for instance, followed with great interest European journal articles on the British trade in tea and identified a New Granadan plant that he hoped would prove an adequate substitute.³⁸ He brought this *Té de Bogotá* to the attention of Spanish authorities, sending a jar of the product to the Count of Floridablanca in November 1785. He accompanied the sample with an essay, “*Té de Bogotá: sus preciosas virtudes*,” in which he described the plant, compared it favorably to Chinese tea, and provided instructions for preparing an infusion. Mutis extolled the medicinal properties of this South American tea and contrasted them to the alimentary uses of eastern tea, perhaps preempting potential criticisms about differences between the two.³⁹ In response to this announcement, Mutis received several letters urging him to prepare a full memoir or treatise on the plant and to send as much of it as possible.⁴⁰ He was also informed that Casimiro Gómez Ortega had prepared a report based on several experiments that had been carried out in Madrid to confirm the characteristics of Bogotá tea.⁴¹

In 1786 the director of Madrid’s Royal Pharmacy produced a report comparing the Bogotá leaf with “tea from the Levant.” As with cinnamon, the question was whether these two teas were the exact same plant, different varieties of a plant, or different plants altogether. Díaz only had the dried leaves to work with, and declared himself unable to determine the plant’s genus for lack of fruit and flower. For this reason, he performed a comparative analysis. He began with a physical examination, from which he concluded that the leaves of Bogotá tea had a very different aspect than those of Levant tea. He then performed a detailed chemical analysis. First, Díaz prepared “resins” by soaking the same weight of both leaves in wine spirit (ethyl alcohol) and filtering out the leaves after a day. The Bogotá tea yielded a light-gold resin, while eastern tea produced a dark greenish-yellow one. Then, Díaz added a few drops of *espíritu de vitriolo ácido* (sulfuric acid) to each of the resins: the resulting clots were also different. The pharmacist proceeded to distill the resins: Bogotá tea yielded a milky tincture and a white solid, while eastern tea gave a lighter-colored liquid and no precipitate. As a final experiment, Díaz brewed cups of tea: he prepared an infusion of each leaf and compared their colors, fragrance, and taste. After these experiments, Díaz concluded that the two leaves came from different plants, “without denying, however, that the virtue of Bogotá Tea is, or can be, as good for use as that of the Tea of Levant.”⁴²

Mutis sent more Bogotá tea to Madrid in mid-1787.⁴³ In 1790, the Royal Pharmacy analyzed the leaves again to advise whether it would be desirable to receive further shipments from Mutis.⁴⁴ Pharmacist Castor Ruiz del Cerro conducted

the same type of experiments that Díaz had performed earlier and reached similar conclusions. He expressed the impossibility of determining the taxonomical identity of Bogotá tea without seeing its fructification parts, concluding that long-distance investigation could not deduce information available exclusively in situ. “The leaves called Bogotá Tea,” he explained in a report to Díaz, “are from a plant that only its discoverer [Mutis] will be able to identify with certainty, having seen and examined it in its native soil.”⁴⁵ Astonishingly, Mutis had not sent images or written observations to Madrid—an unlikely omission from such a fervent advocate of the uses of visual epistemology for taxonomical identification. But for the pharmacist in Madrid, the key issue was not one of classification but of the plant’s medical properties. He suggested that these might only be in evidence in South America, where the combination of climate, patient’s constitution, and effectiveness of the product might come together in ways that could not be replicated in a European laboratory.⁴⁶ Based on this second series of analyses, the Royal Pharmacy’s official reported that Bogotá tea was not the same plant as Chinese tea, though he agreed with Mutis that the former was not inferior to the latter. Díaz concluded that importing Bogotá tea would prove very beneficial to Spain and aid state interests.⁴⁷

Like American cinnamon and pepper, however, Bogotá tea did not live up to its promise, and never fulfilled the high hopes of naturalists or administrators. Botanists succeeded at making imperial nature visible and at incorporating American flora into European global natural history, but they failed to deliver on their promises about economic botany. Although they worked long and hard to identify and promote American substitutes for global natural commodities, and repeatedly argued their cases before peninsular authorities, knowing a plant’s identity was not nearly enough when attempting to develop a new commercial product. Naturalists’ methods based on visual epistemology were insufficient for determining issues of yield and effectiveness that necessitated other techniques, such as chemical analyses and medical trials. And despite abundant rhetoric about Spain’s imperial interests in economic botany, imperial and vice-regal administrators alike failed to implement the decisive large-scale measures that would have yielded results when it came to cultivation, transportation, and commercialization. The optimism in Gómez Ortega’s memoir on malagueta was unfounded. Identifying and promoting new natural commodities was far from simple. His expectations for transporting foreign plants to Spain and acclimatizing them there were equally misguided.

The Challenges of Transportation and Acclimatization

Peninsular naturalists like Gómez Ortega wanted more than information about foreign plants: they wanted the plants themselves, hoping to propagate them

in Spain. But the difficulties of successfully transporting collections to Madrid were formidable, as the experiences of the Chile and Peru expedition demonstrate. In April 1779, two years into their travels, Ruiz and Pavón sent back to Spain a first shipment consisting of four crates with live plants; six with dried herbarium specimens, seeds, bulbs, roots, and natural curiosities; and one with almost 200 drawings of plants and about 60 floral anatomies. Gómez Ortega received the materials in late November of the following year. By then the live plants had perished, as would happen all too often.⁴⁸ “I consider,” Gómez Ortega reported to José de Gálvez, “that the most valuable [items] are the 260 drawings, and the herbaria.”⁴⁹ Ruiz and Pavón sent another collection the following year, but it never arrived at its destination because the British seized the ship that carried it. Four years later, in May 1784, they sent a very large shipment that included six containers with live trees and shrubs, among them bananas, avocados, cedars, guavas, guaiacum, coca, coffee, ginger, and calaguala. They were all lost in a storm off the Chilean coast. The remaining materials—fifty-five crates with natural history samples collected over a period of five years and about 1,000 drawings, 800 of them new and 200 copies replacing those lost in 1780—disappeared when the vessel that carried them shipwrecked. A shipment they sent a year later, in May 1785, did make it to Madrid, though none of the twenty-nine species of live plants survived the journey.⁵⁰

Given the difficulties in conveying live plants, correspondents experimented with a variety of methods of their own invention, or resorted to those reputed to have worked for others. Cuéllar, for example, shipped plant roots packed in sand and earth instead of live plants in pots or open crates, explaining that the French apparently had managed to transport specimens from Mauritius to Europe in this way.⁵¹ Seeds were much simpler to transport than live plants, but often failed to germinate in Europe. Gómez Ortega warned collectors against sending unplanted seeds from distant destinations altogether, citing Philip Miller’s complaints about this problem in the *Gardener’s Dictionary* (London, 1724), La Condamine’s frustrated efforts to cultivate cinchona from seeds collected in Guayaquil and Lima, and his own inability to get coffee, cinchona, or American malagueta seeds to grow in Spain.⁵²

A second problem consisted in keeping plants alive or successfully growing them from seeds once they had reached their destination, especially if the climate there differed significantly from that of the region where the plants originated. Although gardeners managed to grow exotic plants from tropical climates in Northern Europe by using heated greenhouses, this costly and time-consuming practice was better suited for decorative blooms than for large-scale commercial exploitation. However, naturalists hoped that problems posed by climatic differences could be solved through a process of “acclimatization.” Linnaeus, a promoter of the idea, was thoroughly convinced of the possibility of growing in Sweden foreign plants including coffee, tea, opium, cinchona, maize,

olives, and many others that turned out to be disappointingly unsuited to northern climates. Local production, he hoped, would put an end to his homeland's need to purchase these products from other European nations.⁵³

More realistically, most European naturalists focused their efforts on transplanting tropical specimens to regions with similar climates, often in colonial holdings. The French established a network of colonial acclimatization gardens in which they grew several valuable natural commodities—coffee, transplanted to Martinique in the late 1720s, being the most successful and envied case.⁵⁴ The British labored for years to convey mangosteen and breadfruit from the Pacific to the West Indies, where they expected to use them as food sources for slaves. After early failures, they managed to transport the plants to the Caribbean in 1793, but did not manage to turn them into the alimentary staple they had hoped for.⁵⁵ Spanish botanists followed their competitors' efforts with interest and concern.

Although Mediterranean Spain would have been much better suited for acclimatization projects than northern European countries, Spanish attempts to cultivate foreign plants domestically were few, brief, and not very notable. The first report that Cuéllar sent to Madrid was accompanied by live plants for acclimatization in the peninsula, among them cinnamon, tea, coffee, mangosteen, tamarind, cocoa, and black pepper.⁵⁶ Andrés Palacio, a postal employee and occasional contributor of mineral samples to the Royal Natural History Cabinet, tended a small acclimatization garden in Cordoba in the 1780s and was able to grow some American plants from seeds he received from Madrid's botanical garden.⁵⁷ Another small garden operated in Sanlúcar de Barrameda, in the southern province of Cadiz, between 1805 and 1808. Run with the involvement of the local Sociedad Económica and concerned almost exclusively with agriculture, this garden was planned as a node within a network of gardens in Chile, Santa Fe de Bogotá, and the island of Tenerife, in the Canaries.⁵⁸ However, it was abandoned after only four years. For the most part, Spanish ambitions favored extracting and importing natural commodities from the colonies over growing them in acclimatization gardens in the Peninsula.

Gómez Ortega did receive many plants from contributors, and he occasionally managed to grow them in Madrid's Royal Botanical Garden. However, the types of American plants cultivated there held little prospects for profit. Few of them were new, many of them were decorative, and those with commercial potential were not exploited on the scale necessary to fulfill it. Their value lay in their foreignness, and the botanical garden used them to strengthen its prestige and its collections by exchanging samples with its growing network of European correspondents.⁵⁹ In this way, the garden increased its European renown and functioned as a strong symbol of the Bourbon monarchy's hold over its imperial domains, but proved as unsuccessful at pursuing economic botany in the peninsula as in the viceroyalties.

Colonial Projects: Peripheries as Centers

Gómez Ortega envisioned a centripetal natural history, imagining trajectories in which specimens and information flowed from all points of the peninsula and the viceroyalties to Madrid. There, the Royal Botanical Garden would function as the nucleus of a unified global natural history network that deployed travelers, administrators, and other institutions like the Royal Cabinet and Royal Pharmacy—a vision that Gómez Ortega shared with Joseph Banks at Kew Gardens and André Thouin at the French Jardin du Roi, among others.⁶⁰ “In this way,” he explained to potential contributors in his 1779 *Instrucción*, “a Botanical Garden becomes the center of correspondence . . . , of useful experiments on Botany and Agriculture, and of the propagation of plants worthy of being multiplied.”⁶¹ If it only were possible to arrange for each ship arriving to Spain from the Canary Islands, Havana, Cartagena, and Buenos Aires to bring a crate with natural products from the region, he longingly suggested, “in a few years we would become the owners of the greater part of the vegetable riches of Spanish America.”⁶²

The trajectory described by Gómez Ortega operates largely according to a classic model of center and periphery. In the study of the production and circulation of scientific knowledge, a similar understanding is implied in Bruno Latour’s influential concept of “immutable mobiles.”⁶³ According to Latour, the production and circulation of knowledge in European expeditions operated cyclically and iteratively. Data were useless “out there”; a voyage’s success depended on mobilizing information to the metropole, the center of the network. While this model is helpful in pointing out the cyclical nature of knowledge production and the importance of networks, standardization, accumulation, and connectedness, it reinforces problematically rigid notions of center and periphery by disregarding colonial science and suggesting that knowledge production takes place exclusively in the metropole, ignoring negotiations between metropole and colony as well as between different colonial territories.

Matters looked rather different to naturalists in the Spanish Americas. For them, the circulation of information and material facts did not resemble the flight of a boomerang, always returning to the center, but rather the back-and-forth of a ping-pong game. Every letter or shipment from one side provoked a reply from the other. Seeds, to give one example, traveled in both directions: the Madrid botanical garden not only received specimens from the Americas but also sent its own shipments to viceregal institutions like the Mexico City botanical garden.⁶⁴ Although Europe always remained the ultimate frame of reference as the source of funding, prestige, and significance, Spanish and Creole naturalists were involved in both metropolitan and local agendas. Based in viceregal cities like Mexico City, Lima, and Bogotá, which had institutions of higher education, printing presses, important private libraries, and active intellectual

and artistic communities, these men found themselves working very much in the thick of things, not at the edge. For Mutis, Ruiz, Pavón, Sessé, Mociño, and Cuéllar, trajectories were multiple, overlapping, and highly sensitive to local interests, emphases, and interpretations.

All across the Hispanic world, men like José Antonio Alzate (in New Spain), Hipólito Unanue and José Eusebio Llano Zapata (in Peru), and Francisco José de Caldas (in New Granada) actively investigated their local nature.⁶⁵ The natural history expeditions, in fact, owe much to viceregal initiatives. Mutis proposed the New Granada expedition to King Charles III of Spain in 1763 and again in 1764, twenty years before the royal orders that officially inaugurated it in 1783. The Malaspina expedition and the botanical expedition to New Spain likewise arose from suggestions from their leaders. Sessé petitioned not only for an expedition but also for a botanical garden in Mexico City.⁶⁶ The botanical garden, Sessé proudly informed Gómez Ortega in a letter requesting European seeds for it, would be equal in size to the one in Madrid, if not larger.⁶⁷

In May 1788, the opening of the Mexico City Botanical Garden was celebrated in a ceremony that included an ambitious firework display.⁶⁸ The public performance, described a week later in the *Gaceta de México*, began with three live papaya trees on stage, two of them female trees with their fruit and flowers, and between them a male tree without fruit. Before amazed spectators, sparks blew from the male to the female trees, representing the transfer of pollen to fertilize flowers. Lighting effects at the foot of the male tree suggested a growing garden, illuminating the scene with bright changing colors. As the trees disappeared, an inscription appeared in fireworks, reading “*amor urit plantas*” (love inflames plants), to celebrate the Linnaean system. As in Madrid, the garden employed a botanical lecturer to provide lessons and demonstrations. Over fifty people turned up to watch Vicente Cervantes, of the New Spain Botanical Expedition, show and describe plants, mentioning their medicinal virtues, economic value, and Greek, Latin, and Mexican names.⁶⁹ Each year the end of lessons was celebrated with a public performance of “botanical exercises” (*ejercicios públicos de botánica*) in which top students identified and described plants presented to them before an audience that included local notables—as was the case also in the peninsula.⁷⁰ Thus, this American garden represented a functional equivalent of the Madrid institution and not a subordinate acclimatization center whose entire purpose consisted in furnishing the metropole with desirable commodities.

The avidity with which local governors encouraged the investigation of their territories and their level of involvement with these projects suggest that administrators had their own reasons to be interested in natural history, beyond their duty to ensure the prompt fulfillment of orders from Madrid. Investigations of New Granadan nature, for instance, began long before the Crown passed its orders to all local administrators in the late 1770s. Mutis’s independent work started in the early 1760s, and local officials and governors prepared reports to

inform the viceroy of natural commodities. Antonio Caballero y Góngora, the viceroy who helped Mutis to obtain official approval for his expedition in 1783, sent in the same year Francisco Armero to the Bee Mountains to investigate rumors of the existence of American cinnamon trees.⁷¹ He also received a report about the potentially useful trees in the province of Novita.⁷² José García de León Pizarro, president of the Quito *audiencia* between 1778 and 1784, obtained a similar report describing the medicinal plants and useful vegetation of the region.⁷³ Throughout the viceroyalties, administrators actively encouraged the exploration of local nature, hoping to identify products that would boost the regional economy by securing profitable trade with the metropole. The impetus for natural exploration originated in situ much more often than in the metropole. It was the Philippines Company and not the Crown that hired Juan de Cuéllar in 1785 with hopes of improving its success as a purveyor of natural commodities. After all, while Madrid issued rather vague directives to explore everything and identify anything of potential value, administrators and naturalists in the colonies were much more aware of local circumstances, opportunities, and dangers, and had considerably more at stake personally, professionally, and economically. Given the scope of activity with local origins and motivations, Madrid at times lagged years behind viceregal projects—twenty years, in the case of Mutis. Similarly, by the time that the Crown issued royal orders in 1799 requiring the governor of the Philippines to encourage the cultivation of cinnamon, pepper, cacao, cotton, and white mulberry tree, as well as the production of silk, local orders to that effect had been in place for over eighteen years.⁷⁴

The emergence of local projects depended largely on the presence and initiative of interested administrators and naturalists. Don José Basco y Vargas, governor of the Philippines, penned in 1781 an *instrucción* to foster pepper cultivation.⁷⁵ He distributed fifty copies of this document to prominent colonists, requesting that they distribute it to planters and implement the measures described for gathering and planting pepper seeds, and growing the plant effectively. Both the instruction and the responses from local notables, such as Diputado Diego García Herreros, demonstrate the participants' intimate knowledge of the pepper trade in the region, not only in Manila but also in Malabar. The timing of the document is suggestive. Basco y Vargas's 1781 instructions present a striking contrast to those published in Madrid by Gómez Ortega only two years previously—indeed, Basco y Vargas likely issued them at least partially in response to the earlier publication. The aims of the two documents are significantly different. The instructions from Madrid directed readers on the methods for transporting specimens from the colony to the metropole, while those from Manila focused on the development of local plantations and the improvement of the local economy. For Basco y Vargas, Madrid represented above all a market for the pepper he intended to produce in the Philippines. Moreover, his reaction to Gómez Ortega's instructions was by no means one of passive diffusion. Basco y

Vargas did not limit himself to transmitting the instructions from Madrid; rather, he responded by authoring his own.⁷⁶ From his perspective, the Philippines were a center, not a periphery.

As with pepper, efforts to exploit Philippine cinnamon began in the colonies, not the metropole. Four months after issuing his own instructions, Basco y Vargas informed José de Gálvez of a project to develop cinnamon plantations. Gómez Ortega also received this document, which was accompanied by plant samples and a drawing.⁷⁷ It was largely to pursue this goal that the Philippines Company was formed in March 1785, importing Cuéllar shortly thereafter. The botanist reported both to metropolitan authorities in Madrid and to the Philippines Company, a situation that at times proved difficult to navigate, given that the company paid Cuéllar's salary but Madrid offered the recognition he desired for his efforts as a botanist, and that local interests expected their investment to pay off handsomely and quickly while metropolitan institutions and authorities repeatedly rejected Philippine cinnamon.⁷⁸ Other Spanish naturalists invariably found themselves in a similar stance, caught between competing demands from two very different masters.⁷⁹ Ultimately, positioning tended to side with geographical location: with Madrid at least a couple of months away by maritime post, local arguments often proved more urgently pressing, and also tended to be more in accord with naturalists' own situations and opinions.

Distance resulted in botanists' establishing stronger relationships and obligations locally than across the ocean, becoming in this way nodes of local networks. Mutis, for instance, developed over the years a widespread circle of contributors in the Spanish Americas—even before the expedition received official authorization from Madrid in 1783.⁸⁰ His many students traveled botanizing in South America, and his collaborators provided descriptions and natural history specimens from different regions.⁸¹ As his reputation as an expert on American natural products grew, more and more correspondents submitted specimens for his evaluation. Most often, collaborators asked him to pronounce authoritatively on the identity of a questionable natural product. To give just one example among countless others, Mutis answered a query from Juan José de Villaluenga, president of the Quito *audiencia*, about whether a product sold in Quito and Bogotá as *goma de Guayacán* was actually that substance. Mutis concluded it was not, adding that very often substances sold in the Americas as cinchona, balsam, ipecacuanha, and other *materia medica* were not those products at all.⁸² By sharing his expert opinion, Mutis fulfilled his own obligation to Villaluenga, to whom he was indebted since the latter was at the time helping him to locate and hire *quiteño* painters for his expedition. To encourage and reward Villaluenga's efforts, Mutis offered to send him some of the indigo seeds he had requested from Caracas.⁸³ Mutis provided Villaluenga with the indigo in mid-1787, in return for which he received alfalfa seeds, which led to a new obligation he fulfilled by sending instructions for using indigo in the dyeing industry.⁸⁴ All the other expe-

ditions also benefited from local contributions and were engaged in comparable networks of collaboration, obligation, and, often, competition.⁸⁵

As naturalists became more and more deeply ensconced in local projects, their priorities and allegiances shifted subtly and gradually from the distant metropole to much more immediate and present concerns. The local character of natural investigations and the economic promise involved often placed naturalists and territories in direct competition with one another: given the Crown's interest in natural commodities, presenting a region as a privileged repository of natural riches offered it advantageous status vis-à-vis other territories. Basco y Vargas's instructions expressed concern not only with seizing the valuable pepper trade from foreign competitors, but also with demonstrating that the Philippines could be the Crown's most useful possession by surpassing the utility of all other viceregal territories and even that of the peninsular provinces.⁸⁶ For his part, the Philippine colonist Salgado, who produced not only cinnamon but also indigo in his estate, complained to Madrid that the monopoly agreement (*privilegio*) he had received on the latter was being broken by Mathias Octavio, an Augustine friar who cultivated the dye in New Spain.⁸⁷ Thus, while the viceroyalties shared a localist attitude that differed in its aims from the centripetal imperial goals of the metropole, there was by no means a single overarching viceregal or Creole agenda. Rather, the multiple localist interests of each region within the empire often placed them in direct competition against one another. The center-periphery models breaks not only through a revision of the relationship between Madrid and the viceroyalties, but also through a reexamination of the interactions among the viceroyalties themselves.

The example of cinchona shows how the search for natural commodities played out in both viceregal and imperial contexts, and involved taxonomic and economic botany. The bark of the cinchona tree—"Jesuit's bark"—was the preferred treatment for malaria, which at the time was endemic in Europe as well as the New World. This made it an enormously valuable natural commodity.⁸⁸ For many years, the only region known to produce cinchona was in the Spanish Americas: Loja, in the Quito *audiencia*. The tree proved extremely valuable to Quito, but administrators locally and in Madrid constantly worried about depleting the existing crops and also wished they could increase production. Nearby regions hoped to produce cinchona locally, to compete with the Loja trade. In 1752, Miguel de Santiesteban, superintendent of the Bogotá mint, was able to identify cinchona in Popayán, New Granada. The following year, Santiesteban presented to the Spanish Crown a proposal for a cinchona *estanco*, that is, a state monopoly on sale of the product. Santiesteban continued his efforts to promote local cinchona over the years. He was the one to first inform Mutis about the presence of the plant in New Granada, and drew an image that Mutis sent to Linnaeus in 1764 along with dried leaf and flower samples.⁸⁹

As the Loja hills of Ecuador became increasingly depleted, New Granada

and Peru—the two other regions where cinchona had been identified—vied for a share of this profitable trade. In the 1780s, Viceroy Antonio Caballero y Góngora and Mutis repeatedly sent the bark of New Granadan cinchona to Spain and attempted to persuade Madrid of its good quality. Caballero y Góngora suggested that cinchona from Loja should be reserved for sale in Peru, the Philippines, and Asia, while New Granadan cinchona should supply the European market. Mutis also promoted a cinchona *estanco*, which he claimed would prevent market speculation.⁹⁰ This project pitted New Granada, which favored the *estanco* that it would supply with local cinchona, against Lima, which opposed the idea in favor of unrestricted free trade. Not surprisingly, the Quito *audiencia* had no intention of letting its two South American competitors affect its profitable business. Loja growers resolved the threat posed by cinchona from Huanuco (Peru) by taking control over production in that region and used their connections with commercial houses in Spain to edge New Granadan cinchona out of the market.

Beyond competition among regional growers, there existed legitimate doubts about the medical effects and botanical identity of Loja, New Granadan, and Peruvian cinchonas. Throughout the 1770s and 1780s, Madrid's Royal Pharmacy performed multiple analyses to assess whether the different varieties were all truly cinchona, while physicians experimented with patients in the Royal Hospitals to establish whether they had equivalent curative properties.⁹¹ In 1785, the pharmacy pronounced Loja and New Granadan cinchona a single species with identical effects. The opinion, however, was contested by the Marquis of Valdecazana, supervisor of royal pharmacies and the king's chamberlain, and several medical reports. Further tests resulted in a compromise, with New Granadan cinchona pronounced inferior in quality to the Loja variety but nevertheless suitable for medical use. However, amid contradictory information that made it impossible to resolve the issue, in February 1789 the Crown suspended shipment of New Granadan cinchona, and moved away completely from the product in September 1790.⁹² Years later, Alexander von Humboldt described the arbitrariness of this decision by protesting that "physicians, like the Popes, drew lines of demarcation on the map" to establish that cinchona growing north of a certain point ceased to be effective.⁹³

The cinchona wars were also waged on the taxonomical front. The issue was not only the relative efficacy of regional varieties but also how many different types of the plant existed. At stake in the discussions about the relative merits of regional cinchona varieties were both local economies and botanical reputations, in the Americas and Europe. Disagreements about cinchona became entangled with old rivalries between Mutis and Gómez Ortega, and with the battle for control over the Royal Botanical Garden being waged in Madrid between Gómez Ortega and Cavanilles.⁹⁴ Ruiz and Pavón sided with Gómez Ortega and with Mutis's rival Sebastián López Ruiz, while Mutis and his former student Francisco Antonio Zea backed Cavanilles. In 1792, Ruiz authored the

first Spanish publication on cinchona.⁹⁵ His *Quinología* publicized the Chile and Peru expedition's discoveries, organizing its findings into seven types of Peruvian cinchona; later he revised his classification to nine.⁹⁶ The following year, Zea challenged their findings, agreeing with Mutis that there were only four.⁹⁷ Ruiz and Pavón derided Mutis's collection as unreliable, attacking his methods. They criticized his long absence from the field and his dependence on students and peons, as well as his use of color as a criterion for distinguishing cinchona varieties.⁹⁸ In 1802 Alexander von Humboldt, traveling in South America and thus able to examine cinchona varieties firsthand, got involved in the discussion. Humboldt sided with Mutis, his host in Bogotá as well as a correspondent for some time. He wrote to López Ruiz that he and Mutis had discovered cinchona independently, but Mutis in 1772 and López Ruiz three years later.⁹⁹

The case of cinchona demonstrates not only the interplay among botany, medicine, trade, and politics that characterized the investigation of natural commodities in the Hispanic world but also the way in which viceregal agendas vied with imperial ones. If Madrid existed as the center of an extensive network of multidirectional, criss-crossing trajectories, it clearly was not the only participant with much at stake on the results of exploring imperial nature. Mexico City, Lima, Bogotá, Manila, and other viceregal centers had as much, if not more, to gain and often competed against one another. But whatever the direction of colonial exchange, a saleable natural commodity continued to elude the Spanish empire.

Conclusion: Natural Commodities and Geographies of Knowledge

Imperial and local agendas often were in enormous tension with one another. Creoles and American-based Spaniards increasingly argued that they were better able to explore and explain American nature, based on personal experience with the territory and deep cultural knowledge—what Jorge Cañizares-Esguerra has termed a “patriotic Creole epistemology.”¹⁰⁰ At times, they contested the validity of European systems for approaching American nature. For instance the Creole polymath José Antonio Alzate, publisher of Mexico's *Gazeta de Literatura*, critiqued Linnaean botanical classification for being based on morphology rather than on plants' properties. He argued that a taxonomy that looked only at a plant's external forms but ignored local knowledge about its uses created artificial categories and relationships—a charge that European critics also made against Linnaean classification. Even worse, Alzate maintained, Linnaean natural history had a global, decontextualizing approach that erased local expertise, resulting in the loss of valuable information.¹⁰¹

Local traditions of understanding and using specimens and local economic interests in exploiting natural commodities often went hand in hand with

a proprietary attitude towards landscape and territory. Enlightened Creoles agreed with European ideals of science as useful to both economic and moral improvement. For them, however, this improvement was connected to a proprietary sense of ownership—Creoles were concerned with the well-being of their *patrias* above all, rather than with the overall health of the empire or the metropole.¹⁰² An article in the *Mercurio Peruano*, a journal published in Lima between 1790 and 1795 by the Sociedad Académica de Amantes del País (“Academic Society of Lovers of the Country”), voiced this Creole patriotic belief. “Scientific expeditions,” the author declared, “should erase the sad memories of bloody expeditions. They lead far-away towns to culture, order, the arts, and countless goods.”¹⁰³ In Mexico City, Alzate voiced the same sentiment in his own periodical, the *Gazeta de Literatura*, explaining that Enlightenment exploration voyages to new lands served “not to destroy, but rather to civilize their inhabitants; not to destroy through blood and fire one’s fellow men, but rather to establish the branches of trade.”¹⁰⁴ Whereas Madrid considered the expeditions a way of reaching back to a glorious past of conquest, power, and profit, in this way renovating and strengthening the empire—conceived hierarchically and predominantly in terms of the metropole—Creoles and American-based Spaniards found in natural history the promise of reconfiguring and moving away from that tradition.

Visual culture had a role in these disputes about global and local knowledges and agendas. Alzate framed his critique of Linnaeus specifically in terms of visibility and observation, which he connected to a misguided global project to collect, name, and order all of nature in a homogenizing fashion. “It is a remarkable thing,” Alzate wrote of Linnaeus, “that the short-sightedness of one man, be he ever so painstaking and observant as we suppose Linnaeus to be, should seek to review the whole globe in order to index it, impose new names, and allot them their proper place.”¹⁰⁵ Alzate criticized Linnaeus using the language of naturalists, chiding him for being a master observer who nevertheless failed to see important information. Historians Antonio Lafuente and Nuria Valverde have characterized these two different approaches to natural history, one global and imperial, the other Creole and viceregal, in terms of the distinction between an interest in species and an interest in space.¹⁰⁶ In the next chapter, I examine how these two approaches played out in pictorial representations of imperial nature.

Visions of Imperial Nature: Global White Space, Local Color



First Glance: Making Visible and Invisible

Mexico City lies in the distance, a spread of minuscule clay-colored buildings punctuated by countless church steeples at the feet of the volcanoes that surround the central valley of Mexico (fig. 5.1). The empty flatness of the landscape leading to the city matches the muddy sky, accentuating the majestic blue mountains that pull our gaze towards the far background. A tree emerging onto the picture from the left—the lone hint of a more fertile nature in the parched dryness of the scene—jolts us back to the immediate foreground. The watercolor performs an exercise in closeness and distance, focusing less on the city than on what lies before it and beyond it. The foreground, much closer to the viewer than to the city, stretches across the image creating a parallel plane to both the city and the mountains. This frontal strip of space is punctuated by groups of people. In the bottom right of the image, two women in a small hut go about their daily chores. Moving from right to left, we see two men struggling with the mules that draw a carriage, a couple with a small child tending animals, and a horse-rider seen from the back. In the bottom left corner, in a privileged space vertically anchored by the tree and physically raised by a small hill, four figures surround a light-skinned man holding a spyglass. His attire and instrument identify him as a Spanish naval officer. He holds the spyglass close up to his face with both hands, bringing the distant city into focus before his eyes.

The Italian artist Juan Ravenet painted this watercolor in 1791. As a member of the Malaspina expedition, Ravenet traveled great distances and went to tre-



FIGURE 5.1. Juan Ravenet (Malaspina expedition), “View of Mexico City from Guadalupe,” 1791, watercolor, 16.3 × 42.9 in (41.5 × 109 cm). Museo de América, Madrid, 02235.

mendous efforts to see and visualize the empire. The expedition sailed from the southern Spanish port of Cadiz and crossed the Atlantic to reach Montevideo, in present-day Uruguay; it continued south along the South American coast, through the strait of Magellan into the Pacific Ocean and back north all the way to the Mexican port of Acapulco (the expedition’s route is charted in fig. 1.2). Disembarking there, the expedition members traveled by land to the central valley of Mexico, where we finally catch up with Ravenet and the man with the spyglass. The object of this long journey was to see and record the city, its inhabitants, and the region’s natural history—and, in the case of the man in the corner, to be recorded in the act of conducting an observation.

A closely related drawing by Ravenet suggests that the artist understood the importance of bringing attention to the travelers as observers (fig 5.2). This drawing in sepia wash is almost identical to the watercolor, with minor compositional differences. The most significant departure is that the group of figures in the lower left foreground omits the Spanish naval officer included in the watercolor. Ravenet and other artists in the expeditions produced many wash drawings of this sort, depicting cities across the empire from Montevideo to Manila. The watercolor, however, is unique in its choice of medium, finished state, and scale—at nearly twice the width of most city views produced by the expedition, it is composed of two separate sheets of paper glued together to provide the artist with a larger surface. Ravenet must have based the larger watercolor on the monochrome drawing. The decision to insert the man with the spyglass, whether made alone or in consultation with a naval officer from the expedition, was designed to call attention to the expedition’s success at making the empire visible.

But Ravenet’s watercolor records both acts of looking and of not looking. Concentrated on his observation, the naval officer remains oblivious to the fig-



ures around him, a barely clad indigenous couple with three children (fig. 5.30). He is surrounded on one side by a small boy who looks up at him with great interest, arms crossed, and on the other by a girl who extends her arm, reaching out towards the man and thus mirroring with her arm the horizontal line created by his spyglass. Physically close, she reaches out to him; at a distance, he visually reaches out to the city. Giving his full attention to the restricted view framed by his instrument, the man in the corner fails to see the ground on which he stands or the people around him. His expert vision represents an achievement both in observation and in willful blindness. This watercolor highlights that the expeditions' selective efforts to make the empire visible always involved rendering parts of it invisible.¹

This chapter explores the connections between making visible and invisible in two modes of visualizing nature—specifically Spanish American nature—in the eighteenth century. The first approach comes from European natural history, as seen in the botanical illustrations created by the Spanish expeditions. These images select portions of a specimen—a branch of a plant, a few leaves, and most importantly the flower and its internal anatomy—and present them on an overwhelmingly white page. This pictorial approach deracinates naturalia, removing local plants and animals from their surroundings through a process of visual erasure that transforms them into decontextualized products that can circulate globally. Botanical illustrations enabled viewers to classify plants according to Linnaean taxonomy, but did not convey much else. This mode of representation was not limited to the Spanish expeditions and colonial investigations, nor to depictions of American nature. It was the shared pictorial language of European natural history as a global cosmopolitan practice.² The published engravings that the expeditions used as models for their work used that same mode of rep-

FIGURE 5.2. Juan Ravenet (Malaspina expedition), “View of Mexico City from Guadalupe,” 1791, sepia wash, 15.6 × 26.2 in (39.5 × 66.5 cm). Museo Naval, Madrid.

resentation to depict plants from around the world. The erasure of geographical specificity is related to an extractive vision of nature and of the relation between Europe and the rest of the world—a vision also articulated in the allegorical representations of the process of natural history exploration that often appeared in the frontispieces to these European books.

This was not the only way of making the empire visible. A second approach can be seen in eighteenth-century Spanish American paintings that provide an alternative to the decontextualizing white space that dominates natural history illustrations. During the same decades in which the Spanish natural history expeditions operated, artists throughout the New World produced paintings that embed flora and fauna in specific locales alongside specific populations. Examples include a series of six *cuadros de mestizaje* (miscegenation paintings) from Quito, casta paintings from Mexico, and a natural history painting of Peru. These works provide an illuminating counterpart to the expeditions' scientific illustrations. Though belonging to a different genre, the American paintings are also a response to the Spanish demand for visual representations of the viceroyalties' naturalia. They are also export art, created expressly to transport distant specimens so that peninsular eyes could see them—in many cases in the very same institutions involved with the expeditions, most notably the Royal Natural History Cabinet. They also relate word and image. And like the expeditions' natural history illustrations, these paintings are profoundly concerned with classification—not the specialized Linnaean taxonomy of the expeditions but a lay taxonomy that attempted to order the natural world, including humans, according to American categories. But in crucial contrast to the white space of natural history illustration, these American paintings fill up the canvas with profusions of local color, insisting on the inalienable interconnectedness of the American territory, flora, fauna, and human populations. Thus, two different visions of American nature emerge from this comparison: one that proposes global white space, another that insists on local color.

Global White Space:

Visual Trajectories and the Erasure of Origins

Early modern European natural history illustrations almost without exception consist of a few traces floating on a sea of white, the overwhelmingly blank page (fig. 5.3). This is as true for the pictorial work of the Spanish natural history expeditions as it is for European natural history in general. Even the painters of the New Granada expedition, who developed a style of botanical representation that innovated upon existing models and included the word “American” next to their signed names, adhered to this norm. Regardless of whether natural history drawings and prints represent plants, animals, or minerals, they show



FIGURE 5.3. Francisco Xavier Matis (New Granada expedition), untitled (*Chaptalia nutans*), undated, tempera on paper, 21.5 × 15 in (54 × 38 cm). Archivo del Real Jardín Botánico (CSIC), Madrid, III, 1156.

decontextualized, isolated specimens in standard views.³ This pictorial convention privileges the material integrity and specificity of the specimen, understood as an object whose value resides in its appearance and its relationship to other objects in a series. Posed upon the page as if they were collected specimens in a cabinet rather than living organisms, more than depicted items are displayed.⁴

This norm is so universally applied that one could be tempted to take it for granted, concluding that this is simply what natural history images look like. But it is worth investigating, because it presents a great paradox. While distant or exotic provenance added to a specimen's value and interest, this rarity

is impossible to deduce from an illustration itself. The very point of making and publishing these images was to place before a viewer's eyes little-known natural objects, often from distant lands. Specimens were collected, described, drawn, and published precisely because they grew in the Americas, Asia, Africa, or the Pacific. The place of origin, however, never featured in their depictions, although textual descriptions could note it. The visual omission is significant. Eighteenth-century natural history insisted on the centrality of visual epistemology, but demanded that views remain partial.

Natural history illustrations acted as visual avatars replacing perishable or untransportable objects that would otherwise remain unseen and unknown by Europeans. More than illustrations or representations, they came to stand in for the objects they depicted, providing European naturalists with visual repertoires that allowed them to gather and compare natural specimens from around the world within the enclosed spaces of their studies. Given the impressive powers of the naturalist's eyes to identify and classify, it is remarkable just how much these trained eyes chose not to see and not to show. The naturalist's gaze was extraordinarily selective not only about what it noticed but also about what it disregarded.

This selectivity is connected to eighteenth-century ideas about the geography of knowledge, and inherent to global—and more particularly imperial—science. Natural history illustrations defined nature as a collection of transportable objects whose identity and importance were divorced from the environment where they grew or the culture of its inhabitants. The Linnaean system proposed a totalizing, universal way of seeing and classifying. It did so quite self-consciously, since neither geographical nor cultural information was relevant to the taxonomic identity of a species. According to Linnaeus, “Native locality does not make a specific difference. Locality neither canonizes nor changes anyone; as the proverb goes, not even a pig is changed by being taken to Rome.”⁵ Images allowed naturalists to reject the local as contingent, subjective and translatable, favoring instead the dislocated global as objective, truthful and permanent.

Naturalists who had previously faced a multitude of competing taxonomies and nomenclatures were relieved when the ascent of Linnaean classification provided them with a single system, a single naming method, and a single visual approach that remained operative regardless of who employed it where. Images showed decontextualized specimens, uprooted from their native soils, expunged from any use or cultural information. In search of global uniformity and validity, European appropriation of distant nature was aided by the selective vision that produced scientific facts through the erasure of the local. The ordered list of Latin names and descriptions and the illustration of isolated specimens on blank pages served to cleanse the soil out of nature, transforming local productions into delocalized natural specimens that could circulate on a global stage.

The extractive vision of global nature that natural history illustrations im-

plicitly propose is explicitly articulated in contemporary engravings that depict the process of investigating nature, as for instance the allegorical frontispieces to natural history books. One example is the frontispiece to Georg Eberhard Rumphius's *Ambonese Curiosity Cabinet* (Amsterdam, 1705) (fig. 5.4), a book that the Spanish traveling naturalists knew well.⁶ The engraving depicts a splendid neoclassical setting within which a scene unfolds in three spatial acts. In the foreground, a bare-chested servant and a putto deliver a rich collection of natural specimens, among them a giant crab, coral, and many large shells, which they deposit just outside a second room. They genuflect at the threshold with their backs to the viewer, entranced by the events that take place within this internal chamber. The archway into this second room is flanked by statues of Neptune, god of the sea, and Cybele, goddess of the fertile earth and of animals, symbolizing the cabinet's holdings from both domains. Inside the second room, a barely clad servant moves diagonally across the picture plane carrying a basket and a box with specimens into the middle ground. There, scholars gather around a table deep in discussion as they examine the objects that were brought to them.

A book sits open on the floor, ready to assist their observations. To either side of the table, large cabinets attest to the magnitude of this project of accumulation. Their doors open to reveal row upon row of drawers, and they are decorated on top with ornamental heaps depicting natural specimens. In a third room in the background, assistants store the collected objects in the drawers of yet another large cabinet. The open windows of this last room provide the barest glimpse of an outside world from which these specimens were plucked and brought indoors.

This engraving encapsulates an eighteenth-century understanding of the processes involved in natural history, namely collection, observation, and classification. Through the use of perspective and the depiction of receding rooms, the engraving also suggests an orderly movement through space, tracing the trajectories of objects as they penetrate the sphere of European science. It corresponds exactly to the way in which naturalists, collectors, and administrators in Madrid expected the Spanish expeditions to work—as did their colleagues at Kew Gardens, the Jardin du Roi, and other comparable European institu-



FIGURE 5.4. Frontispiece to Georg Eberhard Rumphius, *D'Amboinsche Rariteitkamer*, 2 vols. (Amsterdam, 1705). History & Special Collections for the Sciences, Louise M. Darling Biomedical Library, UCLA.



FIGURE 5.5. Engraved portrait of Georg Eberhard Rumphius, in *D'Amboinsche Rariteitkamer*, 2 vols. (Amsterdam, 1705). History & Special Collections for the Sciences, Louise M. Darling Biomedical Library, UCLA.

tions. What is remarkably absent from this idealized depiction of the study of nature is the realm of fieldwork. While the external world does exist, as the windows in the final chamber suggest, it is far from central, almost an afterthought. We encounter natural products already selected, gathered, and transported indoors into the *rariteitkamer* (cabinet of curiosities, or literally, chamber of rarities).

The erasure of the wider world from the frontispiece to the *Ambonese Curiosity Cabinet* is especially significant given that its author spent most of his adult life in the Dutch East Indies, and it was his access to rare exotic specimens that made his work and collections interesting to many European naturalists and readers. The larger world and the distant fieldwork are likewise erased from Rumphius's portrait, also an interior scene (fig. 5.5).⁷ This is also the case with the portraits of José Celestino Mutis and Antonio José Cavanilles (figs. 2.1 and 2.17). Leaving global nature quite literally out of the picture, these depictions make it impossible for the viewer to learn that Rumphius worked in Indonesia, Mutis in New Granada, and Cavanilles in Spain.

Rumphius's work was published at the peak of what Benjamin Schmidt has termed "Dutch exotic geography"—an approach that emphasized the fascinating strangeness of foreign landscapes, peoples, and natural objects, marketed by its Dutch creators throughout Europe (including Spain) in a wide variety of media and formats such as maps, texts, paintings, prints, and collectible objects such as rarities and imported *naturalia*.⁸ However, Rumphius's publication does not belong to this genre. Compare the restrained order of the frontispiece to the *Ambonese Curiosity Cabinet* to the fantastic exoticism of the equally imaginary collection portrayed in the central panel of Jan van Kessel's well-known *America* (1666), an example of exotic geography that forms part of a series on the four continents (fig. 5.6). As Schmidt points out, this depiction of "America" mixes together peoples, creatures, and objects from many different regions: Amerindians, Africans, and a woman wearing an East Indian costume; a set of Javanese gamelan gongs; paintings depicting New World human sacrifice and Hindu suttee; an African crowned crane and two birds associated with Brazil, a macaw and a toucan; American mammals; insects and butterflies from the Old and New Worlds; statues representing both

Tapuya Indians and Brahmins; a suit of Japanese armor positioned near a Brazilian agouti and an armadillo that stands directly in front to the entrance to the room—this, at last, an unmistakable symbol of America, but hardly the dominant figure in the painting. The work presents “a freshly decontextualized, veriginously decentered world . . . sundry bric-a-brac—*admirabilia mundi*, as one writer put it—intended for a vast and cluttered mental cabinet of curiosities.”⁹ This is characteristic of the fungible way in which baroque European collections approached artefacts, decontextualizing them from their original locales and cultures in order to recontextualize them according to criteria such as exoticism, allegorical or interpretative richness, rarity, preciousness, shape, material, and their resonance with other items in display.¹⁰ By contrast, in Rumphius’s frontispiece the exoticism and the distant setting are entirely absent, as is the clutter. Eighteenth-century natural history proposed a vision of global nature based on a diagnostic, taxonomic gaze that functioned to remove strangeness, rather

FIGURE 5.6. Jan van Kessel, *America*, 1666, oil on copper, 19.1 × 26.6 in (48.5 × 67.5 cm). Bayerische Staatsgemäldesammlungen, Alte Pinakothek, Munich.



than accentuate it. In van Kessel's *America*, an example of exotic geography, geography is erased through mixing, lack of specificity, and indeterminacy; in Rumphius's frontispiece, an example of natural history approaches to collecting and visualizing specimens, geography is erased through deletion.

The connections among making visible and invisible, transporting, and centripetal trajectories are likewise suggested in many other eighteenth-century frontispieces to natural history books and accounts of travel to distant lands. Frontispieces frequently use variants of an iconographical trope that presents Europe as a crowned queen who receives gifts from personifications of America, Asia, and Africa—a secularization of the Christian iconography of the adoration of the Magi, in which the Christ child is surrounded by the three gift-bearing kings. For instance, a version of this scene appears in the frontispiece to Engelbert Kaempfer's *Amoenitatum Exoticarum politico-physico-medicarum* (Lemgo, 1712), an account of the author's travels in Persia, Indonesia, and Japan that described the regions' natural history (fig. 5.7). In it, Europe stands before a throne under an elaborate baldachin decorated with the zodiac signs. Accompanied by Zeus in his incarnation as a bull, she receives gifts from Eastern emissaries. These three worldly ambassadors are countered with three other-worldly messengers: Neptune, god of the Sea, who crowns her; Ceres, goddess of the fruitful earth and agriculture, who unfurls a map illustrating the regions described in the book; and Time. Flying above Europe, a putto pokes a spyglass through the drapery in order to peer into the outside world. The window on the left of the image allows the viewer to see some of the "exotic pleasures" that lie outside the room, such as a pagoda.

Another example of this iconography is found in the frontispiece to Carl Linnaeus's *Hortus Cliffortianus* (Amsterdam, 1737), designed and engraved by the celebrated artist Jan Wandelaar (fig. 5.8). In this engraving, allegories of Africa, Asia, and America bring their floral tribute to Europe as personified by Cybele, who is attended by Apollo and Diana. Behind them, Ceres drapes a floral garland around a bust of the wealthy Anglo-Dutch merchant and botanical enthusiast George Clifford, Linnaeus's employer at the time and the owner of the collections described in the book. To the right of the image, both patron and author are honored through the presence of the *Musa cliffortiana*, one of the earliest banana plants to bear fruit in Europe—tended by Linnaeus, in a hothouse in Clifford's garden at Hartenkamp—as well as the subject and title of Linnaeus's first monograph. A plan of the garden appears at the bottom of the scene, next to a putto holding a thermometer, an instrument with which Linnaeus was experimenting in order to better suit the needs of a botanist working in a hothouse.¹¹ Given the connections linking Linnaean taxonomy to economic botany and global exploration, it is particularly significant that the frontispiece to one of his early publications articulates this extractive vision.

This vision of Europe as a botanical monarch receiving floral tribute from



FIGURE 5.7. Frontispiece to Engelbert Kaempfer, *Amoenitatum Exoticarum politico-physico-medicarum* (Lemgo, 1712). Huntington Library.

every corner of the world is common to eighteenth-century natural history, and was shared by the naturalists in the Spanish expeditions.¹² Had they had their choice, they would have surely appreciated similar frontispieces in the books they hoped to publish with results from their travels. But in practice the geography of knowledge was rather less unidirectional: travelers moved back and forth between Europe and the Americas, as did specimens, objects, and words. Just as the Spanish natural history expeditions found their counterparts in American initiatives that pursued economic and taxonomic botany to further local agendas, and Spanish institutions and instructions coexisted with viceregal ones, the geographically neutered natural history illustration was not the only way to en-



vision New World nature. Spanish American paintings from the period also represented nature but rejected global white space, opting instead for local color.

Local Color

The exclusion of all local specificity from natural history illustrations, be it in terms of landscape, geography, human presence, or cultural or social conditions, is particularly intriguing for the Spanish Americas in the late eighteenth century.

During the very same years in which the Spanish natural history expeditions operated, artists working independently from one another in sites across the Hispanic world produced new kinds of paintings that suggested the inalienable interconnectedness of American flora, fauna, human populations, and a patriotically inflected territory.¹³

These works focus on nature to an unprecedented degree in Spanish American painting. In what follows, I discuss three different examples of this innovative kind of approach: *cuadros de mestizaje* from Quito, casta paintings from Mexico, and a natural history painting of Peru. These paintings are no more realistic than their scientific counterparts, in the sense that they do not purport to offer transparent, reportorial statements of fact about Spanish American nature but rather provide highly constructed, selective, and stylized visions that adhere to their own pictorial conventions, among them those of portraiture as a genre. However, they transported a rather different vision of viceregal nature from the one presented by natural history illustrations.

A localist vision of American nature is articulated in a unique series of six untitled canvases that Vicente Albán painted in Quito in 1783, most likely intended for Madrid's Royal Cabinet of Natural History (figs. 5.9 through 5.14).¹⁴ These little-known paintings are commonly called *cuadros de mestizaje* ("miscegenation paintings"), but this is a misleading name given that they do not depict human mixing.¹⁵ The paintings portray local human types posing in lush natural landscapes that also showcase indigenous fruits, flowers, plants, and animals from the region. The level of attention that these works lavish on the region's flora and fauna is rare in Spanish American portraiture.¹⁶ Although *quiteño* art of the period commonly includes floral motifs in borders and backgrounds or as ornament, Albán's paintings are singular in transforming the natural products of the Quito region from decorations into the central subject matter of these works. Here, flora and fauna assume a starring role equal to that held by humans: they are all creatures of the land. Also unusual is the choice to portray the human figures in rural settings, given the lack of a landscape tradition in Spanish American painting. The people in these paintings commingle with Ecuadorean nature and are far removed from viceregal architecture, with the plinth that is present in four of the paintings a rather incongruous relic of the built environments they have left behind.

FIGURE 5.8. (facing)
Frontispiece to Carl
Linnaeus, *Hortus Cliffortianus*
(Amsterdam, 1737). Missouri
Botanical Garden Library,
www.mobot.org.



Each of the works contains an ornately framed cartouche with writing that identifies and highlights various elements. First among them is the central figure in each painting, labeled “A,” who corresponds to the first item of text in the cartouche: an elite male Indian from Quito wearing his finery (fig. 5.9); a female Indian also in finery (fig. 5.10); an elite lady with her black female slave—the only painting that is signed and dated (fig. 5.11); a *Yapanga* from Quito, “in the dress worn by this class of women who try to please” (fig. 5.12); a Yumbo Indian from the vicinity of Quito, “wearing his dress of feathers and wild animal fangs, which they wear as finery” (fig. 5.13); and a Yumbo Indian from the region of Maynas carrying a load of fruits (fig. 5.14).¹⁷ The remaining textual entries in the cartouche identify the various local fruits, trees, and animals in each painting.

The flora of the region, ripe and colorful, is exuberantly presented in fanciful arrangements for visual consumption: in four of the paintings, the fruits are displayed in baskets placed upon pedestals; many of the fruits are sliced open to better reveal their flesh; and in three of the paintings the figures hold fruits in their hands, offering them to the viewer. Like cornucopias, these canvases emphasize abundance without any attempt to indicate ecological relationships. The series format helps to convey a sense of American nature as extravagantly fertile, suggesting through the accumulation of multiple paintings that a single canvas would not have been enough to contain its bounties.¹⁸ The painting of the Yumbo Indian from Maynas (fig. 5.14) also features three animals: a “preaching bird,” a parrot, and a monkey. The fruits and animals are common enough to



FIGURE 5.9. (facing) Vicente Albán, *Yndio Principal de Quito en traje de Gala*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00071.

FIGURE 5.10. Vicente Albán, *Yndia en traje de Gala*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00072.

FIGURE 5.11. Vicente Albán, *Sra. Prinsipal con su negra, Esclava*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00073.



FIGURE 5.12. Vicente Albán, *Yapanga de Quito con el traje que usa esta clase de Mugeres que tratan de agradar*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00074.

FIGURE 5.13. Vicente Albán, *Yndio Yumbo de las inmediaciones de Quito con su traje de Plumas y Cormillos de Animales de Caza de que usâ quando estan de Gala*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00075.

FIGURE 5.14. (facing) Vicente Albán, *Yndio Yumbo de Maynas con su Carga*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00076.





the region that they would not have been considered rare there, but a European spectator would have found them exotic. This suggests that the works were made with a peninsular audience in mind, as does the characterization of a type of strawberry in the painting of the yapanga as similar to “those in Spain but much larger and sweeter” (fig. 5.12).¹⁹

The paintings make an implicit connection between the region’s inhabitants and its flora, fauna, and landscape. The exoticism and abundance of the tropical fruits is matched by the types depicted, four of whom are identified as *indios*. In the first four works, the subjects’ dress is portrayed in meticulous and ornate detail (figs. 5.9 through 5.12). The *indio principal* wears a dark long black vest over a gleaming white shirt with lace cuffs, an elaborate large lace collar that is further adorned by a white cravat with red and black trim, delicate translucent lace pantaloons that reveal the skin beneath, a magnificent red cape with a mosaic-patterned lining that suggests gold embroidery, a black hat adorned with red ribbon, and black shoes with red soles—one of only two figures in the entire series to wear shoes (fig. 5.9). The four women are bedecked in copious amounts of lace, colorful patterned fabrics, hair ornaments, and splendid jewelry of gold, pearls, jet, and coral (figs. 5.10 through 5.12).²⁰ The most soberly attired of them, the *india de Quito* (fig. 5.10), adorns her predominantly black ensemble with lace and embroidery and wears ribbons in her hair, long cluster earrings of pearls and coral, a two-stranded pearl necklace accented with jet, a second beaded necklace, large matching ten-stranded cuff bracelets made of coral (or a red

bead) in either hand, and a large *tupu* or decorative pin to fasten her cloak. The *señora principal* and her black slave, whose jewelry, skirt, and hat are covered in gold leaf, strike a particularly rich note (fig. 5.11). In these four canvases, the selective use of the color red in both clothing and fruit helps to make a further visual link between humans and flora, associating the fertility of the land and the lavishness of human attire.

The last two paintings in the series depict two *indios yumbos*, one from the vicinity of Quito and the other from Maynas (today in Peru), both wearing face paint (figs. 5.13 and 5.14). In contrast to the sumptuously dressed types in the other four canvases, these Amerindians wear very little clothing. The load bearer is dressed only in a pair of short pants of a rough dark fabric, accessorized with a spear in his right hand and a sizable machete in the carrying basket that he has on his back (fig. 5.14). Despite these weapons, he is not a threatening figure but a servile one, the only main figure in the series who is shown performing physical labor. This is also the only painting in which animals feature prominently and are noted in the cartouche. They are all quite large, almost competing with the human figure for a starring role. The animals, and the setting in a landscape that is wilder than any other—perhaps to suggest that of Maynas, in the Amazonian rain forest—situate this Amerindian particularly close to nature. The *yumbo* Amerindian from the Quito region is shown wearing his finery; the term used is *gala*, as in the first two paintings in the series (fig. 5.13). His dress consists of a headdress, short belt skirt, and armbands all made from colorful feathers; a gold hoop earring; a large necklace described as made from the fangs of wild animals, thus demonstrating his abilities as a hunter; and thighbands made of small shells attached to leather bands. He also carries a quiver filled with feathered arrows, a bow, and a long spear. The connection between his attire and the local natural landscape is particularly strong, since he is dressed with items from the birds, animals, and waters of the region.

In this series, a lay taxonomy classifies the human types and relates them to one another. This classification is brought out only through the contrast among the paintings: viewing them comparatively one against the other creates a relational order among the types depicted. Although the paintings are a series—that is, they were created as a group and meant to be seen together—it is unclear whether the artist had a specific sequence in mind for their display. None is indicated in the cartouches or through numeration (the number two, which appears at the bottom center of each painting, is likely a later addition related to the series' presence in a collection). While three of the works focus on males and three on females, they are not presented as couples. Rather than pairing the figures according to sex, the series seems to break into three sets according to social type: a duo of refined Indians, one of urbane ladies, and one of un-Hispanized Indians. These three pairs are distinguished by dress, the landscapes in which they stand, the positioning of the figures and in two of the three instances of the



cartouche as well, and the text describing the contents of each picture. The first pair consists of the *indio principal* and *india*, both of whom wear finery in black with white and red accents. These two lavishly dressed *indios* present a stark counterpoint to the barely clad *indios yumbos*, suggesting the higher social and economic status that is promised through assimilation to the viceregal order. The contrast is made not only between the two pairs of paintings, but also within the first two portraits themselves, each of which includes a small figure in the distance labeled as *indio* or *india de campo* (male or female Indian of the fields): figure E in the male portrait, on the left edge of the painting directly below the tree labeled as C and hard to see among the vegetation (fig. 5.15); and figure C in the female portrait, to the left of the main character, framed between two trees and directly below a red bird (fig. 5.16). Thus, the lavishly dressed Hispanized and urban Amerindians tower over the tiny depictions of field laborers, both of them poorly dressed and bearing loads. Finally, the third pair is actually a triad, composed of the *señora principal* with her slave, and the *Yapanga*, presenting different models of urban femininity. The *cuadros de mestizaje* do not attempt to cover the full scope of human types in viceregal Ecuador, nor to display the novel hybrid forms that are unique to the Americas. Rather, they present a small selection of indigenous fruits and peoples, both of which are deeply rooted in the territory, and emphasize contextualization, providing a full picture that leaves absolutely no white space.

These rare *quiteño* paintings will remind viewers familiar with Spanish American art of a much better known genre: *cuadros de castas* (casta paintings), depictions of interracial families produced in the Spanish Americas in the eighteenth century, for the most part in central New Spain and in one known case in

FIGURE 5.15. Detail of Vicente Albán, *Yndio Principal de Quito en traje de Gala*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00071.

FIGURE 5.16. Detail of Vicente Albán, *Yndia en traje de Gala*, 1783, oil on canvas, 31.5 × 43 in (80 × 109 cm). Museo de América, Madrid, 00072.

Peru (figs. 5.17 through 5.23). Like the *cuadros de mestizaje*, casta paintings were made as sets with multiple works, most commonly sixteen canvases. Many sets, particularly those from the second half of the century, suggest close relationships among American peoples and the fruits, places, and cultures of the region. And, like Albán's paintings, casta portraits transported visions of American nature to Europe.

Scholars have provided rich analyses of casta paintings in relation to vice-regal racial politics, Creole patriotism, and Spanish American art.²¹ Here, I consider casta paintings in relation to natural history illustrations, focusing on their treatment of the fruits of the land—human and vegetal—and of their relationship to the territory itself. There is evidence to suggest that Spaniards in the New World commissioned casta paintings to take or send back to Spain as visual demonstrations of the nature and peoples of the Americas.²² This is the case, for instance, with the single known example from Peru, which Viceroy Manuel de Amat y Juniet (r. 1761–76) sent to Madrid in 1770.²³ Amat's correspondence about this set shows that viewers at the time related works like casta paintings and the *cuadros de mestizaje* to natural history illustrations. Amat presented the paintings as a gift for the natural history cabinet of Prince Charles, the future Charles IV, and described "the mixing of Indians and Blacks" as a noteworthy strand within the remarkable and curious products of the land ("*uno de los ramos principales de raras producciones que ofrecen estos Dominios*"). Two years later, Amat followed up with a second gift for the cabinet, a collection of seven paintings depicting "the fruits that are particular to the region," in this way equating human and vegetal forms, casta paintings and natural history illustrations.²⁴ But while casta paintings and natural history illustrations both propose a relationship between seeing, knowing, and classifying natural types, they evidence sharply divergent attitudes in their preference or avoidance of contextual information versus white space.

Casta paintings focus on the mixing of Spaniards, Amerindians, and blacks in an attempt to provide an idealized racial taxonomy of viceregal society. Each painting within a series depicts a husband and wife belonging to different castas or racial categories, accompanied by their child. A written inscription appears in each painting, either as a label or as a brief textual statement inside a cartouche, identifying the three protagonists with the terms that classified those racial types in New Spain. The series tend to begin with a painting depicting a male Spaniard, a female Indian, and their mestizo or mestiza child. The remaining fifteen paintings in a series will address other mixtures, often correlating casta to social standing, wealth, dress, occupation, physical setting, and at times familial harmony (figs. 5.17, 5.18, 5.22). The very last painting in the series often depicts Amerindians—either Christianized (*indios gentiles*) or not (*indios bárbaros*). Many times they wear feathers and inhabit landscapes of natural wilderness that characterize them as particularly close to nature (fig. 5.19).²⁵



In casta painting, human populations are the naturalia that is subjected to a classificatory gaze.

The common choice to include sixteen canvases in a series is significant, since it alludes indirectly to the four generations that were taken into account to calculate a person's *calidad* (quality) according to the notion of *limpieza de sangre* (purity of blood). The viceroalties inherited this concept from late-medieval and early modern Spanish concerns about *conversos* or “new Christians,” Jewish converts to Christianity. In the New World, the word “casta” came to refer to people of mixed Spanish, Amerindian, and black ancestry, and to be associated to both Spanishness and whiteness, shifting from peninsular preoccupations with religion to American ones with race.²⁶ Casta paintings ordered nature and society into an idealized taxonomy, attempting to minimize one of the great social fears of the higher classes in viceregal societies by suggesting that ethnicity was not uncertain, fluid, and hard to pin down but rather mathematically fixed, rigid, and readily identified through visual inspection. This naturalized social order governed not only race but also gender and age, since the family units often depict the man in a dominant position over his wife, who in turn holds power over the child. While this imaginary taxonomy is not the same classificatory project as the one pursued by natural historians and scientific ex-



FIGURE 5.17. Miguel Cabrera, 9. *De Negro y de India, China Cambuja* (9. *From Black and Indian, China Cambuja*), 1763, oil on canvas, 52 × 39.75 in (132 × 101 cm). Museo de América, Madrid, 00007.

FIGURE 5.18. Miguel Cabrera, 11. *De Lobo y de India, Albarasado* (11. *From Wolf and Indian, Albarasado*), 1763, oil on canvas, 52 × 39.75 in (132 × 101 cm). Museo de América, Madrid, 00008.



FIGURE 5.19. Miguel Cabrera, *16. Indios gentiles* (16. *Heathen Indians*), 1763, oil on canvas, 52 × 39.75 in (132 × 101 cm). Museo de América, Madrid, 00013.

peditions, there is a shared belief in visual epistemology as a tool for knowing and for imposing order.

The paintings often go beyond portraying the human types to provide idealized tableaux of viceregal life, often in urban settings, that show details of home interiors, local manufactures, and in many cases flora and fauna from the region. Clothing is often depicted in meticulous, lavish detail, both to show the wealth and abundance of the colony and as a particularly precise marker of class.²⁷ Overall, there seems to be greater interest in depicting the castas that result from the successive mixing of Amerindians and blacks, with white Spaniards



FIGURE 5.20. Unknown artist, 12. *De Tente en el Aire y Mulata, Albarrazado* (12. *From Hold Yourself in Midair and Mulata, Albarrazado*), ca. 1775–1800, oil on canvas, 14.2 × 18.9 in (36 × 48 cm). Museo de América, Madrid, 00061.

appearing in a minority of the canvases—that is, while Spaniards always feature in the earlier paintings in a series as they mix with Amerindians (to produce mestizos), blacks (to produce mulatos), mestizos (to produce castizos), and castizos (to revert back to Spaniards), in many cases they tend to disappear as the series progresses, with the latter paintings focusing on skin darkening rather than lightening. While it is hard to speak of absolutes given the great number of existing casta paintings, these generalities serve to characterize the genre.

Given that casta paintings portray local categories of social order, and present them as deriving from a natural order, it is highly suggestive that people are at times accompanied by local fruits—this is particularly the case for works produced in the second half of the century, which coincides with the height of Spanish natural history investigations.²⁸ Though casta paintings are genre scenes and not natural history illustrations, in various series some of the canvases feature a great number of local fruits that at times are labeled with their names, just like the human types (see for instance figs. 5.17 through 5.19). This distinguishes casta paintings from contemporary New Spanish portraiture, which does not establish such close relationships among humans and natural products. An unsigned casta painting from the last quarter of the eighteenth century includes two cartouches, one identifying the human types and the other detailing twenty-six different *frutas de la Nueva España* through both word and number—the artist, unable to fit all fruit names within the cartouche in the right, had to include the last few at the bottom of the cartouche on the left (fig. 5.20).



Two casta paintings from a series by Andrés de Islas, ca. 1774—one of them depicting a scene of domestic discord—likewise devote great space on the canvas to the presentation of numerous fruits, each individually identified in writing (figs. 5.21 and 5.22). The fruits represented in casta paintings, like the humans, are characteristic of the region. As in the quiteño *cuadros de mestizaje*, they are the type of products that would have been well-known in New Spain but highly exotic to European viewers—pineapple, plantain, zapote, chirimoya, jicama, mango, guava, and chayote. The paintings draw strong associations among the people, the fruits, and the territory, portraying them as tightly interrelated rather than separate from one another.

The desire to localize is particularly in evidence in a casta painting by Luis de Mena, produced in Mexico City around 1750 (fig. 5.23). This is an example of a casta painting that gathers multiple scenes into a single canvas, rather than providing sixteen separate ones as is much more common.²⁹ In it, Mena provides a highly localist vision of New Spain, drawing an explicit connection among human types, the fruits of the land, and the territory as portrayed through symbols and places with cultural, religious, and social patriotic significance. The painting is divided into four horizontal strips of roughly equivalent size. The

two rows in the center are further partitioned into eight compartments, each containing a mixed casta couple and their offspring. Small legends under every cell identify the human types represented. Though the casta families occupy the central half of the canvas, they are considered in connection to other natural specimens and to places and traditions particular to the region. The bottom row showcases Mexican fruits, as depicted in other casta paintings but here with a more prominent role since they are equal in size to the human beings. They include the avocado, pineapple, plantain, and mamey. Like the humans, they are also annotated with text and numbers. On the top row of the painting, at its very center, the Virgin of Guadalupe presides over the entire composition. She is surrounded by views of two well-known sites in the outskirts of Mexico City. The scene on the left shows the Virgin's sanctuary in the Tepeyac Hill, built earlier



FIGURE 5.21. (facing; left) Andrés de Islas, No. 13. *De Tente en el Aire y Mulata, nace Albarasado* (No. 13. From *Hold Yourself in Midair and Mulata, is born an Albarasado*), ca. 1774, oil on canvas, 29.5 × 21.3 in (75 × 54 cm). Museo de América, Madrid, 1980/03/13.

FIGURE 5.22. (facing; right) Andrés de Islas, No. 4. *De Español y Negra, nace Mulata* (No. 4. From *Spaniard and Black, is born a Mulata*), ca. 1774, oil on canvas, 29.5 × 21.3 in (75 × 54 cm). Museo de América, Madrid, 1980/03/04.

FIGURE 5.23. Luis de Mena, *Casta Painting with the Virgin of Guadalupe, Mexican Scenes, and Fruits*, ca. 1750, 46.8 × 40.6 in (119 × 103 cm). Museo de América, Madrid, 00026.

in the century, before which a “Dance of Matachines” takes place in her honor (as the legend clarifies). The scene on the right depicts the Paseo de Jamaica, a popular promenade along a canal navigated by colorful canoes, where Spaniards and Creoles could spend a day of leisure seeing and being seen.

Mena’s work is unique among casta paintings in featuring the Virgin of Guadalupe, a highly localist, patriotic, and timely reference. Although the cult of this incarnation of the Virgin Mary arose in Mexico in the sixteenth century predominantly in connection with indigenous converts, in the seventeenth and eighteenth centuries it became increasingly associated with the Creole elites and their growing sense of patriotic pride. A campaign to obtain recognition for Guadalupe as the primary Virgin of New Spain began in 1648. After the Virgin’s alleged miraculous intercession in the plague epidemic that ravaged central Mexico in 1737, Creole efforts to have her named patroness of the viceroyalty succeeded in 1746, around the time Mena painted this work. The measure received papal ratification in 1754.³⁰ Thus, the presence of the Virgin of Guadalupe and of her sanctuary in this painting would have clearly registered for viewers as intensely local symbols, and perhaps also as ones particularly related to Creoles. This localist, patriotic agenda is by extension applicable to the Mexican fruits in the work.

In this way, the painting brings together the human types characteristic to the region, the fruits from the land, prominent sites near Mexico City, and the Virgin of Guadalupe, that most powerful symbol of New Spanish Creole patriotic identity and pride. Connections are established through proximity and relation, but despite the painting’s multiple combinations—of various human types in the depiction of castas; of diverse artistic genres in its inclusion of portraits, a religious painting, two views or genre scenes, and a *bodegón* or still life—the effect is not of all-out mixing but rather of precise, compartmentalized order. The painting thus achieves a balance between integration and separation, mixing and order.

A most dramatic example of the ways in which pictorial statements that transported Spanish American nature to Europe insisted on the connections among human populations, social order, natural products, and territory is the *Quadro de Historia Natural, Civil, y Geográfica del Reyno del Perú* (“Painting of the Natural, Civil, and Geographical History of the Kingdom of Peru,” fig. 5.24).³¹ This unique and spectacular painting was completed and signed in Madrid in 1799 by an artist with a French surname, Luis Thiebaut, using American sources provided by his patron, José Ignacio Lequanda. Born in the Basque city of Viscay in 1747, the young Lequanda traveled to Peru in 1768 together with his uncle, Baltasar Jaime Martínez Compañón, who would go on to become bishop of the province of Trujillo.³² Lequanda remained in Peru for the next twenty-eight years, becoming part of the viceroyalty’s administrative and intellectual elite. He held various positions in the colonial financial administration, accompanied

Martínez Compañón on his *visita* (administrative review tour) through the province of Trujillo, and wrote several demographic and economic accounts of Peruvian regions, some of which he published in the Lima journal *El Mercurio Peruano*.³³ Lequanda formed part of a circle of enlightened intellectuals deeply concerned with the relationship between the political and economic well-being of the viceroyalty and its natural resources, commerce, and industry—a group that included both Creoles and peninsular Spaniards.³⁴ In 1796 Lequanda returned to Spain, having lived more than half of his life in Peru: he was twenty-one when he arrived and forty-nine when he left. Back in Europe, Lequanda seems to have spent the next year or so traveling in Spain and France, where he visited the royal cabinets of natural history. In March 1798 the Council of the Indies granted Lequanda the top post in the Lima Tribunal de Cuentas, but he never managed to take this position; he died in Madrid in 1800.³⁵

Lequanda surely commissioned the *Quadro del Perú* as a patronage gift to thank the Head Secretariat of the Indies Treasury (Suprema Secretaría de la Real Hacienda de Indias) for his new position. The painting's enormous size—it measures approximately 45¼ by 128 inches (115 by 325 centimeters)—adds to its visual impact, and suggests Lequanda's intention to have it displayed in a large public space where it would impress viewers both through its scale and through the various images and information it contains. Meant for the eyes of peninsular administrators, the painting is a testament to Lequanda's lengthy firsthand experience in Peru, to his interest in political economy, and to his administrative experience and ambitions. It functions as a microcosm of the viceroyalty of Peru, providing an encyclopedic overview that connects its territory, history, population, social order, and natural history. There is not a single overall composition but rather distinct complementary sections, all of which are in turn mosaics of smaller figures. A vertical axis divides the painting into two symmetrical sides. The very center of the work is occupied by a geographical map of Peru and a view of the mine of Gualgayoc or Chota, thus emphasizing the importance of mining to the viceroyalty (fig. 5.25).³⁶ To each side of the map and mine we find thirty compartments with images of animals and plants, and two larger boxes with water creatures. The cells directly underneath the aquatic creatures show intermediate forms between terrestrial and aquatic animals, such as the iguana, the sea wolf, and the river wolf (figs. 5.26 and 5.27).

At the top of the painting, a long horizontal strip depicts thirty-two human types. The sixteen figures on the left are termed “civilized nations” (*naciones civilizadas*, fig. 5.28), and the sixteen on the right “savage nations” (*naciones salvajes*, fig. 5.29). Most of these human types are presented in male-female pairs, although as with the *cuadros de mestizaje* and unlike in *casta* paintings the focus is on isolated types rather than on interbreeding. These images provide a complex ethnic and social gradation of viceregal society. The “civilized nations” include different Amerindian populations, African and American blacks, mulatos,



FIGURE 5.24. Luis Thiebaut, *Quadro de Historia Natural, Civil, y Geográfica del Reyno del Perú*, 1799, oil on wood, Madrid, 45.3 × 128 in (115 × 325 cm). Museo Nacional de Ciencias Naturales, Madrid.



FIGURE 5.25. Map of Peru and view of the mine of Gualgayoc or Chota, detail of Luis Thiebaut, *Quadro del Perú*, 1799 (fig. 5.24).

FIGURE 5.26. (facing; top) Animals and plants (left side), detail of Luis Thiebaut, *Quadro del Perú*, 1799 (fig. 5.24).

FIGURE 5.27. (facing; bottom) Animals and plants (right side), detail of Luis Thiebaut, *Quadro del Perú*, 1799 (fig. 5.24).







FIGURE 5.28.
 “Civilized nations,” detail of Luis Thiebaut,
Quadro del Perú, 1799 (fig. 5.24).



FIGURE 5.29.
 "Savage nations," detail of Luis Thiebaut,
 Quadro del Perú, 1799 (fig. 5.24).

and Creoles from Lima. Unlike in casta paintings, no Spaniards are included, as if none were present in Peru—the focus is on autochthonous forms, not imports. All of the “savage nations” are Amerindians, treated as noble savages. They may not have adopted Christianity, but they are not the bestial cannibals we know from sixteenth-century European depictions of New World inhabitants—this is true even of a figure who is described as belonging to a tribe of ruthless anthropophagous warriors who not only eat the flesh of their enemies but then wear their shrunk hearts in a necklace.³⁷ The painting’s perimeter consists of eighty-eight cells showing images of birds and plants, which act as a frame; the four corners depict insects. Overall, the *Quadro* amounts to an encyclopedic collection of 214 individual images, which provide a detailed inventory of the territory, fauna, flora, and human inhabitants of Peru, creating an insoluble bond among these various elements.³⁸

This comprehensive collection is rendered through both images and words. In addition to its multiple pictorial elements, the work also contains a staggering quantity of text: everything that looks like white blank space from a distance or in a reproduction is actually filled out with minuscule writing, whose transcription occupies sixty single-spaced published pages. The *Quadro*’s loquaciousness and the close relationship between textual and visual material is such that this work functions not only as a painting, but also as a manuscript illustrated book, albeit one that is written in miniature on a single magnum canvas page and has oversized images. As in the *cuadros de mestizaje* and casta paintings, text is of central importance to the *Quadro*’s task of documenting, authenticating, and transporting information across distances.

The textual portion of the painting begins at the top center of the image, where a dedication written in black ink on a white background functions as a heading, providing the title of the work and the names of the artist who painted it, the patron who commissioned it, and the institutions to which it was offered. Below it, a textual introduction entitled “Preliminary Discourse” describes the painting as divided into three parts. The first covers “physical geography,” while the second discusses “several establishments that men have created and the political divisions into which they have partitioned the land,” detailing the number of inhabitants in each region of Peru as well as the natural products there that can be used in industry and for commerce. The third and final part treats natural history, providing images of “the rare animals of this part of America.”³⁹

Directly below this preface, a band of writing forms a textual belt all around the central elements of the painting. The top portion is divided into ten compartments, each on a different topic. They narrate the history of Peru from the founding of the Inca empire to the end of the eighteenth century, indicating notable events; assess the state of commerce and mining, describing the temperament of its inhabitants; and provide individual accounts of the *intendencias* of Trujillo, Lima, Arequipa, Tarma, Puno, Guancavelica, and Guamanga. The vertical col-

umn on the right gives an account of the *intendencia* of Cuzco, while the vertical column on the left and the bottom row provide information about each of the birds and plants that form the outer frame of the painting. The two columns of text on either side of the image of the mine address the importance of mining to the Peruvian economy, list all the active mines in Peru at the time as well as their annual productivity and economic yield, and recommend reforms to the labor organization. The map and the view of the mine are also accompanied by a written commentary, and each one of the 212 remaining images has a small cell underneath with written information about it, in the manner of captions.

In terms of natural history, the plants described and depicted have medicinal uses, commercial value, or ethnographic interest. The information given about animals is also highly anthropocentric. Although each box depicts both an animal and a plant, no environmental relationship is suggested between them, nor is there an attempt to indicate their size, present them at an accurate scale, or represent their habitat. There is certain interest in grouping animals into classes—for example, the top row on both the left and right sides show monkeys—but the only attempt at classification is the division of human types into civilized and savage. This is lay natural history, providing vernacular names and information and unconcerned with Latin names or with taxonomy. It is not the totalizing vision of Linnaean natural history that seeks to survey the flora and fauna of a region, detailing all the species found in Peru, but rather a selection based on local experience that is exclusively concerned with plants and animals whose interest lies in their utility or curiosity. The guiding impulse is to emphasize the biotic wealth of the territory through sheer volume and to point out the curiosity of many of the animals and plants included.

The *Quadro del Perú* shares this focus on abundance, variety, and curiosity with natural history cabinets of the time. This connection is also made through the painting's structure. While the multiple visual and textual sections that comprise the *Quadro del Perú* are related to one another, they do not form a single composition or provide a linear narrative. Each figure is framed by a rectangular outline that compartmentalizes it, dividing the work into multiple boxes that contain and separate.⁴⁰ There is a relationship of proximity among the different elements, but it is not explicit. The painting functions as a large collection—indeed, it is organized according to the very same principles of early modern natural history collections, and was probably linked to them; we know that Lequanda visited the cabinets in Paris and Madrid upon returning to Spain and before the work was completed. Thus, the *Quadro del Perú* can be considered as a painting, as a text, as a collection of useful and curious objects, and as the crate that transported all of these elements from Peru to Madrid, evidence both of the viceroyalty's bounty and of Lequanda's expertise.

However, although the *Quadro del Perú* functions as a visual statement, as a manuscript, and as a collection—image, word, and thing—it is important to

recognize that Lequanda chose to demonstrate his expertise as well as his gratitude to the Indies Treasury in the form of a painting. After writing a detailed treatise on Peru, Lequanda hired the artist Thiebaut because he understood well that the most powerful way of conveying South American nature to Madrid was by pictorial means. While images often traveled in the company of objects and words, in the eighteenth-century Hispanic world visual epistemology reigned triumphant. Images were considered the privileged medium for collecting, ordering, and transporting information about nature. This is true across regions and genres, and applies to the *Quadro del Perú* as well as to casta paintings and the *cuadros de mestizaje*, all of which were created primarily for Spanish audiences. It is also the case with the expeditions' natural history illustrations. Despite their differences, these were all moving images whose goal was to transport American nature across distances so that it could be viewed by European eyes.

Conclusion:

Moving Images, Visibility, and Invisibility

This chapter has outlined two different pictorial approaches to the depiction of Spanish American nature in the second half of the eighteenth century, one characterized by white space and the other by local color. The illustrations from the Spanish expeditions exemplify the first mode, which deployed the expertly trained eyes and hands of naturalists and artists to produce highly selective visions of decontextualized specimens, allowing for their inclusion in global natural history. By contrast, works such as the *cuadros de mestizaje*, casta paintings, and the *Quadro del Perú* present a rather different approach to Spanish American nature. Though not realistic portrayals of ecological relationships, they nevertheless insist on the interconnections among peoples, flora, fauna, history, social order, and territory. They provide vernacular and highly localized names, information, and taxonomies based on deep knowledge of a region, its culture, and its history. They evidence local concerns and agendas, whether about racial mixing or the current state of mining. They exult in the variety and richness of local forms, providing visions of orderly societies in which every person has his or her place and stays in it, and of fertile regions overflowing with useful plants, delicious fruits, and curious animals. They embed and contextualize, filling out white space with local color.

These two visions of Spanish American nature are the two faces of a coin, alternate but not separate, opposed but not contradictory. They shared a common objective: to visualize, collect, classify, and transport Spanish American nature, making it visible across distances. The approaches were not incompatible, and in some cases were even related. Some of the figures in the *Quadro del Perú* adapt works by members of the Malaspina expedition who were in the region

at the same time as Lequanda, indicating that Thiebaut must have had access to either the original drawings or to copies in Lequanda's possession.⁴¹ And it appears that Mutis, director of the Royal Botanical Expedition to New Granada, commissioned Albán's *cuadros de mestizaje*. Albán worked in Quito, and Mutis had connections with several of the city's renowned artistic workshops, which he mined for painters for his expedition. His direct involvement would explain why the *cuadros de mestizaje* transform floral motifs from the decorative elements often found in *quiteño* art into a central subject of these unique paintings.

A letter from March 1784 in which Mutis mentions a public viewing of "my natural history oil paintings" at court supports this interpretation, given that the expedition's botanical illustrations were not done in that medium and no other oil paintings from the region in that period can be described in those terms.⁴² The timing and courtly setting are also suggestive. Mutis received royal approval for his botanical expedition in 1783, in part thanks to the intercession of Viceroy Caballero y Góngora. It is thus likely that he commissioned the *cuadros de mestizaje* to thank his patrons in Bogotá and Madrid, intending the works for the Royal Natural History Cabinet—in much the same way that the *Quadro del Perú* and the Peruvian casta paintings were sent to the cabinet and other peninsular institutions.

Such connections between the two modes of depicting American suggest that visibility and invisibility are closely related, as Ravenet's watercolor view of Mexico City reminds us (fig. 5.30). The naval officer depicted in this work uses a spyglass to see more—the instrument allows him to observe up close Mexico City at a distance—and also to see less—this magnified and highly focused view excludes from his sight his immediate surroundings and the people who inhabit them. As a symbol for the expeditions, the man in this watercolor highlights the relationships between traveling and observing, seeing and transporting, as well as the use of visual epistemology to bridge closeness and distance. But he also demonstrates the need for visual selectivity, for ignoring as well as perceiving. The watercolor articulates both presence and erasure, white space and local color. As we examine the painting, analyzing what it shows and does not show, as viewers we are implicated in the problem of inclusion and exclusion, seeing and not seeing that the work poses. The empire has traveled to us across space, time, and medium, at once visible and invisible.



FIGURE 5.30. Detail of Juan Ravenet, "View of Mexico City from Guadalupe" (fig. 5.1).

CONCLUSION

The Empire as an Image Machine



In the last decades of the eighteenth century, the Hispanic world buzzed with scientific activity. A flurry of expeditions criss-crossed the empire surveying, collecting, and documenting its natural history as part of a process of reassessing and rediscovering kingdoms that though long-held remained in crucial ways half-known.¹ In addition to these travelers, throughout the viceroalties local institutions and a wide cast of characters that included both Europeans and Americans participated in a concerted effort to identify useful and valuable natural products. This large-scale investigation of imperial nature was linked to administrative reforms that sought to counter political and economic pressures through new policies that addressed trade, agriculture, and useful industry, among other aspects. In the Hispanic world, these attempts at imperial renovation through useful science were framed not only within the context of Enlightenment ideologies and policies but also as the continuation of ventures that had taken place at a glorious moment of imperial expansion in the sixteenth century. Thus in the 1780s Spanish naturalists like José Celestino Mutis and Martín de Sessé saw their investigations of American nature as direct extensions of the pioneering work of physician Francisco Hernández, who had led the first European scientific expedition to the Americas two hundred years earlier.

The expeditions pursued three related goals, the first of which was economic botany. In a climate of fierce economic and political competition among European nations vying for primacy as commercial and imperial powers, botany appeared particularly well-suited to fulfilling ambitions of controlling trade in useful and valuable natural commodities. Eighteenth-century European botanists—in Spain and elsewhere—promised administrators that they could identify desirable plants throughout the world and if necessary successfully transplant

them to other locations, convincing their patrons of the need to fund expeditions that would exploit items such as coffee, tea, spices, and medicinal plants. Casimiro Gómez Ortega, director of Madrid's Royal Botanical Garden, assured the Spanish imperial administration that its vast and fertile territories must surely hold valuable botanical commodities like cinnamon, pepper, tea, and nutmeg, which would allow Spain to compete with the valuable Dutch trade in eastern spices, British profits from tea, and French successes with coffee transplantation. He followed with interest and concern activities at the Jardin du Roi in France and Kew Gardens in England, emulating their examples and seeking to outdo them. Meanwhile, Britain and France cast envious glances at the Spanish monopolies in cinchona and cochineal, two valuable American natural commodities that they attempted to locate in their colonial holdings or to steal away from the Spanish Americas. Spanish botanists, however, failed to deliver on their economic promises.

The expeditions proved much more successful at fulfilling their two other objectives, namely taxonomic botany and collecting. With the ascendancy of the Linnaean system of classification and the increasing access to non-European flora provided by imperial and commercial voyages, European botanists in the second half of the eighteenth century embarked on a global mission to survey and classify all the world's plants. Spanish botanical expeditions were in good company: Linnaeus sent young students to various points in Europe, Asia, Africa, and the Americas; the French naturalist Philibert Commerçon took part in Louis Antoine de Bougainville's circumnavigation expedition (1766–69), botanizing in Tahiti, Mauritius, and Madagascar; and the British naturalist Joseph Banks participated in Captain Cook's first voyage (1768–71), among many other travelers. Spanish naturalists, however, had privileged access to the Spanish Americas. Other European naturalists followed their work with anticipation and great interest.

Scientific voyaging was expensive, uncomfortable, exhausting, and dangerous, when not altogether deadly. Many of Linnaeus's "apostles" succumbed to feverish tropical deaths; Commerçon perished in Mauritius; the Ecuadorian Creole naturalist Antonio Pineda, of the Malaspina expedition, died in the Philippines, not to mention Captain Cook's infamous and contested demise in Hawaii. As Mutis explained, cabinet naturalists who stayed behind in Europe simply had no idea of what their traveling colleagues endured. Not one to mince words, Mutis described the "unspeakable hardships that the toilsome study of Nature entails":

Savants, in their cabinets or in schools, spend their days in great comfort, gathering the fruit of their diligence without moving. A traveler must spend a great part of each night ordering and describing what he gathered in the field during the day, and this after having suffered the conditions of that Season; the roughness and pitfalls

*presented by the ground he surveys, which tend to be greatly varied; the discomfort of insufferable insects that surround him everywhere; the frights and dangers of many poisonous and horrible animals that at every step scare him, terrify him about the austerity of a truly austere and boring life that through heats, moors, and deserted places breaks down and wears out his body.*²

Travelers often emphasized such rigors in their writings, in part as a rhetorical strategy to claim a privileged capacity to know and understand the territories they so laboriously explored. Bougainville wryly described himself as “a voyager and a seaman; that is, a liar and a stupid fellow, in the eyes of that class of indolent haughty writers, who in their closets reason *in infinitum* on the world and its inhabitants, and with an air of superiority, confine nature within the limits of their own invention.” His compatriot Jean-François de Galaup, Count of La Pérouse—a naval officer who in 1788 disappeared in the Pacific along with all the members of the circumnavigation expedition he led—derided “the system makers, who sit down in their closets, and there draw the figures of lands and islands.”³

La Pérouse’s allusion to drawing figures was no accident. As I show in this book, natural history was premised on visual epistemology and focused overwhelmingly on visual materials in its practices, techniques, and results. Carefully trained as expert observers, naturalists embarked on voyages with the explicit task of looking. The orders given to pharmacist Jean-Baptiste-Christophe Fusée-Aublet as he set off to explore the natural history of the French American colony of Guiana put it succinctly: “The whole purpose of your mission must be to see everything and to examine everything.” But seeing and examining would be pointless if those observations were not recorded and communicated. According to Aublet, the most significant problem with European knowledge of American flora in the late 1750s was that the majority of available images and textual descriptions were inaccurate or incomplete. Naturalists, he urged, desperately needed more exact and complete figures and descriptions, and for these they depended on travelers who could observe, describe, and illustrate accurately and appropriately.⁴ Such travelers were not only naturalists but also artists, whose representational skills were essential for capturing foreign nature—or, more precisely, naturalists’ observations of foreign nature—in the form of pictorial embodiments that transported it across distances. The Spanish expeditions, with their lengthy stays in the Americas, access to local resources and expertise, and incomparable artistic workshops were uniquely poised to satisfy the European demand for depictions of New World flora. As an awestruck Alexander von Humboldt explained after visiting Mutis in Bogotá and witnessing the pictorial work of the New Granada expedition, no one had ever compiled such a magnificent collection of drawings, nor one on a grander scale.⁵ Humboldt paid homage to Mutis’s accomplishments by dedicating the botanical section of his

multivolume publication about the voyage, the *Plantes équinoxiales* (2 vols., Paris, 1808–17), to him “as a simple mark of our admiration and acknowledgment.”⁶

Mutis knew well that European naturalists prized above all an expedition’s images, provided that they included all the information necessary for identifying and classifying plants within a global Linnaean inventory. Pictorial depictions conveyed foreign nature in stable form back to Europe, allowing cabinet naturalists to conduct firsthand observations at a distance. Thus botanists Antonio José Cavanilles in Madrid and Augustin Pyramus de Candolle first in Montpellier and later in Geneva used some of the Spanish expeditions’ illustrations to observe, classify, and publish descriptions of new American plants without ever crossing the Atlantic. Because the images had traveled, these botanists did not have to.

Given the importance of visual materials, the Spanish naturalists dedicated great attention to hiring, training, and supervising artists, looking over their shoulders as they worked. Naturalists used printed images to interpret what they saw as they traveled, and also as models to indicate to their artists exactly what a standard botanical illustration should show and how it should look. Mutis and his artists went further, devising over time a unique style that departed from printed models. For Mutis, the exploration and representation of American nature was a competitive sport, and he proudly enthused that his artists’ images surpassed even the most prestigious and exquisite European botanical art of the time. His artists seem to have shared that pride, signing their works not only with their names but also by identifying themselves as American painters.

If visual culture was integral to European natural history in general, it carried an additional valence within the Hispanic world, where images had a long tradition as particularly powerful and persuasive evidence both locally and at a distance. Thus, the expeditions shared the goal of depicting the empire’s nature with other pictorial informants. New genres of paintings produced at the time throughout the Spanish Americas pay unprecedented attention to natural history themes. Works like Vicente Albán’s *cuadros de mestizaje* series from Quito, casta paintings from Mexico, and the *Quadro de historia natural* of Peru showcase regional flora, fauna, geography, and human populations. However, while natural history illustrations provide highly selective visions of decontextualized specimens, in this way permitting their inclusion in global natural history, these paintings instead embed and contextualize, suggesting inalienable connections among the plants, animals, and people of a region and filling out white space with local color.

Spain had a prodigious visual appetite, incessantly requesting images from its Indies; the viceroalties, in turn, knew well that pictorial arguments carried special weight and sent images not only in response to peninsular demands but also of their own accord, to make themselves seen and in this way heard.⁷ Thus, the enormous pictorial corpus I address in this book—about twelve thousand natural history illustrations produced by the scientific expeditions, over a thou-

sand known casta paintings, the six-piece *cuadros de mestizaje*, the collection of hundreds of miniature images in the *Quadro del Perú*—is far from exhaustive, even for the period 1770–1808 alone. Multiple individuals responded to Madrid's requests for images, objects, and written information about viceregal nature, showing the great ambition and enormous success of this project to make the empire visible.⁸ Many of these visual and material collections remain underexamined and await further study by scholars exploring the connections among visual culture, empire, and science. Considered together, these extensive pictorial collections make clear the central importance of visual epistemology and of traveling images to investigations of imperial nature in the eighteenth-century Hispanic world. The Spanish empire functioned as an image-making machine, churning out illustration after illustration so that imperial nature could be collected, classified, transported, and seen both locally and across distances.

Visibility, however, often went hand in hand with invisibility. At times this was intentional, as in the conventions of scientific illustrations that selected only certain elements for view and disregarded many others. At other times this was accidental and far from desired: the expeditions' thousands of visualizations of imperial nature were not widely seen at the time. The original watercolors and tempera paintings were kept in Madrid's Royal Botanical Garden and shown only to a few experts, as was the norm at the time. Ideally, these originals would have served as the basis for engravings through which the Spanish travelers would have shared their observations and discoveries. But the naturalists for the most part did not manage to fulfill their dreams of publishing lavishly illustrated floras. The factors that prevented publication are so many as to form a perfect storm that includes the shortage of skilled engravers, the enormous funds necessary to produce this type of book, the deaths of many of the travelers and political difficulties of others, the French invasion and occupation of Spain between 1808 and 1813, and the beginning of the independence wars in the Spanish Americas in 1810. It bears mentioning that in their failure to publish the Spanish expeditions were by no means alone: it was common at the time for travelers to fail to publish the results of an expedition, given the practical and financial challenges of producing lavishly illustrated natural history books. Even Joseph Banks, despite his great personal fortune and extremely privileged and influential position, was unable to publish the botanical results of the first Cook expedition—they appeared in print only in the 1980s.⁹

The Chile and Peru expedition was the only one of the Spanish voyages to publish results, and it did so slowly and with difficulty. Malaspina, who returned to Spain in 1794, became the object of a political scandal when he was accused by Prime Minister Miguel de Godoy of holding seditious, revolutionary, and anarchic views. He was imprisoned in 1795 and later sent into exile in Italy, where he died in 1809.¹⁰ The materials from the Malaspina expedition did not appear in publication until 1885.¹¹ Of the three naturalists in this expedition, Luis Née

was the only one to return to Spain—Pineda died in the Philippines in 1792 and Thaddeus Haenke remained in South America for the rest of his life. Née published descriptions of new plants in the periodical *Anales de Ciencias Naturales* between 1801 and 1803, but not a major flora with the expedition's results.¹² Sessé and Mociño also did not publish the findings of the New Spain expedition, though the Swiss botanist Augustin Pyramus de Candolle used their drawings to describe many new plants. As for Mutis, he privileged the production of visual materials and neglected textual descriptions. He never fulfilled his ambitious plans to publish a major *Flora de Bogotá*, and it was not until 1954 that the first volume of the *Flora de la Real Expedición Botánica del Nuevo Reino de Granada* appeared in Madrid.

The pictorial work of the Spanish natural history expeditions thus remained largely unseen until the second half of the twentieth century. In recent decades, historians have turned anew to these voyages, which nevertheless remain little known outside of the Hispanic world. The fact that the commemoration of the quincentennial of Columbus's arrival in the New World provided the impetus and necessary funding for many recent publications resonates with the ways in which the expeditions themselves, in the eighteenth century, alluded to earlier days of Spanish investigations in the Americas. But although many of these new studies are decorated with beautiful illustrations, the expeditions' visual archive has remained for the most part neglected as an important source for the history of science, the history of empire, and the history of art and visual culture.

As this book demonstrates, the expeditions' images provide unique insight into the work of imperial natural history and visual culture in the Hispanic world, allowing us to consider the day-to-day practices of science in the making; the rich and multifaceted lives that images led at the time; and the ways in which science, art, and empire came together. My intention is not to offer the last word on the subject but rather to open up a line of inquiry and to stimulate avenues of interdisciplinary and transregional scholarly research. In this

my work is part of a larger conversation about the ways in which two much celebrated and debated master narratives about early modernity and the making of the West—the artistic renaissance and the scientific revolution—relate to European global expansion.¹³ The long-neglected images that I study in this book allow us, like the naturalists who studied American nature from the comfort of their European studies, to piece together a picture of a distant world, using them as a spyglass in order to peer through the curtain and see it in a new light.

FIGURE C.1. Putto looking through a spyglass, detail from the frontispiece to Engelbert Kaempfer, *Amoenitatum Exoticarum politico-physico-mediciarum* (Lemgo, 1712) (fig. 5.7). Huntington Library.



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Notes



Introduction

1. Twelve thousand is an approximation: the exact number of natural history illustrations is even greater if in addition to the finished corpus we also take into account the multiple related sketches, unfinished studies, copies, and prints, not to mention the hundreds of previously published prints that served as resources in the formation of this visual archive.
2. A note on nomenclature: Men and women in the early modern Hispanic world did not use the word “colonies” to refer to the non-European regions of the Spanish empire. In this book, I do my best to adhere to actors’ categories, alluding to the Indies, viceroyalties, and kingdoms; I refer to the Spanish Americas rather than to colonial Latin America. I use the term “Creole” (*criollo*) in its specific Spanish American connotation, that is, American-born people of Spanish descent. All translations are mine unless otherwise noted.
3. The term “natural history,” as used in the early modern period, refers to the systematic study of the plants, animals, minerals, and natural phenomena of a region. It comprises fields that later became the separate disciplines of botany, zoology, geology, and geography. A useful overview is Nicholas Jardine, James A. Secord, and Emma C. Spary (eds.), *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996).
4. There are happy exceptions to the scholarly neglect of scientific images. I have found particularly helpful the work of Horst Bredekamp, Lorraine Daston, David Freedberg, Peter Galison, Ludmilla Jordanova, Thomas DaCosta Kaufmann, Martin Kemp, Sachiko Kusukawa, Amy R. W. Meyers, Pamela Smith, Barbara Maria Stafford, and Claudia Swan, cited throughout this book.
5. Previous scholarship on these expeditions is cited extensively in chapter 1. A notable exception to the analytical neglect of the expeditions’ visual material is the work of Antonio E. de Pedro: see “Imágenes de una expedición botánica,” in Antonio González Bueno (ed.), *La Expedición botánica al Virreinato del Perú (1777–1788)* (Madrid: Lunwerg, 1988), 105–17, and “Las expediciones científicas a América a la luz de sus imágenes artístico-científicas,” in José Luis Peset (ed.), *Ciencia, vida y*

- espacio en Iberoamérica* (Madrid: CSIC, 1989) 3: 407–27. A study that has much in common with my own approach, though it does not examine these expeditions, is Marta Penhos, *Ver, conocer, dominar: imágenes de Sudamérica a fines del siglo XVIII* (Buenos Aires: Siglo Veintiuno, 2005).
6. Hipólito Ruiz López and José Pavón, *Flora Peruviana et Chilensis. Prodromus, descripciones y láminas de los nuevos géneros de plantas de la Flora del Perú y Chile* (Madrid, 1794), xv. José Celestino Mutis provided a similarly dramatic version of the travails of the traveling naturalist, which the cabinet naturalist could not even begin to image. See A. Federico Gredilla, *Biografía de José Celestino Mutis* [1911], prol. by Guillermo Hernández de Alba (Bogotá: Plaza & Janés, 1982), 42–43.
 7. Hipólito Ruiz López and José Pavón, *Flora Peruviana et Chilensis*, 3 vols. (Madrid, 1798–1802), in addition to the 1794 *Prodromus*.
 8. Ian Hacking, “‘Style’ for Historians and Philosophers,” in *Historical Ontology* (Cambridge, MA: Harvard University Press, 2002), 178–99, quote on 181.
 9. Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007): 19–23.
 10. See for instance David Arnold, *The Tropics and the Traveling Gaze: India, Landscape, and Science, 1800–1856* (Seattle: University of Washington Press, 2006); Felix Driver and Luciana Martins (eds.), *Tropical Visions in an Age of Empire* (Chicago: University of Chicago Press, 2005); Nancy Leys Stepan, *Picturing Tropical Nature* (Ithaca, N.Y.: Cornell University Press, 2001); Beth Fowkes Tobin, *Colonizing Nature: The Tropics in British Arts and Letters 1760–1820* (Philadelphia: University of Pennsylvania Press, 2005) and *Picturing Imperial Power: Colonial Subjects in Eighteenth-Century British Painting* (Durham: Duke University Press, 1999). The pioneering study of visual culture, travel, and empire is Bernard Smith, *European Vision and the South Pacific, 1768–1850: A Study in the History of Art and Ideas* (Oxford: Clarendon Press, 1960).
 11. I have found inspiring models in Peter Burke, *Eyewitnessing: The Uses of Images as Historical Evidence* (London: Reaktion Books, 2001), Francis Haskell, *History and its Images: Art and the Interpretation of the Past* (New Haven: Yale University Press, 1993), and Richard Kagan, *Urban Images of the Hispanic World, 1493–1793* (New Haven: Yale University Press, 2000).
 12. For a suggestive critique of hybridity as an analytical category in Spanish American visual culture, see Carolyn Dean and Dana Leibsohn, “Hybridity and Its Discontents: Considering Visual Culture in Colonial Spanish America,” *Colonial Latin American Review* 12, no. 1 (2003): 5–35.
 13. Beth Fowkes Tobin makes a similar argument in *Colonizing Nature*, 168–97.

Chapter One

1. *La expedición Malaspina, 1789–1794*, 9 vols. (Madrid: Lunwerg Editores, 1987–96); Iris H. W. Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions* (Seattle: University of Washington Press, 1981); Andrés Galera Gómez, *La ilustración española y el conocimiento del nuevo mundo. Las ciencias naturales en*

- la expedición Malaspina (1789–1794): La labor científica de Antonio Pineda* (Madrid: CSIC, 1988); María Dolores Higuera Rodríguez (ed.), *La Botánica en la Expedición Malaspina, 1789–1794* (Madrid: Turner Libros, 1989); Juan Pimentel, *La física de la monarquía. Ciencia y política en el pensamiento colonial de Alejandro Malaspina (1754–1810)* (Madrid: Doce Calles, 1998); and María Pilar de San Pío Aladrén and María Dolores Higuera Rodríguez (eds.), *La armonía natural. La naturaleza en la expedición marítima de Malaspina y Bustamante (1789–1794)* (Madrid: Lunwerg Editores, 2001).
2. On the importance of virtual witnessing in early modern science, see the classic study by Steven Shapin and Simon Schafer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).
 3. Carmen Sotos Serrano, *Los pintores de la expedición de Alejandro Malaspina*, 2 vols. (Madrid: Real Academia de la Historia, 1982) and Mercedes Palau de Iglesias, *Museo de América. Catálogo de los dibujos, aguadas y acuarelas de la Expedición Malaspina* (Madrid: Museo de América / Ministerio de Cultura, 1980).
 4. Antonio Lafuente and Nuria Valverde, “Linnaean Botany and Spanish Imperial Biopolitics,” in Londa Schiebinger and Claudia Swan (eds.), *Colonial Botany: Science, Commerce, and Politics* (Philadelphia: University of Pennsylvania Press, 2004): 134–47, on p. 136.
 5. Alejandro Díez Torre et al. (eds.), *La ciencia española en ultramar* (Madrid: Doce Calles, 1991); Antonio Lafuente, “Enlightenment in an Imperial Context: Local Science in the Late Eighteenth-Century Hispanic World,” *Osiris*, 2nd series, 15 (2000): 155–73; Antonio Lafuente and José Sala Catalá (eds.), *Ciencia colonial en América* (Madrid: Alianza Editorial, 1992); Lafuente and Valverde, “Linnaean Botany and Spanish Imperial Biopolitics”; Mauricio Nieto Olarte, *Remedios para el imperio: historia natural y la apropiación del Nuevo Mundo* (Bogotá: Instituto Colombiano de Antropología e Historia, 2000); and Marie Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992), introduction and part 1.
 6. *The Journals of Hipólito Ruiz, Spanish Botanist in Peru and Chile 1777–1788*, trans. by Richard Evans Schultes and María José Nemry von Thenen de Jaramillo-Arango (Portland, OR: Timber Press, 1998); Antonio González Bueno (ed.), *La expedición botánica al Virreinato del Perú (1777–1788)* (Madrid: Lunwerg, 1988); Félix Muñoz Garmendia (ed.), *La botánica al servicio de la corona: la expedición de Ruiz, Pavón y Dombey al virreinato del Perú* (Madrid: Lunwerg Editores, 2003); and Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964).
 7. Royal order authorizing the Royal Botanical Expedition to Chile and Peru, Aranjuez, 8 April 1777: AMNCN, item no. 13 in María de los Ángeles Calatayud Arinero, *Catálogo de las expediciones y viajes científicos españoles a América y Filipinas (siglos XVIII y XIX)* (Madrid: CSIC, 1984). The New Spain expedition received almost identically phrased instructions, Real Orden, El Pardo, 20 March 1787, ARJB, V, 1, 1, 17.
 8. On the New Granada expedition, see Daniela Bleichmar, “Painting as Exploration: Visualizing Nature in Eighteenth-Century Colonial Science,” *Colonial Latin Ameri-*

- can Review* 15, no. 1 (June 2006): 81–104; Marcelo Frías Núñez, *Tras El Dorado vegetal: José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783–1808)* (Seville: Diputación Provincial de Sevilla, 1994); A. Federico Gredilla, *Biografía de José Celestino Mutis* [1911] (Bogotá: Plaza & Janés, 1982); Gonzalo Hernández de Alba, *Quinas amargas, el sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Academia de Historia de Bogotá, 1991); Enrique Pérez Arbeláez, *José Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada*, 2nd ed. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983); María Pilar de San Pío Aladrén (ed.), *Mutis y la Real Expedición Botánica del Nuevo Reyno de Granada*, 2 vols. (Barcelona: Lunwerg Editores, 1992). On the New Spain expedition, see Juan Carlos Arias Divito, *Las expediciones científicas españolas durante el siglo XVIII. Expedición Botánica a Nueva España* (Madrid: Instituto de Cultura Hispánica, 1968); Engstrand, *Spanish Scientists*; Xavier Lozoya, *Plantas y luces en México. La Real Expedición Científica a Nueva España (1787–1803)* (Barcelona: Ediciones del Serbal, 1984); Belén Sánchez, Miguel Ángel Puig-Samper, and J. de la Sota (eds.), *La Real Expedición Botánica a Nueva España 1787–1803* (Madrid: V Centenario, 1987); María Pilar de San Pío Aladrén (ed.), *El águila y el nopal. La expedición de Sessé y Moziño a Nueva España (1787–1803)* (Madrid: Lunwerg Editores, 2000).
9. There were other natural history investigations, which I do not explore in this book for reasons of space. See for instance Susana Pinar García, *El sueño de las especias: viaje de exploración de Francisco Noroña por las islas de Filipinas, Java, Mauricio y Madagascar* (Madrid: CSIC, 2000); María Pilar de San Pío Aladrén and Miguel Ángel Puig Samper (eds.), *Las flores del paraíso. La expedición botánica de Cuba en el siglo XVIII y XIX* (Barcelona: Lunwerg Editores, 1999); Carmen Sotos Serrano, *Flora y fauna cubanas del siglo XVIII: los dibujos de la expedición del conde de Mopox, 1796–1802* (Madrid: Turner, 1984).
 10. Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven: Yale University Press, 2000); Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004), 1–104; Schiebinger and Swan (eds.), *Colonial Botany*; Emma C. Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000), 15–47.
 11. Steven Shapin, "The Invisible Technician," *American Scientist* 77, no. 6 (November–December 1989): 554–63, and *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), 355–408.
 12. See for instance Linda Colley, *The Ordeal of Elizabeth Marsh: A Woman in World History* (New York: Pantheon Books, 2007), and Maya Jasanoff, *Edge of Empire: Lives, Culture, and Conquest in the East, 1750–1850* (New York: Alfred A. Knopf, 2005).
 13. José Celestino Mutis, *Archivo Epistolar del Sabio naturalista Don José C. Mutis*, ed. Guillermo Hernández de Alba, 2nd ed., 4 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983); Julio Humberto Ovalle Mora, "El fondo José Celestino Mutis de la Biblioteca Nacional de Colombia," *Boletín de Historia y Antigüedades*

- 93, no. 833 (June 2006): 359–74; and Jaime Mejía Duque, “Libros comprados por Mutis,” *Revista Bolívar*, no. 48 (1957): 521–24. There is ample archival material on the contents of his library and the practices through which he obtained books. See for instance ARJB III, 1, 2, 20; III, 1, 2, 40; III, 2, 2, 128; III, 11, 3, 1 to 3; III, 11, 3, 5 to 9; and [José Celestino Mutis], *Diario de observaciones de José Celestino Mutis (1760–1790)*, transcr. and prol. Guillermo Hernández de Alba, 2nd ed., 2 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 1: 209.
14. Eduardo Estrella, “Introducción histórica: La expedición de Juan Tafalla a la Real Audiencia de Quito (1799–1808) y la ‘Flora Huayaquilensis,’” in Juan Tafalla, *Flora Huayaquilensis*, ed. Eduardo Estrella, 2 vols. (Madrid: Real Jardín Botánico, 1989–91), 1: xiii–cvi.
 15. Hans Sloane, *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers, and Jamaica, with the Natural History . . . of the Last of Those Islands*, 2 vols. (London, 1707–25); Mark Catesby, *The Natural History of Carolina, Florida, and the Bahama Islands*, 2 vols. (London, 1731–43); Charles Plumier, *Description des plantes de l’Amerique* (Paris, 1693), *Nova Plantarum Americanarum Genera* (Paris, 1703), and *Plantarum Americanarum*, ed. Johann Burmann (Amsterdam, 1755–60); Louis Feuillée, *Journal des Observations Physiques, Mathématiques et Botaniques, Faites par l’ordre du Roy sur les Côtes Orientales de l’Amerique Meridionale, & dans les Indes Occidentales, depuis l’année 1707 jusques en 1712*, 3 vols. (Paris, 1714–25); Nikolaus Joseph von Jacquin, *Selectarum stirpium Americanarum Historia* (Vienna, 1763; 2nd ed. 1780; 3rd ed. 1788; facs. ed. New York: Hafner, 1970).
 16. Alexander von Humboldt and Aimé Bonpland, *Voyage aux régions équinoxiales du nouveau continent* (Paris: F. Schoell, 1810–34); Alexander von Humboldt, *Essai sur la géographie des plantes* (Paris: Chez Levrault, Schoell et co., 1805), which is dedicated to José Celestino Mutis.
 17. Luis Née, “Diarios y trabajos botánicos de Luis Née,” in *La expedición Malaspina, 1789–1794* (Madrid: Lunewerg Editores, 1992), 3: 318–19.
 18. The evocative phrase comes from James E. McClellan and François Regourd, “The Colonial Machine: French Science and Colonization in the Ancien Régime,” *Osiris*, 2nd series, 15 (2000): 31–50.
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 23. Miguel Barnades, *Principios de Botánica, sacados de los mejores escritores, y puestos en lengua castellana* (Madrid, 1767); Antonio Palau, *Explicación de la filosofía y fundamentos botánicos de Linneo* (1778) and *Parte práctica de botánica del caballero Carlos Linneo* (1784–88); and Casimiro Gómez Ortega and Antonio Palau, *Curso elemental de botánica, teórico y práctico*, 2 vols. (Madrid, 1785, 2nd rev. ed. 1795), with a Mexican edition and Italian translation.
 24. Spary, *Utopia’s Garden*, 49–98; Drayton, *Nature’s Government*.
 25. “Copia del listado de los títulos despachados a los correspondientes del Real Jardín Botánico desde el año de 1783,” Madrid, 1794?–1801?: ARJB, I, 13, 6, 15; and “Razón de los títulos despachados a los correspondientes del jardín desde el año de 1783,” Madrid, 1794?–1801?: ARJB, I, 13, 6, 16. There is a discrepancy between the two documents, with the former listing eighty-six correspondents, and the latter only seventy-six.
 26. Juan del Castillo to Gómez Ortega, Puerto Rico, 8 June 1785: ARJB, I, 20, 2, 1; Victoriano de Aldea Urries to Gómez Ortega, Puerto Rico, 20 April 1790: ARJB, I, 20, 1, 2; Ramón Hernáiz to Gómez Ortega, Puerto Rico, 12 May 1790: ARJB, I, 20, 2, 30.
 27. ARJB I, 5, 10, 1; I, 5, 9, 5, items 1–8; I, 5, 9, 7, items 7–10; I, 7, 5, 1; I, 7, 5, 5; I, 8, 6, 3; and I, 9, 4, 1. Espinosa’s contributions are outlined in “Borrador del informe de Mariano Lagasca sobre la actividad de Mariano Espinosa en La Habana,” Madrid, 1817?–1820?: ARJB, I, 30, 4, 3.
 28. Susan Scott Parrish demonstrates the same for British North America in *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill: University of North Carolina Press, 2006).
 29. Colmeiro, *Bosquejo histórico*, 7 and “Índice de plantas que se han sembrado en el Real Jardín Botánico de Madrid en este año de 1772,” cited in Puerto Sarmiento, *Ciencia de cámara*, 333.
 30. “Catálogo de las plantas cultivadas en el Real Jardín Botánico procedentes de América con expresión de sus lugares nativos y nombres vulgares,” Madrid, 9 June 1788: ARJB I, 4, 9, 8.
 31. Madrid, 3 June 1781: ARJB, I, 3, 2, 1.

32. Much of Dávila's collection is described in a sale catalog, Jean-Baptiste-Louis Romé de L'Isle, *Catalogue systématique et raisonné des curiosités de la nature et de l'art, qui composent le cabinet de M. Davila, avec figures en taille douce*, 3 vols. (Paris, 1767).
33. "Carolus III Rex naturam et artem sub uno tecto in publicam utilitatem consociavit."
34. [Pedro Franco Dávila], *Instrucción para que los Virreyes, Gobernadores, Corregidores, Alcaldes mayores e Intendentes de Provincias en todos los Dominios de S.M. puedan hacer escoger, preparar y enviar a Madrid todas las producciones curiosas de la Naturaleza que se encontraren en las Tierras y Pueblos de sus distritos, a fin de que se coloquen en el Real Gabinete de Historia Natural que S.M. ha establecido en esta Corte para beneficio e instrucción pública* (Madrid, 1776). On remittances, see Francisco de las Barras de Aragón, "Noticias acerca de las órdenes y disposiciones dictadas en el siglo XVIII para la recolección en Indias de ejemplares con destino al Real Gabinete de Historia Natural," *Boletín de la Real Sociedad Española de Historia Natural* 15 (Madrid, 1915): 230–34, and "Noticias sobre varios envíos de objetos naturales hechos de América en el siglo XVIII, recogidas en el Archivo de Indias de Sevilla," *BRSEHN* 18 (Madrid, 1918): 309–14; and Paula De Vos, "The Rare, the Singular, and the Extraordinary: Natural History and the Collection of Curiosities in the Spanish Empire," in Daniela Bleichmar, Paula DeVos, Kristin Huffine, and Kevin Sheehan (eds.), *Science in the Spanish and Portuguese Empires, 1500–1800* (Stanford: Stanford University Press, 2008), 271–89.
35. Casimiro Gómez Ortega, *Instrucción sobre el modo más seguro y económico de transportar plantas vivas por mar y tierra a los países más distantes* (Madrid, 1779).
36. The French source is Duhamel de Monceau, *Avis pour le transport par mer des arbres, des plantes vivaces, des semences, des animaux, et de différents autres morceaux d'Histoire Naturelle* (Paris, 1752).
37. Gómez Ortega, *Instrucción*, 37–45.
38. Lorelai Kryry, "Les instructions de voyage dans les expéditions scientifiques françaises, 1750–1830," *Revue d'histoire des sciences* 51 (1998): 65–91; Joan-Pau Rubiés, "Instructions for Travellers: Teaching the Eye to See," *History and Anthropology* 9, no. 2–4 (1996): 139–90; and Justin Stagl, *A History of Curiosity: The Theory of Travel 1550–1800* (Chur: Harwood Academic Publishers, 1995), esp. 221–27, 269–96.
39. José de Ezpeleta to Mutis, Santa Fe de Bogotá, 29 November 1789: ARJB, III, 2, 1, 25; reproduced in *Archivo Epistolar*, 3: 249–50.
40. Tiburcio Rodríguez, "Relación individual de los árboles útiles, de fábricas, tintas, y medicinales, que se enquentran en el Partido de Coamo (Puerto Rico)," Coamo, 1 March 1790: ARJB I, 5, 2, 6.
41. Robert Jones Shafer, *The Economic Societies in the Spanish World, 1763–1821* (Syracuse, N.Y.: Syracuse University Press, 1958).
42. Pedro Rodríguez de Campomanes, *Discurso sobre el fomento de la industria popular* [1774], ed. John Reeder (Madrid: Instituto de Estudios Fiscales / Ministerio de Hacienda, 1975), cxlii–clxxiv, 104–16; quote on cxliii, 104.
43. Shafer, *The Economic Societies*, 145.
44. Patricia Aceves Pastrana (ed.), *Periodismo científico en el siglo XVIII: José Antonio de Alzate y Ramírez* (Mexico City: UAM Xochimilco & Sociedad Química de

- México, 2001); Fiona Clark, “The *Gazeta de Literatura de México* (1788–1795): The Formation of a Literary-Scientific Periodical in Late-Viceregal Mexico,” *Dieciocho: Hispanic Enlightenment* 28, no. 1 (2005): 7–31, and “Read All About It: Science, Translation, Adaptation, and Confrontation in the *Gazeta de Literatura de México* (1788–1795),” in Bleichmar et al., *Science in the Spanish and Portuguese Empires*, 147–77; Jean-Pierre Clément, *El Mercurio Peruano, 1790–1795*, 2 vols. (Madrid: Iberoamericana; Frankfurt am Main: Vervuert, 1997).
45. Among the vast literature on these reforms see David Brading, “Bourbon Spain and Its American Empire,” in Leslie Bethell (ed.), *The Cambridge History of Latin America* (New York: Cambridge University Press, 1984), 389–440; John Lynch, *Bourbon Spain, 1700–1808* (Oxford: Blackwell, 1989); Gabriel B. Paquette, *Enlightenment, Governance, and Reform in Spain and Its Empire, 1759–1808* (New York: Plagrave Macmillan, 2008); Jean Sarrailh, *L’Espagne éclairée de la seconde moitié du XVIII siècle* (Paris: Imprimerie Nationale, 1954); 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), esp. 147–259, and *Apogee of Empire: Spain and New Spain in the Age of Charles III, 1759–1789* (Baltimore: Johns Hopkins University Press, 2003). On the American side, see Kenneth J. Andrien and Lyman L. Johnson (eds.), *The Political Economy of Spanish America in the Age of Revolution, 1750–1850* (Albuquerque: University of New Mexico Press, 1994); Jacques A. Barbier, *Reform and Politics in Bourbon Chile, 1755–1796* (Ottawa: University of Ottawa Press, 1980); John R. Fisher, Allan J. Kuethe, and Anthony McFarlane (eds.), *Reform and Insurrection in Bourbon New Granada and Peru* (Baton Rouge: Louisiana State University Press, 1990); and Anthony McFarlane, *Colombia before Independence. Economy, Society, and Politics under Bourbon Rule* (New York: Cambridge University Press, 1993), esp. 99–184. Adam Warren discusses the impact of the Bourbon reforms on viceregal medicine in *Medicine and Politics in Colonial Peru: Population Growth and the Bourbon Reforms* (Pittsburgh: University of Pittsburgh Press, 2010).
 46. Pedro Rodríguez de Campomanes, *Reflexiones sobre el comercio español a Indias* [1762], ed. and with an intro. by Vicente Llombart Roca (Madrid: Instituto de Estudios Fiscales, 1988), esp. 373–86.
 47. See, among many others, 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), and *The Economic Aspects of Spanish Imperialism in America, 1492–1810* (Liverpool, Liverpool University Press, 1997); Antonio García-Baquero González, *Cádiz y el Atlántico, 1717–1778*, 2 vols. (Seville: Escuela de Estudios Hispanoamericanos/CSIC, 1976); Lynch, *Bourbon Spain*, 350–74; and Stein and Stein, *Apogee of Empire*, 69–80, 143–85, 267–304.
 48. Campomanes, *Reflexiones*, 67–88.
 49. *Ibid.*, 112–20, quotation on 120.
 50. *Ibid.*, 85, 91–92, 102.
 51. Casimiro Gómez Ortega, “Oración gratulatoria al tomar posesión de su plaza de académico supernumerario [Real Academia de la Historia]” (1770), quoted in Francisco Javier Puerto Sarmiento, *Ciencia de cámara. Casimiro Gómez Ortega (1741–1818), el científico cortesano* (Madrid: CSIC, 1992), 54.

52. A cameralist approach to botany also held by Carl Linnaeus and Joseph Banks, among others. See Drayton, *Nature's Government*; 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); Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge: Harvard University Press, 1999); David Philip Miller and Peter Hans Reill, eds., *Visions of Empire: Voyages, Botany and Representations of Nature*, (Cambridge: Cambridge University Press, 1996), esp. David Mackay, "Agents of Empire: The Banksian Collectors and Evaluation of New Lands," 38–47, and David Philip Miller, "Joseph Banks, Empire, and 'Centers of Calculation' in Late Hanoverian London," 21–37.
53. Gómez Ortega, *Instrucción*, 22.
54. Casimiro Gómez Ortega, *Historia natural de la Malagueta ó Pimienta de Tavasco, y noticia de los usos, virtudes y exención de derechos de esta saludable y gustosa especia, con la lámina de su árbol* (Madrid, 1780), 1–2.
55. José Celestino Mutis to King Charles III, 20 June 1764: ARJB, III, 2, 6, 10, reproduced in Mutis, *Archivo Epistolar*, 1: 31–43.
56. Casimiro Gómez Ortega to José de Gálvez, Madrid, 23 February 1777, quoted in Puerto Sarmiento, *Ciencia de cámara*.
57. Antonio José Cavanilles, "Materiales para la historia de la Botánica," *Anales de Historia Natural* (Madrid: Imprenta Real, 1800; facs. ed. Madrid: Doce Calles, 1993), vol. 2, no. 4, 3–57, this quote on 24.
58. Francisco Hernández, *Obras completas*, ed. Germán Somolinos d'Ardois, 3 vols. (Mexico: UNAM, 1959); José María López Piñero, *El Códice Pomar (ca. 1590): el interés de Felipe II por la historia natural y la expedición Hernández a América* (Valencia: Universidad de Valencia / CSIC, 1991); José María López Piñero and José Pardo Tomás, *Nuevos materiales y noticias sobre la Historia de las plantas de Nueva España de Francisco Hernández* (Valencia: Universidad de Valencia / CSIC, 1994) and *La influencia de Francisco Hernández (1515–1587) en la constitución de la botánica y la materia médica modernas* (Valencia: Universidad de Valencia / CSIC, 1996); Simon Varey (ed.), *The Mexican Treasury: The Writings of Dr. Francisco Hernández* (Stanford: Stanford University Press, 2000); and Simon Varey, Rafael Chabrán, and Dora V. Weiner (eds.), *Searching for the Secrets of Nature: The Life and Works of Dr. Francisco Hernández* (Stanford: Stanford University Press, 2000).
59. Francisco Hernández, *Opera, cum edita, tum inedita, ad autographi fidem et integritatem expressa*, ed. Casimiro Gómez Ortega (Madrid, 1790).
60. Juan Pimentel, "The Iberian Vision: Science and Empire in the Framework of a Universal Monarchy, 1500–1800," *Osiris*, 2nd series, 15 (2000): 17–30.
61. Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006); David Goodman, *Power and Penury: Government, Technology, and Science in Philip II's Spain* (New York: Cambridge University Press, 1988); María M. Portuondo, *Secret Science: Spanish Cosmography and the New World* (Chicago: University of Chicago Press, 2009).
62. Howard F. Cline (ed.), *Handbook of Middle American Indians*, vol. 12: *Guide to Ethnohistorical Sources* (Austin: University of Texas Press, 1972), 183–542, and Fran-

- cisco de Solano (ed.), *Cuestionarios para la formación de las Relaciones Geográficas de Indias. Siglos XVI–XIX* (Madrid: CSIC, 1988).
63. Barbara Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas* (Chicago: University of Chicago Press, 1996).
 64. Quoted in Raquel Álvarez Peláez, “Estudio introductorio,” in Francisco Hernández, *De materia medica novae hispaniae, libri quatuor. Cuatro libros sobre la materia médica de Nueva España. El manuscrito de Recchi*, 2 vols. (Madrid: Ediciones Doce Calles, 1998), 36.
 65. Barrera-Osorio, *Experiencing Nature*, 82, 84.
 66. There is a rich literature on colonial codices. A useful and succinct introduction is Elizabeth Hill Boone, “Pictorial Documents and Visual Thinking in Postconquest Mexico,” in Elizabeth Hill Boone and Thomas B. F. Cummins (eds.), *Native Traditions in the Postconquest World* (Washington: Dumbarton Oaks, 1998), 149–99. The classic reference sources are Howard F. Cline (ed.), “Guide to Ethnohistorical Sources,” vols. 12–15 of the *Handbook of Middle American Indians*, ed. Robert Wauschope, 16 vols. (Austin: University of Texas Press, 1964–76), and Donald Robertson, *Mexican Manuscript Painting of the Early Colonial Period*, ed. Elizabeth Hill Boone, 2nd ed. (Norman: University of Oklahoma Press, 1992); see also David Carrasco (ed.), *The Oxford Encyclopedia of Mesoamerican Cultures: The Civilizations of Mexico and Central America* (New York: Oxford University Press, 2001). Insightful case studies include Thomas B. F. Cummins, “From Lies to Truth: Colonial Ekphrasis and the Act of Crosscultural Translation,” in Claire Farago (ed.), *Reframing the Renaissance: Visual Culture in Europe and Latin America, 1450–1650* (New Haven: Yale University Press, 1995), 152–174, and Serge Gruzinski, *Painting the Conquest: The Mexican Indians and the European Renaissance*, trans. Deke Dusinberre (Paris: Flammarion, 1992).
 67. Travis Barton Kranz, “The Tlaxcalan Conquest Pictorials: The Role of Images in Influencing Colonial Policy in Sixteenth-Century Mexico,” Ph.D. dissertation, UCLA, 2001.
 68. See for instance Linda Báez Rubí, *Mnemosine novohispánica: retórica e imágenes en el siglo XVI* (Mexico City: UNAM, 2005), 119–70; Samuel Edgerton, *Theaters of Conversion: Religious Architecture and Indian Artisans in Colonial Mexico* (Albuquerque: University of New Mexico Press, 2001); Serge Gruzinski, *Images at War: Mexico from Columbus to Blade Runner (1492–2019)*, trans. Heather MacLean (Durham, NC: Duke University Press, 2001), esp. 30–97; and Lina Bolzoni, “Mexican Nature in Diego Valadés’ *Rhetorica christiana* (1579),” in Therese O’Malley and Amy R. W. Meyers (eds.), *The Art of Natural History: Illustrated Treatises and Botanical Paintings, 1400–1850* (Washington: National Gallery of Art, 2008), 127–42, which addresses the connections between images, evangelization, and New World nature.
 69. Quoted in Francisco Stastny, “Colonial Art,” in Natalia Majluf, Cristóbal Makowski, and Francisco Stastny (eds.), *Art in Peru: Works from the Collection of the Museo de Arte de Lima* (Lima: Museo de Arte de Lima, 2001), 83–125, quote on 99.
 70. Felipe Guaman Poma de Ayala, *El primer nueva corónica y buen gobierno* (1615), Copenhaguen Royal Library, Ms. GKS 2232 4º, fol. 10, available online at “The Guaman Poma Website,” <http://www.kb.dk/permalink/2006/poma/info/en/frontpage>.

- htm. Rolena Adorno has perceptively argued that for Guaman Poma pictures were more powerful than words, see *Guaman Poma: Writing and Resistance in Colonial Peru*, 2nd. ed. (Austin: University of Texas Press, 2000), 83–89. On the production of images by Guaman Poma and his circle, see Thomas B. F. Cummins, “The Images in Murúa’s *Historia General del Piru*: An Art Historical Study,” in Thomas B. F. Cummins and Barbara Anderson (eds.), *The Getty Murúa: Essays on the Making of Martín de Murúa’s “Historia general del Piru,” J. Paul Getty Museum Ms. Ludwig XIII 16* (Los Angeles: Getty Research Institute, 2008), 147–74.
71. W. Michael Mathes, *The America’s [sic] First Academic Library: Santa Cruz de Tlatelolco* (Sacramento: California State Library Foundation, 1985).
 72. Bernardino de Sahagún, *The Florentine Codex: General History of the Things of New Spain*, trans. Arthur J. O. Anderson and Charles E. Dibble, 13 vols., 2nd ed. (Salt Lake City: University of Utah Press; Santa Fe: School of American Research, 1970); Jorge Klor de Alva, H. B. Nicholson, and Eloise Quinones Keber (eds.), *The Work of Bernardino de Sahagún: Pioneer Ethnographer of Sixteenth-Century Aztec Mexico* (Austin: University of Texas Press, 1988).
 73. Martín de la Cruz, *The Badianus Manuscript, Codex Barberini, Latin 241, Vatican Library: An Aztec Herbal of 1552*, intro., trans., and ed. Emily Walcott Emmart (Baltimore: Johns Hopkins University Press, 1940); and *Libellus de medicinalibus Indorum herbis*, trans. Juan Badiano, 2 vols. (Mexico: Fondo de Cultura Económica / IMSS, 1991).
 74. Millie Gimmel, “Reading Medicine in the Codex de la Cruz Badiano,” *Journal of the History of Ideas* 69, no. 2 (April 2008), 169–92.
 75. Quoted in Barrera-Osorio, *Experiencing Nature*, 107–8.
 76. Jesús María Carrillo Castillo, *Naturaleza e imperio: la representación del mundo natural en la Historia general y natural de las Indias de Gonzalo Fernández de Oviedo* (Madrid: Fundación Carolina / Doce Calles, 2004) and “The Eyes of the New Pliny: The Use of Images in Gonzalo Fernández de Oviedo’s *Historia general y natural de las Indias*,” in O’Malley and Meyers (eds.), *The Art of Natural History*, 108–25.
 77. Quoted in Kathleen A. Myers, “The Visual Representation of New World Phenomena: Visual Epistemology and Gonzalo Fernández de Oviedo’s Illustrations,” in Jerry M. Williams and Robert E. Lewis (eds.), *Early Images of the Americas: Transfer and Invention* (Tucson: University of Arizona Press, 1993), 183–213, quotes on 188, 193, and 189.
 78. Anthony Pagden, “*Ius et Factum*: Text and Experience in the Writings of Bartolomé de las Casas,” in Stephen Greenblatt (ed.), *New World Encounters* (Berkeley: University of California Press, 1993), 85–100, quote on 91. However, writers on the New World often combined their firsthand experiences with existing official accounts: see Rolena Adorno, “The Discursive Encounter of Spain and America: The Authority of Eyewitness Testimony in the Writing of History,” *William and Mary Quarterly* 49, no. 2 (1992): 210–28.
 79. The literature on early responses to the New World is vast. A landmark study is Stephen J. Greenblatt, *Marvelous Possessions: The Wonder of the New World* (Chicago: University of Chicago Press, 1991).
 80. Portuondo, *Secret Science*; Mundy, *The Mapping of New Spain*.

81. The dazzling productivity and diversity of visual culture in the Spanish viceroyalties are documented in Gauvin Alexander Bailey, *Art of Colonial Latin America* (New York: Phaidon, 2005), and Joseph Rishel (ed.), *The Arts in Latin America, 1492–1820* (New Haven: Yale University Press, 2006), among others.
82. Luisa Elena Alcalá, “Sources and Meaning in Colonial Historical Images: the Case of the Paracas and Pantasma Reducciones,” unpublished manuscript. Alcalá’s insightful analysis of a large oil painting entitled “Conquista y reducción de los indios infieles de las montañas de Paraca y Pantasma en Guatemala” (Museo de América, Madrid), painted ca. 1684–86 in Mexico City or Guatemala and sent to Madrid by Franciscans to publicize and request support for their missionary efforts in Guatemala, is closely related to my own arguments about the role of images as visual documentary evidence used to transport and persuade across distances in the Spanish empire. I am grateful to Alcalá for sharing her unpublished work with me.
83. Hernández de Alba, *Quinas amargas*.
84. On the expedition’s pictorial work, see Mónica de Cossio Savin D’Orfond, “Mutis; un botánico español en América,” B.A. thesis, Universidad Complutense, Madrid, 2002; Marta Fajardo de Rueda, “La Flora de la Real Expedición Botánica: primera escuela de arte en el Nuevo Reino de Granada,” *Anuario colombiano de historia social y de la cultura*, vols. 13–14 (Bogotá: Universidad Nacional, 1985–86); Carmen Sotos Serrano, “Aspectos artísticos de la Expedición Botánica de Nueva Granada,” in San Pío Aladrén (ed.), *Mutis y la Real Expedición Botánica*, 1:121–57; Lorenzo Uribe Uribe, “Los maestros pintores,” in *Flora de la Real Expedición Botánica del Nuevo Reino de Granada (1783–1816)*, 50 vols. (Madrid: Ediciones Cultura Hispánica, 1954–) 1:102–6.
85. Daniela Bleichmar, “A Visible and Useful Empire: Visual Culture and Colonial Natural History in the Eighteenth-Century Spanish World,” in Bleichmar et al. (eds.), *Science in the Spanish and Portuguese Empires*, 290–310.

Chapter Two

1. Eighteenth-century portraits of naturalists often emphasize their visual expertise by depicting them in the act of conducting observations, surrounded by specimens, images, and at times also optical instruments. On scientific portraiture, see Ludmilla Jordanova, *Defining Features: Scientific and Medical Portraits* (London: Reaktion, 2000).
2. On honorific naming, see Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge: Harvard University Press, 2004), 194–225; and Mauricio Nieto Olarte, *Remedios para el imperio: historia natural y la apropiación del Nuevo Mundo* (Bogotá: Instituto Colombiano de Antropología e Historia, 2000), ch. 2.
3. These two modes are not unconnected nor completely exclusive of one another, nor are they the only possibilities. I am not attempting a taxonomy of vision in the eighteenth century but rather highlighting ways in which naturalists framed their

expertise in visual terms and distinguished themselves from other nature enthusiasts.

4. Noël-Antoine Pluche, *Spectacle de la nature, or Nature display'd*, translated by M. Humphreys, 4 vols. (London, 3rd. ed. 1736–39), 1: x.
5. Barbara Maria Stafford, *Artful Science: Enlightenment, Entertainment, and the Eclipse of Visual Education* (Cambridge, Massachusetts: MIT Press, 1994); Anke te Heesen, *The World in a Box: The Story of an Eighteenth-Century Picture Encyclopedia* (Chicago: University of Chicago Press, 2002).
6. Barbara Maria Stafford, “Voyeur or Observer? Enlightenment Thoughts on the Dilemmas of Display,” *Configurations* 1, no. 1 (1993): 121.
7. On scientific observation, see Lorraine Daston and Elizabeth Lunbeck (eds.), *Histories of Scientific Observation* (Chicago: University of Chicago Press, 2011).
8. Pierre André Latreille, *Histoire naturelle, générale et particulière des crustacés et des insectes. Ouvrage faisant suite aux Oeuvres de Leclerc de Buffon*, 14 vols. (Paris, 1802–5), 1: 52.
9. On embodied artisanal knowledge and its connections to early modern science, see Pamela Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004).
10. Jean Jacques Menuret de Chambaud, “Observateur,” in Denis Diderot and Jean le Rond d’Alembert (eds.), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers* (Paris, 1751–72), 11: 311; electronic version: University of Chicago, ARTFL Encyclopédie Projet (Winter 2008 Edition), Robert Morrissey (ed.), <http://encyclopedia.uchicago.edu/>.
11. Lorraine Daston and Peter Galison discuss “trained judgment” as a scientific virtue in *Objectivity* (New York: Zone Books, 2007), 309–62, though they characterize it as part of a twentieth-century approach.
12. [Lucas Antonio Palacio], *Secretos raros de artes y oficios. Obra útil a toda clase de personas*, 3rd ed., 8 vols. (Madrid, 1806), 6: 121. I am grateful to Nuria Valverde for sharing this quote with me.
13. [José Celestino Mutis], *Diario de observaciones de José Celestino Mutis (1760–1790)*, transcr. and prol. Guillermo Hernández de Alba, 2nd ed., 2 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 2: 65.
14. José Celestino Mutis to Antonio Caballero y Góngora, Santa Fe de Bogotá, 19 January 1784: ARJB, III, 2, 2, 26; reproduced in José Celestino Mutis, *Archivo Epistolar del Sabio naturalista Don José C. Mutis*, ed. Guillermo Hernández de Alba, 2nd ed., 4 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 1: 154–56.
15. Carl Linnaeus, *Philosophia Botanica* [Stockholm, 1751], trans. Stephen Freer (Oxford: Oxford University Press, 2003), 131; emphasis in the original.
16. *Ibid.*, 329; emphasis in the original.
17. The growing number of botanical publications represented a great resource, and helped in no small measure to create a community of naturalists, however dispersed, defined as much by the set of books with which they were all conversant as by the subject itself. On the other hand, the expanding bibliography presented practical obstacles, including its greater cost and reduced portability. Staying up-to-date with the latest publications grew ever more challenging, but it was

- essential in order to avoid replicating the work of other authors. On the challenges posed by the growing volume of printed information in the period, see Ann Blair, *Too Much to Know: Managing Scholarly Information Before the Modern Age* (New Haven: Yale University Press, 2010); on natural history in particular see Brian Ogilvie, “The Many Books of Nature: Renaissance Naturalists and Information Overload,” *Journal of the History of Ideas* 64, no. 1 (January 2003): 29–40.
18. Linnaean methods show striking continuity with sixteenth-century natural history practices, as described in Brian Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006).
 19. Ehret’s original drawing for the plate is at the Natural History Museum, London. On Ehret, see Wilfrid Blunt and William T. Stearn, *The Art of Botanical Illustration* [1951], rev. ed. (Woodbridge, Suffolk: Antique Collector’s Club, 1994), ch. 12; Lys de Bray, *The Art of Botanical Illustration: The Classic Illustrators and Their Achievements from 1550 to 1900* (London: Quarto, 1989), 62–85, 107–19; and Gerta Calmann, *Ehret: Flower Painter Extraordinary* (Boston: New York Graphic Society, 1977).
 20. On Linnaean classification, see Wilfrid Blunt, *The Compleat Naturalist: A Life of Linnaeus*, intro. William T. Stearn [1971] (London: Francis Lincoln, 2001); Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge: Harvard University Press, 1999); James L. Larson, *Interpreting Nature: The Science of Living Form from Linnaeus to Kant* (Baltimore: Johns Hopkins University Press, 1994); and Frans A. Stafleu, *Linnaeus and the Linnaeans: The Spreading of Their Ideas in Systematic Botany, 1735–1789* (Utrecht: Oosthoek, 1971). On Spanish American reactions to the Linnaean system see Roberto Moreno, *Linneo en México: las controversias sobre el sistema binario sexual, 1788–1798* (Mexico: UNAM, 1989).
 21. Matters could prove much more complicated, as the Spanish naturalists learned in their pursuit of economic botany.
 22. Staffan Müller-Wille, “Linnaeus’ Herbarium Cabinet: A Piece of Furniture and Its Function,” *Endeavour* 30, no. 2 (June 2006): 60–64.
 23. On the connections between media, practices, and techniques for ordering, see Matthew D. Eddy, “Tools for Reordering: Commonplacing and the Space of Words in Linnaeus’ *Philosophia Botanica*,” *Intellectual History Review*, 20 (2010): 227–252.
 24. Casimiro Gómez Ortega and Antonio Palau, *Curso elemental de botánica, teórico y práctico*, 2 vols. (Madrid: 1785, 2nd rev. ed. 1795). Versions of these plates appear in Philip Miller, *Gardener’s Dictionary* (1st ed. 1724, 8th ed. 1768), Antoine Gouan, *Hortus Regius Monspelienensis* (Leiden, 1762), and John Miller, *An Illustration of the Sexual System of Linnaeus*, 2 vols. (London, 1779), among many other works.
 25. September 1794, dossier suggesting hiring artist José Guío, ARJB, I, 7, 1, 3.
 26. Staffan Müller-Wille, “Collection and Collation: Theory and Practice of Linnaean Botany,” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 38, no. 3 (September 2007): 541–62.
 27. Compare to the earlier practices of humanist natural history discussed in Ogilvie, *The Science of Describing*, esp. ch. 2.
 28. Mutis and his Spanish and Spanish American colleagues followed a notebook-

- based method in which the passage from compilation of texts to compilation of things was practically seamless. This represents the continuation of a much older tradition of taking notes and using notebooks discussed in Ann Blair, “Humanist Methods in Natural Philosophy: The Commonplace Book,” *Journal of the History of Ideas* 53(4) (1992): 541–51, and Ann Moss, *Printed Commonplace-Books and the Structuring of Renaissance Thought* (New York: Oxford University Press, 1996).
29. Mutis to Eloy Valenzuela, Mariquita, 25 June 1786, in Mutis, *Archivo Epistolar*, 1: 309.
 30. In a letter dated 27 October 1788, Sessé asked Gómez Ortega for Johan Frederick Gronovius, *Flora Virginica* (Leiden, 1739–43); Peter Kalm, *Travels into North America*, trans. John Reinhold Forster (Warrington, 1770–71); Hans Sloan, *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers, and Jamaica . . .*, 2 vols. (London, 1707–25); Miller, *Gardener’s Dictionary*; and Jacquin, *Selectorum stirpium*: ARJB, V, 1, 1, 25.
 31. Martín de Sessé to Antonio Porlier, Querétaro, 28 May 1790, AMNCN, item no. 499 in María de los Ángeles Calatayud Arinero, *Catálogo de las expediciones y viajes científicos españoles a América y Filipinas (siglos XVIII y XIX)* (Madrid: CSIC, 1984).
 32. Luis Née to José Celestino Mutis, n.d. (probably 1790): ARJB, III, 1, 1, 230; reproduced in Mutis, *Archivo Epistolar*, 4: 74–76.
 33. Daniela Bleichmar, “Exploration in Print: Books and Botanical Travel from Spain to the Americas in the Late Eighteenth Century,” *Huntington Library Quarterly* 70, no. 1 (March 2007): 149–51.
 34. Casimiro Gómez Ortega, “Instrucción a que deberan arreglarse los sugetos destinados por S.M. para a la América Meridional en Compañía del Médico Dr. Josef Dombey a fin de reconocer plantas y yerbas y a hacer observaciones Botánicas en aquellos países,” Madrid, 1776: ARJB, IV, 7, 1, 2; reproduced in Hipólito Ruiz, *Relación histórica del viage, que hizo a los reinos del Perú y Chile el botánico D. Hipólito Ruiz en el año 1777 hasta el de 1788, en cuya época regresó a Madrid*, ed. Jaime Jaramillo Arango, 2nd ed., 2 vols. (Madrid: Real Academia de Ciencias Exactas Físicas y Naturales, 1952), 1: 393–402.
 35. *Ibid.*
 36. On the connections between eighteenth-century encyclopaedism and the sciences, see Richard Yeo, *Encyclopaedic Visions: Scientific Dictionaries and Enlightenment Culture* (Cambridge: Cambridge University Press, 2001).
 37. Martín de Sessé to Casimiro Gómez Ortega, 27 June 1788: ARJB, V, 1, 1, 23.
 38. Jacquin, *Selectorum stirpium*, entry for *Ehretia*, 45 and plate 180, figure 18; Patrick Browne, *The Civil and Natural History of Jamaica* (London, 1756); Sloane, *A Voyage*.
 39. Quoted in Andrés Galera Gómez, *La ilustración española y el conocimiento del nuevo mundo. Las ciencias naturales en la expedición Malaspina (1789–1794): La labor científica de Antonio Pineda* (Madrid: CSIC, 1988), 155.
 40. Bleichmar, “Exploration in Print,” 147–48.
 41. Mutis, *Diario de observaciones*, 1: 49–50 (1760).
 42. Mutis, “Noticias extractadas de la correspondencia familiar, 11 May 1783–18 March

- 1786,” ARJB, III, 1, 2, 85. Martín de Sessé conveyed the same intention in a letter to Gómez Ortega, 27 October 1788: ARJB, V, 1, 1, 25.
43. Eloy Valenzuela to Mutis, Santa Fe de Bogotá, 15 December 1784, ARJB, III, 1, 1, 428, reproduced in Mutis, *Archivo epistolar*, 4: 239.
 44. Mutis, “Noticias . . .,” ARJB, III, 1, 2, 85: Mariquita, 18 March 1786, 3r. He likewise noted a necessary emendation to Patrick Browne’s description of a passion fruit in *Diario de observaciones*, 1: 70 (1761).
 45. Martín de Sessé, “Catálogo de las aves remitidas en dos cajones al Real Gabinete con Dn. Cristóbal Quintana,” Mexico City, n.d. (probably 28 March 1793), ARJB, V, 1, 4, 13.
 46. José Longinos to José Clavijo (vicedirector of Madrid’s Royal Natural History Cabinet), Cuernavaca, 22 April 1789: AMNCN, item no. 493 in Calatayud Arinero, *Catálogo*. On the challenges posed to traveling naturalists by the need to consult rapidly expanding bibliographies, see Bleichmar, “Exploration in Print,” 142–43.
 47. Preface, ii. On the Bauers, see William T. Stearn, “Franz and Ferdinand Bauer, Masters of Botanical Illustration,” *Endeavour* 19 (1960): 27–35.
 48. Although Linnaeus enthusiastically used images for multiple purposes, his criticism of their use in this very limited context has been misinterpreted by some historians to mean that he profoundly distrusted images and rejected their use in botany, as for instance David Freedberg, *The Eye of the Lynx: Galileo, His Friends, and the Beginnings of Modern Natural History* (Chicago: University of Chicago Press, 2002), 412–13; and Karen Reeds, “When the Scientist Can’t Draw: The Case of Linnaeus,” *Interdisciplinary Science Reviews* 29, no. 3 (2004): 248–58. A careful reading of aphorism 13 in his introduction to *Genera Plantarum* (1737) shows that this is not the case. See Staffan Müller-Wille and Karen Reeds, “A Translation of Carl Linnaeus’s Introduction to *Genera Plantarum* (1737),” *Studies in the History and Philosophy of Biology and Biomedical Sciences* 38 (2007): 568.
 49. Alexander von Humboldt to Carl Ludwig Willdenow, Havana, 21 February 1801, as quoted in H. Walter Lack, “The Plant Self Impressions Prepared by Humboldt and Bonpland in Tropical America,” *Curtis’s Botanical Magazine* 18, part 4 (November 2001): 218–29, quote on 220.
 50. See Bruno Latour’s discussion of “immutable mobiles” in *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge: Harvard University Press, 1987), 215–57.
 51. On early modern natural history collecting, see among many others Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994); Oliver Impey and Arthur MacGregor (eds.), *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe* (Oxford: Clarendon Press, 1985); and Krzysztof Pomian, *Collectors and Curiosities: Paris and Venice, 1500–1800* (Cambridge: Cambridge University Press, 1987). On Spanish colonial collections specifically see Paz Cabello Carro, *Coleccionismo americano indígena en la España del siglo XVIII* (Madrid: Ediciones de Cultura Hispánica, 1989).
 52. Findlen, *Possessing Nature*; Emma Spary, *Utopia’s Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000), esp. 49–98.

53. Observational skills did not reside exclusively in the eye but were also embodied and internalized in the hand. Viewing and representing constituted related activities. The French collector and art connoisseur Antoine-Joseph Dezallier d'Argenville, for instance, recommended drawing shells as a way of learning to recognize and classify them. "What better way is there to recognize all the differences among shells," he asked, "than to draw them from nature? The slightest fold, the subtleties in the shape of a contour, of the mouth: nothing can escape, and nothing can better reveal the shell's true character." Dezallier D'Argenville, *L'Histoire naturelle, éclaircie dans deux de ses parties principales, La Lithologie et la Conchyliologie* (Paris, 1742), 117. Though the trained hand could help the learned eye to see, naturalists rarely possessed the desired level of drawing skills and for that reason collaborated with artists.
54. Daniel Margocsy, "Commercial Visions: Trading with Representations of Nature in Early Modern Netherlands," Ph.D. dissertation, Harvard University, 2009; Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007).
55. Müller-Wille, "Collection and Collation," 558.
56. Jan Golinski discusses a comparable process of human synchronization in *British Weather and the Climate of Enlightenment* (Chicago: University of Chicago Press, 2007).
57. On Cavanilles, see Antonio González Bueno, *Antonio José Cavanilles (1745–1804): la pasión por la ciencia* (Madrid: Fundación Jorge Juan, 2002) and Félix Muñoz Garmendia (ed.), *La botánica ilustrada. Antonio José Cavanilles (1745–1804), jardines botánicos y expediciones científicas* (Madrid: Caja Madrid Obra Social; Barcelona: Lunwerg Editores, 2004).
58. Lorenzo Uribe Uribe, "Salvador Rizo, artista botánico y prócer de la independencia," *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 11, no. 42 (1960): xxiii–xxvi.
59. Cavanilles described the new plant and dedicated it to Rizo in his "Descripción de los géneros Aeginetia, Rizoia y Castelia," *Anales de Ciencias Naturales* 3 (1801): 132–33. His description, however, was based on a herbarium sample and drawing sent by Luis Née, a member of the Malaspina expedition, and not by the New Granada expedition. The original type specimen is preserved in the Madrid Royal Botanical Garden, MA 29393.
60. José Celestino Mutis to Juan José de Villaluenga, president of Quito *Audiencia*, 10 July 1786, ARJB III, 2, 2, 196 and 197; reproduced in *Archivo Epistolar*, 1: 316.
61. My account of this episode comes from Augustin Pyramus de Candolle, *Flore du Mexique* [1819], published in Hervé M. Burdet, "Le récit par Augustin Pyramus de Candolle de l'élaboration de la *Flore du Mexique*, dite aussi *Flore des dames de Genève*," *Anales del Jardín Botánico de Madrid* 54 (1996): 575–88.
62. *Ibid.*, 580.
63. On the popularity of botany among women at the time, see Ann B. Shteir, *Cultivating Women, Cultivating Science: Flora's Daughters and Botany in England, 1760–1860* (Baltimore: Johns Hopkins University Press, 1996).
64. The collection was bound as a thirteen-volume manuscript, entitled *Flore du Mexique* and popularly known as the "Flora of the Ladies of Geneva," still at the

- Geneva Botanical Garden. The expedition's original drawings never made it back to Madrid: on his trip back to the capital, Mociño died in Barcelona in 1820. The whereabouts of the illustrations remained unknown for 160 years, until they resurfaced in the art market in 1980. They now are the Torner Collection of Sessé and Mociño Biological Illustrations at the Hunt Institute for Botanical Documentation, in Pittsburgh. See James J. White, Rogers McVaugh, and Robert W. Kiger (comp.), *The Torner Collection of Sessé and Mociño Biological Illustrations*, CD-ROM (Pittsburgh: Carnegie Mellon CD Press, 1998).
65. Candolle, *Flore du Mexique*, 579.
 66. *Ibid.*, 579–80.
 67. Paula Findlen's description of correspondence as a semi-public zone in the sixteenth century is largely operative for eighteenth-century naturalists. See "The Formation of a Scientific Community: Natural History in Sixteenth-Century Italy," in Anthony Grafton and Nancy Siraisi (eds.), *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge: MIT Press, 1999), 369–400. See also Ogilvie, *The Science of Describing*.
 68. On Dombey, see Ernest Théodore Hamy, *Joseph Dombey, médecin, naturaliste, archéologue, explorateur du Pérou, du Chili et du Brésil (1778–1785). Sa vie, son oeuvre, sa correspondance, avec un choix de pièces relatives à sa mission* (Paris: E. Guilmoto, 1905). On his participation in the expedition see Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964), esp. 88–98, 161–86.
 69. Casimiro Gómez Ortega, "Instrucción a que deberán arreglarse los sujetos."
 70. The fantastic story of Dombey's materials is described in Steele, *Flowers for the King*, 161–86.
 71. José Celestino Mutis, Mariquita, 17 June 1785: ARJB, III, 1, 2, 85, 1v–2r.
 72. *Stirpes novae, aut minus cognitae, quas descriptionibus et iconibus illustravit*, 2 vols. (Paris, 1784–85 [actual publication date 1785–89]).
 73. Hamy, *Joseph Dombey*, 389. Cavanilles responded to L'Héritier's publications with an article, "Observations de M. L'Abbé Cavanilles de l'Académie des Sciences d'Upsal, sur le cinquième fascicule de M. L'Héritier," *Observations sur la physique, sur l'histoire naturelle et sur les arts*, 34 (March 1789): 183–84, discussed in Steele, *Flowers for the King*, 182–83.
 74. Hamy, *Joseph Dombey*, 382–83. Apparently, Ruiz did not get the letter until twelve years later; he replied to L'Héritier from Madrid only on 5 November 1798. The letter appears in Hamy, *Joseph Dombey*, 383–84.
 75. Mercedes Cabello Martín et al., "Luces y sombras de una publicación: La *Flora Peruviana y Chilensis*," in Antonio González Bueno (ed.), *La Expedición botánica al Virreinato del Perú (1777–1788)* (Madrid: Lunweg, 1988), 119–30; Antonio González Bueno, "Un tesoro de las maravillas de la naturaleza: la *Flora Peruviana et Chilensis*," in Hipólito Ruiz and José Pavón, *Flora Peruviana et Chilensis*, facs. ed. (Madrid: CSIC, 1995), 1: cx–cxxv; Raúl Rodríguez Nozal and Antonio González Bueno, "La formación de grabadores para las 'Floras Americanas': un proyecto frustrado," in Alejandro R. Díez Torre et al. (eds.), *De la ciencia ilustrada a la ciencia romántica* (Madrid: Ateneo de Madrid/Doce Calles, 1995), 325–43; and Raúl Rodríguez

- Nozal, “El trabajo científico en la España ilustrada: La ‘Oficina Botánica’ y la publicación de las ‘Floras Americanas’,” in Ruiz and Pavón, *Flora Peruviana*, facs. ed., 1: lxxxiv–cvii. Much of the financing came from American contributors who responded to a royal request for donations, Steele, *Flowers for the King*, 212–24.
76. “Razón de los géneros y especies que desde nuestro descubrimiento y pocos años antes, nos han ido publicando los botánicos siguientes,” ARJB, IV, 12, 1, 7. The authors are Antoine Laurent de Jussieu, Carl Linnaeus, Charles Louis L’Héritier, Nikolaus Joseph von Jacquin, Charles Plumier, John Reinhold Forster, Wandellio (?), James Edward Smith, and Jean-Baptiste-Christophe Fusée-Aublet.
 77. José Celestino Mutis to Casimiro Gómez Ortega, 31 March 1784: ARJB, III, 1, 2, 32.
 78. Hipólito Ruiz López and José Pavón, *Flora Peruviana et Chilensis. Prodromus, descripciones y láminas de los nuevos géneros de plantas de la Flora del Perú y Chile* (Madrid, 1794), 86 and plate 17.
 79. Hipólito Ruiz, *Respuesta para desengaño del público a la impugnación que ha divulgado prematuramente el presbítero Don Josef Antonio Cavanilles* (Madrid, 1796), 66.
 80. *Ibid.*, 10, 11, 14, 16, 25, 27, 35, 37, 39, 45, 65.
 81. *Ibid.*, 18–19.
 82. Antonio José Cavanilles, *Colección de papeles sobre controversias botánicas* (Madrid, 1796), 7–8, 11.
 83. *Ibid.*, 10–13, quote on 13. True to this criterion, Cavanilles also published some of the findings from the Malaspina expedition: “Descripción de cinco géneros nuevos y de otras plantas,” *Anales de Historia Natural* 1, no. 3 (Madrid, 1799): 33–45, tabs. 1–5; “De los géneros Goodenia y Scaevola,” *Anales de Historia Natural* 1, no. 2 (Madrid, 1799): 89–101; “Observaciones sobre el suelo, naturales y plantas del Puerto Jackson y Bahía Botánica,” *Anales de Historia Natural* 1, no. 3 (Madrid, 1800): 181–239.
 84. This is in pointed contrast to Friedrich Georg Weitsch’s portrait of Alexander von Humboldt (1806), at the Berlin Alte Nationalgalerie, which depicts Humboldt in South America surrounded by vegetation and landscape. The focus here is on Humboldt as a traveler to distant and exotic locales, not on his prowess as a scientific expert observer. This is also the case for Weitsch’s painting, *Humboldt and Bonpland at the Foot of the Chimborazo in Ecuador* (1806), at Schloss Bellevue in Berlin.
 85. Dorinda Outram, “New Spaces in Natural History,” in Nicholas Jardine, James A. Secord, and Emma C. Spary (eds.), *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), 249–65.

Chapter Three

1. The production and uses of eighteenth-century botanical illustration are analyzed in great detail in Kärin Nickelsen, *Draughtsmen, Botanists, and Nature: The Construction of Eighteenth-Century Botanical Illustrations*, Archimedes Series vol. 15 (Dordrecht: Springer, 2006). More generally, see Brian J. Ford, “Scientific Illustration in the Eighteenth Century,” in Roy Porter (ed.), *The Cambridge History*

- of Science, vol. 4: *Eighteenth-Century Science* (Cambridge: Cambridge University Press, 2003), 561–83.
2. For examples see Rachel Doggett (ed.), *New World of Wonders: European Images of the Americas, 1492–1700* (Seattle: University of Washington Press, 1992); Hugh Honour, *The New Golden Land: European Images of America from the Discoveries to the Present Time* (New York: Pantheon Books, 1975); and Anthony Grafton, *New Worlds, Ancient Texts: The Power of Tradition and the Shock of Discovery* (Cambridge: Belknap, 1992).
 3. With de Bry's engravings, the agenda was not only to make the New World visible but also to reflect and foment Protestant anti-Spanish sentiment. Thomas B. F. Cummins, "De Bry and Herrera: 'Agua Negras' or the Hundred Years War over and Image of America," in *Arte, historia e identidad en América: visiones comparativas. 17o. Coloquio Internacional de Historia del Arte, Zacatecas, México* (Mexico City: UNAM, 1994), 17–31; Michael Gaudio, *Engraving the Savage: The New World and Techniques of Civilization* (Minneapolis: University of Minnesota Press, 2008); Michiel van Groesen, *The Representations of the Overseas World in the de Bry Collection of Voyages (1590–1634)* (Boston: Brill, 2008).
 4. Richard Kagan, *Urban Images of the Hispanic World, 1493–1793* (New Haven: Yale University Press, 2000).
 5. This was the case with William Roxburgh's *Plants of the Coast of Coromandel*, 3 vols. (London, 1795–20); see Ray Desmond, *Great Natural History Books and their Creators* (London: British Library and Oak Knoll Press, 2003), 49–57.
 6. Malaspina to Antonio Valdés, 26 December 1788, quoted in Carmen Sotos Serrano, *Los pintores de la expedición de Alejandro Malaspina*, 2 vols. (Madrid: Real Academia de la Historia, 1982), 1: 178.
 7. Casimiro Gómez Ortega, Madrid, 25 November 1776: AMNCN, item no. 7 in María de los Ángeles Calatayud Arinero, *Catálogo de las expediciones y viajes científicos españoles a América y Filipinas (siglos XVIII y XIX)* (Madrid: CSIC, 1984); reproduced in Hipólito Ruiz, *Relación histórica del viaje, que hizo a los reinos del Perú y Chile el botánico D. Hipólito Ruiz en el año 1777 hasta el de 1788, en cuya época regresó a Madrid*, ed. Jaime Jaramillo Arango, 2nd ed., 2 vols. (Madrid: Real Academia de Ciencias Exactas Físicas y Naturales, 1952), 1: 403–5.
 8. José de Gálvez to Ignacio de Hermosilla, El Pardo, 12 February 1777: AMNCN, item no. 10 in Calatayud Arinero, *Catálogo*.
 9. Ignacio de Hermosilla to José de Gálvez, Madrid, 19 March 1777: AMNCN, item no. 10 in Calatayud Arinero, *Catálogo*.
 10. Report from Mr. Magallón, Madrid?, 9 March 1777: AMNCN, item no. 12 in Calatayud Arinero, *Catálogo*.
 11. Aranjuez, 8 April 1777: AMNCN, item no. 13 in Calatayud Arinero, *Catálogo*.
 12. Casimiro Gómez Ortega, "Instrucción a que deberán arreglarse los sujetos destinados por S.M. para pasar a la América Meridional en compañía del médico Josef Dombey a fin de reconocer las plantas y yerbas y de hacer observaciones botánicas en aquellos países," Madrid, 1776, article 11: ARJB, IV, 7, 1, 2; reproduced in Ruiz, *Relación histórica*, 393–402.
 13. Casimiro Gómez Ortega, "Instrucción que deberán observar los dibujantes que

- pasan al Perú de orden de S.M. para servir con el ejercicio de su profesión en la expedición botánica,” approved 9 April 1777: AMNCN, item no. 7 in Calatayud Arinero, *Catálogo*; reproduced in Ruiz, *Relación histórica*, 416–18. Francisco Javier Puerto Sarmiento analyzes these two instructions, among others, in *Ciencia de cámara. Casimiro Gómez Ortega (1741–1818), el científico cortesano* (Madrid: CSIC, 1992), 160–76.
14. On San Carlos, see Thomas A. Brown, *La Academia de San Carlos de la Nueva España*, trans. María Emilia Martínez Negrete Deffis, 2 vols. (Mexico: Secretaría de Educación Pública, 1976); Abelardo Carrillo y Gariel, *Datos sobre la Academia de San Carlos de Nueva España. El arte en México de 1781 a 1863* (Mexico: Escuela Nacional de Bellas Artes, 1939); Jean Charlot, *Mexican Art and the Academy of San Carlos 1785–1915* (Austin: University of Texas Press, 1962); and Susan Deans-Smith, “‘This Noble and Illustrious Art’: Painters and the Politics of Guild Reform in Early Modern Mexico City, 1674–1768,” in Susan Deans-Smith and Eric van Young (eds.), *Mexican Soundings: Essays in Honour of David A. Brading* (London: Institute for the Study of the Americas, 2007), 67–98.
 15. Martín de Sessé to Casimiro Gómez Ortega, Mexico City, 27 March 1787: ARJB, V, 1, 1, 10, ff. 1r–1v.
 16. Sessé to Gómez Ortega, Mexico City, 27 June 1788, 2v–3r: ARJB, 5, 1, 1, 23. Alexander von Humboldt and Augustin Pyramus de Candolle shared this opinion; see Hans Walter Lack, “The Plant Self Impressions Prepared by Humboldt and Bonpland in Tropical America,” *Curtis’s Botanical Magazine* 18, part 4 (November 2001): 227; and Augustin Pyramus de Candolle, *Flore du Mexique*, 1819, transcribed in Hervé M. Burdet, “Le récit par Augustin Pyramus de Candolle de l’élaboration de la Flore du Mexique, dite aussi Flore des dames de Genève,” *Anales del Jardín Botánico de Madrid* 54 (1996): 578.
 17. This expedition also left behind the most documentation on its practices; nevertheless, its pictorial output remains under-studied. See ch. 1, n. 84.
 18. Only three of the fourteen artists employed by the Chile and Peru, New Spain, and Malaspina expeditions were not academically trained: Francisco Pulgar, José Guío, and José Cardero.
 19. Examples of botanical elements in Andean painted murals include those in the refectory of the Monasterio del Carmen de la Asunción in Cuenca, Ecuador (1801) and in the house of the *escribano* Juan de Vargas in Tunja, Colombia (ca. 1590), both reproduced in Santiago Sebastián, “European Models in the Art of the Viceroyalty of New Granada,” in *Barroco de la Nueva Granada: Colonial Art from Colombia and Ecuador* (New York: Americas Society, 1992), 13–37. See also Alexandra Kennedy Troya, “Baroque Art in the Audiencia of Quito,” in *Barroco de la Nueva Granada: Colonial Art from Colombia and Ecuador* (New York: Americas Society, 1992), 61–77 and Alexandra Kennedy Troya, “La pintura en el Nuevo Reino de Granada,” in Ramón Gutiérrez (ed.), *Pintura, escultura y artes útiles en Iberoamérica: 1500–1825* (Madrid: Cátedra, 1995); José María Vargas, *El arte quiteño en los siglos XVI, XVII y XVIII* (Quito: Romero, 1949).
 20. “Mutis Icones Ineditae,” Linnean Society, Mss. BL 1178. Mutis also sent Linnaeus herbarium specimens in both occasions.

21. ARJB III, 1, 2, 85, folio 2r.
22. ARJB III, 1, 3, 599; III, 1, 3, 600.
23. Lorenzo Uribe Uribe, “Los maestros pintores,” in *Flora de la Real Expedición Botánica del Nuevo Reino de Granada (1783–1816)*, 50 vols. (Madrid: Ediciones Cultura Hispánica, 1954–), 1: 103.
24. José Celestino Mutis, *Archivo Epistolar del Sabio naturalista Don José C. Mutis*, ed. Guillermo Hernández de Alba, 2nd ed., 4 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 1: 416–17.
25. Mutis, *Archivo Epistolar*, 1: 313, 330–31.
26. Mutis, *Archivo Epistolar*, 1: 442.
27. Mutis to Jonas Bergius, quoted in Mónica de Cossio Savin D’Orfond, “Mutis: un botánico español en América,” B.A. thesis, Universidad Complutense, Madrid, 2002, 228.
28. Hipólito Ruiz to Jorge Escobedo, *superintendente general de real hacienda*, Huánuco, 9 July 1786: AMNCN, item no. 125 in Calatayud Arinero, *Catálogo*; reproduced in Ruiz, *Relación histórica*, 466–72.
29. Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), ch. 2, esp. 84–98, and Nickelsen, *Draughtsmen*, esp. 1–68.
30. Luis Née to José Celestino Mutis, Guayaquil, ca. 22 October 1790: ARJB, III, 1, 1, 230, folio 2r, reproduced in Mutis, *Archivo Epistolar*, 4: 74–76.
31. Sometimes, artists talked back: see Daston and Galison, *Objectivity*, 93–94.
32. The manuscript of sixteenth-century Swiss naturalist Conrad Gessner’s *Historia plantarum*, for instance, are replete with his feedback to the artist. See the facsimile edited by Heinrich Zoller, Martin Steinmann, and Karl Schmid (Dietikon-Zürich: Urs Graf-Verlag, 1972). I thank Sachiko Kusukawa for bringing this source to my attention.
33. Per my count, based on the charts in María Pilar de San Pío Aladrén (ed.), *Mutis y la Real Expedición Botánica del Nuevo Reyno de Granada*, 2 vols. (Barcelona: Lunwerg Editores, 1992). Lorenzo Uribe Uribe found 1,269 signed illustrations; see “La Expedición Botánica del Nuevo Reino de Granada: su obra y sus pintores,” *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 19 (1953): 7.
34. Mutis, *Archivo Epistolar*, 1: 121–22, 166–68, 179–85, 300–304.
35. [José Celestino Mutis], *Diario de observaciones de José Celestino Mutis (1760–1790)*, transcr. and prol. Guillermo Hernández de Alba, 2nd ed., 2 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 2: 530–31.
36. *Ibid.*, 339 (12 July 1784).
37. *Ibid.*, 364 (22 July 1784).
38. *Ibid.*, 479 (2 October 1784).
39. *Ibid.*, 1: 273 (1778).
40. Botanists in Spain also followed foreign plants over time, for instance in the Spanish Royal Gardens of Aranjuez: “Lista de las Plantas que se observaron en el Real Sitio de Aranjuez y cuyos nombres se procuraron determinar por su traza a causa de no estar en flor en el Otoño ultimo y se han determinado en este mes de Junio con presencia de su flor rectificando las dudas o equivocaciones que por falta de ella se habian padecido”: ARJB, I, 4, 4, 10. The experience was repeated with another set of foreign plants: ARJB, I, 4, 5, 3.

41. Mutis, *Diario*, 2: 348–49 (16 July 1784).
42. Martín de Sessé to Casimiro Gómez Ortega, Mexico City, 26 November 1787: ARJB, V, 1, 1, 14.
43. Martín de Sessé to Antonio Porlier, Querétaro, 28 May 1790: AMNCN, item no. 499 in Calatayud Arinero, *Catálogo*.
44. Hans Walter Lack and Victoria Ibáñez, “Recording Colour in Late Eighteenth-Century Botanical Drawings: Sydney Parkinson, Ferdinand Bauer, and Thaddäus Haenke,” *Curtis’ Botanical Magazine* 14, part 2 (1997): 88–89; see also Victoria Ibáñez (ed.), *Trabajos científicos y correspondencia de Tadeo Haenke*, vol. 4 of *La expedición Malaspina, 1789–1794*, 9 vols. (Madrid: Lunwerg Editores, 1987–96).
45. Mutis, *Diario*, 2: 316 (1 July 1784).
46. *Ibid.*, 318 (2 July 1784).
47. *Ibid.*, 408–9 (5 August 1784).
48. José Celestino Mutis to unnamed recipient, Mariquita, 9 June 1784: ARJB, III, 1, 2, 86; reproduced in *Archivo Epistolar*, 1: 202.
49. See for instance Mutis, *Diario*, 1: 267, 282 (1778), 2: 115 (1784). Mutis also compared a local bird to one in his natural history paintings: *Diario*, 1: 270 (1778).
50. Mutis, *Diario*, 2: 525–26 (2 December 1784).
51. José Celestino Mutis to Eloy Valenzuela, Mariquita, 25 June 1786: ARJB, III, 1, 2, 72; reproduced in *Archivo Epistolar*, 1: 308.
52. Mutis, *Diario*, 2: 317 (2 July 1784).
53. Mutis sent Linnaeus dried plants on five separate occasions: in 1767, 1770, 1773, 1777, and 1778. The last two sets were particularly large, with about 150 and 180 specimens. The specimens are held in the Linnean Society, London, and catalogued in Spencer Savage, *A Catalogue of the Linnaean Herbarium* (London: Linnean Society, 1945).
54. Cossio Savin D’Orfond, “Mutis,” 65–67.
55. Casimiro Gómez Ortega to José de Gálvez, 10 February 1779, quoted in Francisco de las Barras de Aragón, “Noticias acerca de las órdenes y disposiciones dictadas en el siglo XVIII para la recolección en Indias de ejemplares con destino al Real Gabinete de Historia Natural,” *Boletín de la Real Sociedad Española de Historia Natural* 15 (Madrid, 1915): 234.
56. José Celestino Mutis to Antonio Caballero y Góngora, Mariquita, 19 November 1785, in Mutis, *Archivo Epistolar*, 1: 264–65, quote on 265.
57. Martín de Sessé to Casimiro Gómez Ortega, Mexico, 26 November 1787: ARJB, V, 1, 1, 14.
58. José Celestino Mutis to Bruno Landete, Valle de Guaduas, 25 August 1783: ARJB, III, 1, 2, 67, reproduced in Mutis, *Archivo Epistolar*, 1: 128.
59. Since the expedition’s botanical illustrations are not oil paintings, it is likely that Mutis refers to the series of six *Cuadros de mestizaje* by Vicente Albán (1783), which I discuss in chapter 5.
60. José Celestino Mutis to Eloy Valenzuela, Santa Fe de Bogotá, 15 March 1784, in Mutis, *Archivo Epistolar*, 1: 174.
61. José Celestino Mutis to José Moñino, Conde de Floridablanca, Mariquita, 19 November 1785: ARJB, III, 2, 2, 182, reproduced in Mutis, *Archivo Epistolar*, 1: 266–67.
62. Antonio Porlier to José de Ezpeleta, San Lorenzo de El Escorial, 27 October 1789:

- ARJB, III, 2, 6, 70. Ezpeleta issued the order to move on 9 February 1790, see Mutis, *Archivo Epistolar*, 3: 252–53.
63. José Celestino Mutis to José de Ezpeleta, Santa Fe de Bogotá, 27 October 1791: ARJB, III, 2, 2, 133. The four naturalists were Antonio Zea, Mutis's nephews José and Sinforoso Mutis, and another unnamed young man; only the first would receive a salary. The hires were approved in a letter from Ezpeleta to Mutis, Santa Fe de Bogotá, 11 November 1791, in Mutis, *Archivo Epistolar*, 3: 268–69.
 64. Marcelo Frías Núñez, *Tras El Dorado vegetal: Jose Celestino Mutis y la Real Expedición Botánica del Nuevo Reino de Granada (1783–1808)* (Sevilla: Diputación Provincial de Sevilla, 1994), 133.
 65. Nickelsen, *Draughtsmen*, 71–106, 149–84. More generally on style and scientific illustration, see Horst Bredekamp, Birgit Schneider, and Vera Dünkel (eds.), *Das technische Bild: Kompendium für eine Stilgeschichte wissenschaftlicher Bilder* (Berlin: Akademie Verlag, 2008).
 66. Lorraine Daston and Peter Galison, “The Image of Objectivity,” *Representations*, 40 (1992): 81–128, and *Objectivity*, 19–27, 55–113; Nickelsen, *Draughtsmen*, 87–92.
 67. Martin Kemp, “Taking It on Trust: Form and Meaning in Naturalistic Representation,” *Archives of Natural History* 17 (1990): 127–88. See also Bert Hall, “The Didactic and the Elegant: Some Thoughts on Scientific and Technological Illustrations in the Middle Ages and Renaissance,” in Brian S. Baigrie (ed.), *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science* (Toronto: University of Toronto Press, 1996), 3–39; Peter Parshall, “*Imago Contrafacta*: Images and Facts in the Northern Renaissance,” *Art History* 16 (1993): 554–79; Claudia Swan, “*Ad vivum, naer het leven*, From the Life: Defining a Mode of Representation,” *Word & Image* 11, no. 4 (1995): 353–72.
 68. On L’Empereur, see Kapil Raj, “Surgeons, Fakirs, Merchants, and Craftspeople: Making L’Empereur’s *Jardin* in Early Modern South Asia,” in Londa Schiebinger and Claudia Swan (eds.), *Colonial Botany: Science, Commerce, and Politics* (Philadelphia: University of Pennsylvania Press, 2005), 252–69.
 69. Gill Saunders, *Picturing Plants: An Analytical History of Botanical Illustration* (London: Zwemmer, 1995), 73–81.
 70. The study of syncretism, *mestizaje*, and the adaptation and transformation of European models has been a central topic in the study of Spanish American art in the 1500s and 1600s. See among others Thomas Cummins, *Toasts with the Inca: Andean Abstraction and Colonial Images on Quero Vessels* (Ann Arbor: University of Michigan Press, 2002), and “Imitación e invención en el barroco peruano,” in Ramón Mujica Pinilla (ed.), *El barroco peruano* (Lima: Banco de Crédito, 2003), 26–59; Barbara Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas* (Chicago: University of Chicago Press, 1996); Serge Gruzinski, *Painting the Conquest: The Mexican Indians and the European Renaissance* (Paris: Flammarion, 1992); and Jeanette Favrot Peterson, *The Paradise Garden Murals of Malinalco: Utopia and Empire in Sixteenth-Century Mexico* (Austin: University of Texas Press, 1993).
 71. Carolyn Dean and Dana Leibsohn, “Hybridity and Its Discontents: Considering Visual Culture in Colonial Spanish America,” *Colonial Latin American Review* 12, no. 1 (2003): 5–35.

72. The misattribution is resolved in Javier Fuertes, “La colección de láminas de Mutis localizadas en el fondo documental ‘Expedición Malaspina’ del Archivo del Real Jardín Botánico,” in María Pilar de San Pío Aladrén and María Dolores Higuera Rodríguez (eds.), *La armonía natural. La naturaleza en la expedición marítima de Malaspina y Bustamante (1789–1794)* (Madrid: Lunwerg Editores, 2001), 85–92.
73. Mutis, *Archivo Epistolar*, 2: 548–51, 553.
74. Mutis, *Diario*, 2: 584–85.
75. Carolyn Dean, “The Renewal of Old World Images and the Creation of Colonial Peruvian Visual Culture,” in Diana Fane (ed.), *Converging Cultures: Art and Identity in Spanish America* (New York: Harry N. Abrams, 1996): 171–82.
76. ARJB III, 1, 2, 85, folio 2r.
77. Mutis, *Archivo Epistolar*, 1: 300–304.
78. Mutis, Mariquita, 18 March 1786, 3r, in “Noticias extractadas de la correspondencia familiar, 11 May 1783–18 March 1786,” ARJB, III, 1, 2, 85.
79. Mutis, *Diario*, 2: 514.
80. ARJB III, 1, 2, 85, folio 3r.
81. Mutis, *Archivo Epistolar*, 1: 167, 186.
82. ARJB III, 1, 2, 85, folio 2v.
83. Mutis, *Archivo Epistolar*, 1: 439–40.

Chapter Four

1. Juan de Cuéllar, “Manifiesto o pequeño discurso acerca de la canela de las islas [Filipinas], comparada con la de China y Zeylán,” Manila, 22 January 1789: AMNCN, item no. 475 in María de los Ángeles Calatayud Arinero, *Catálogo de las expediciones y viajes científicos españoles a América y Filipinas (siglos XVIII y XIX)* (Madrid: CSIC, 1984). There is another copy of the report, entitled “Memoria de Juan de Cuéllar sobre la canela, con detallado estudio de esta planta,” AGI, Estado, 47, N.12. A report on Cuéllar’s activities, probably written in Madrid and dated 6 September 1788, refers to the artists as “indios aficionados a la pintura,” pointedly distinguishing them from “dibujantes” (draftsmen). AGI, Filipinas, 723, 46, f. 2r. On Cuéllar, see María Pilar de San Pío Aladrén (ed.), *La expedición de Juan de Cuéllar a Filipinas* (Madrid: Lunwerg and Real Jardín Botánico, 1997), and María Belén Bañas Llanos, *Una historia natural de Filipinas: Juan de Cuéllar, 1739?–1801* (Barcelona: Ediciones del Serbal, 2000), esp. 209–49 on cinnamon.
2. Cf. my discussion of collation as central to the Linnaean method in chapter 2. Cuéllar sent two shipments to Madrid on 26 November 1787 and 8 January 1788: AGI, Filipinas, 723, 46. The Manifiesto suggests that the illustrations were part of the latter shipment.
3. Cuéllar mentioned sending “thirty-four drawings of plants from these islands, illuminated after nature by the draftsmen I am training” in a letter to Antonio Porlier, Manila, 28 December 1788: AGI, Filipinas, 723, 12. It is likely that the two drawings of cinnamon formed part of this shipment. He also recorded sending “nineteen drawings of plants and animals from these islands for the Royal Botanical Garden; same number of drawings, separately, for the Royal Natural History Cabinet,” Ma-

- nila, 3 January 1792: AGI, Filipinas, 723, 32. These drawings are held today at the Madrid Botanical Garden (ARJB, X, 1 to 64). The Chinese botanical watercolors that Cuéllar sent to the Royal Natural History Cabinet in 1787 are also at the ARJB.
4. On the Philippines Company, see María Lourdes Díaz-Trechuelo Spínola, *La Real Compañía de Filipinas* (Seville: Escuela de Estudios Hispano-Americanos de Sevilla / CSIC, 1965).
 5. Casimiro Gómez Ortega to José de Gálvez, Puertollano, 19 July 1779: AMNCN, item no. 33 in Calatayud Arinero, *Catálogo*; Joseph Dombey to Gálvez, Cuchero, 20 May 1780: AMNCN, item no. 39 in *ibid.*; Dombey to Gálvez, Huanuco, 22 June 1780, item no. 41 in *ibid.*; Jorge Escobedo to Gálvez, Lima, 5 November 1787: AMNCN, item no. 128 in *ibid.*
 6. Minutes of *oficio* to Pedro Cevallos, San Lorenzo de El Escorial, 10 October 1804: AMNCN, item no. 538 in *ibid.*
 7. “Lista de las maderas,” ARJB, V, 1, 4, 28; “Virtudes de la corteza del palo nombrado Coplachi,” Veracruz, 16 January 1802: ARJB, V, 1, 5, 5.
 8. Luis Née, “Relación de las maderas,” Madrid, 1797: AMNCN, item no. 642 in Calatayud Arinero, *Catálogo*.
 9. Casimiro Gómez Ortega to José de Gálvez, 23 February 1777; AGI, Indiferente General, 1544, cited in Francisco José Puerto Sarmiento, *Ciencia de cámara. Casimiro Gómez Ortega (1741–1818), el científico cortesano* (Madrid: CSIC, 1992), 154–56.
 10. Other naturalists wrote similar treatises to promote imperial commodities, for instance Hipólito Ruiz, *Disertaciones sobre la raíz de la ratánhia de la calaguala y de la china y acerca de la yerba llamada canchalagua* (Madrid, 1796), and outside of Spain James Anderson, *Letters to Sir Joseph Banks . . . on the Subject of Cochineal Insects, discovered in Madras* (Madras, 1788); Charles Marie de La Condamine, “Sur l’arbre du quinquina,” *Mémoires de l’Académie des Sciences* (Paris, 1738), 226–43; John Ellis, *A description of the Mangostan and the Bread-fruit: the first, esteemed one of the most delicious; the other, the most useful of all the fruits in the East Indies* (London, 1775); and Thiery de Menonville, “Traité de la culture du nopal & de l’éducation de la cochenille dans les colonies Françaises de l’Amérique précédé d’un voyage a Guaxaca,” *Annales de Chimie* 5 (1790): 107–41.
 11. Antonio José Cavanilles, “Descripción de cinco géneros nuevos y de otras plantas,” *Anales de Historia Natural* 1, no. 1 (1799): 33–45, tabs. 1–5; “De los géneros Goodenia y Scaevola,” *Anales de Historia Natural* 1, no. 2 (1799): 89–101, tabs. 6–10; “Diez especies nuevas del género *Acrostichum*,” *Anales de Historia Natural* 1, no. 2 (1799): 101–7; and “Observaciones sobre el suelo, naturales y plantas del Puerto Jackson y Bahía Botánica,” *Anales de Historia Natural* 1, no. 3 (1800): 181–239, tabs. 11–16. All are reproduced in Joaquín Fernández Pérez (ed.), *Anales de Historia Natural, 1799–1804*, facs. ed., 3 vols. (Madrid: Doce Calles, 1993).
 12. Casimiro Gómez Ortega, *Historia natural de la Malagueta ó Pimienta de Tavasco, y noticia de los usos, virtudes y exención de derechos de esta saludable y gustosa especia, con la lámina de su árbol* (Madrid, 1780), 17.
 13. The element of patriotic propaganda is also evidenced in Gómez Ortega’s mention that the plant had first been described in the 1570s by Francisco Hernández, in

- this way connecting contemporary natural history investigations to an illustrious genealogy of Spanish exploration. On Monardes, see Daniela Bleichmar, “Books, Bodies, and Fields: Sixteenth-Century Transatlantic Encounters with New World *Materia Medica*,” in Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics* (Philadelphia: University of Pennsylvania Press, 2004), 83–99.
14. The cinnamon trade is discussed in the correspondence of Viceroy Martín Enríquez for the years 1574–76, AGI, Mexico, 19, N. 151 and 175–77.
 15. On early Spanish experiences with American cinnamon, see Marcelo Frías Núñez and Andrés Galera (eds.), *Pedro Fernández de Cevallos: la ruta de la canela americana* (Madrid: Historia 16, 1992), 7–52. For early published descriptions, see 10–19.
 16. There is ample mention of cinnamon in official correspondence from the Philippines in the sixteenth century. On a letter dated 26 July 1568, Governor Miguel López de Legazpi recorded two shipments of cinnamon to Spain. AGI, Filipinas, 6, R.1, N. 9.
 17. Jonathan Israel, *Conflicts of Empires: Spain, the Low Countries, and the Struggle for World Supremacy, 1585–1713* (London: Hambledon Press, 1997), 305–18, 349–60; M. N. Pearson (ed.), *Spices in the Indian Ocean World* (Aldershot, Hampshire, Great Britain: Variorum, 1996); Benjamin Schmidt, *Innocence Abroad: The Dutch Imagination and the New World, 1570–1670* (New York: Cambridge University Press, 2001), 123–84.
 18. Luis J. Ramos Gómez, *Las noticias secretas de América, de Jorge Juan y Antonio de Ulloa (1734–1745)* (Madrid: CSIC, 1991), 1: 586.
 19. Cited in Arthur Robert Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964), 90.
 20. Casimiro Gómez Ortega, “Informe al Duque de Losada sobre la canela y el clavo de Quito,” 15 January 1777, cited in Puerto Sarmiento, *Ciencia de cámara*, 153–55.
 21. Joseph Dombey to José de Gálvez, Lima, 16 March 1780: AMNCN, item no. 37 in Calatayud Arinero, *Catálogo*.
 22. José Celestino Mutis to J. E. Ramos, Santa Fe de Bogotá, 15 October 1783: ARJB, III, 1, 2, 58; reproduced in José Celestino Mutis, *Archivo Epistolar del Sabio naturalista Don José C. Mutis*, ed. Guillermo Hernández de Alba, 4 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 2nd. ed. 1983), 2: 270.
 23. Antonio Caballero y Góngora to Mutis, December 1783 (date attributed by Guillermo Hernández de Alba), in Mutis, *Archivo Epistolar*, 3: 41.
 24. Draft of letter from José Celestino Mutis to Juan Casamayor, Caballero y Góngora’s secretary, Santa Fe de Bogotá, 23 December 1783: ARJB, III, 1, 2, 22; reproduced in Mutis, *Archivo Epistolar*, 1: 144. Mutis was referring to a collection of thirty-two pen-and-ink drawings he had sent to Linnaeus in 1773, held today in the Linnean Society, London, Mss. BL 1178 (“Mutis, *Icones Ineditae*”).
 25. José Celestino Mutis to Antonio Caballero y Góngora, Mariquita, 18 September 1786: ARJB, III, 2, 2, 87, reproduced in Mutis, *Archivo Epistolar*, 1: 347–48; Caballero y Góngora to Mutis, Turbaco, 16 October 1786, reproduced in *ibid.*, 3: 61.
 26. Manuscript translation extracting a letter sent by Humboldt from Contreras, New Granada, to a Berlin monthly: ARJB, III, 9, 1, 57.

27. Frías Núñez and Galera, eds., *Pedro Fernández de Cevallos*, 28–51.
28. Cuéllar successfully petitioned to receive the official title of “Botanist, in the same way as it was given to the professors of the Peru Expedition,” and was thereafter required to send reports and samples back to Madrid every six months. Juan de Cuéllar, Manila, undated memorandum: AGI, Filipinas, 723, 2; royal approval of request, 19 November 1785: AGI, Filipinas, 723, 20. Over the years, Cuéllar repeatedly requested receiving a salary from Madrid, without success; see for instance a letter to Antonio Porlier, Manila, 29 June 1793: AGI, Filipinas, 723, 24.
29. Salgado outlined his involvement with cinnamon, dating back to 1778, in a letter to Antonio Porlier, Manila, 30 January 1789: AGI, Filipinas, 723. On Salgado, see Francisco de las Barras de Aragón, “Don Francisco Xavier Salgado y sus obras en Filipinas en el siglo XVIII,” paper presented on 11 May 1917 at Congreso de Sevilla, Asociación Española para el Progreso de las Ciencias (Madrid, n.d.), 8: 53–122.
30. Ibid., 2r–v. Cuéllar described natives as lazy by temperament but improvable through supervised work in an unsigned letter to José de Gálvez, Manila, 05 January 1788: AGI, Filipinas, 723, 26, and a signed one to Antonio Porlier, Manila, 28 December 1788, Filipinas, 723, 12. Similar connections between imperial science and notions of improvement were at play in the British Empire; see Richard Drayton, *Nature’s Government: Science, Imperial Britain, and the “Improvement” of the World* (New Haven: Yale University Press, 2000).
31. Gómez Ortega to Antonio Porlier, Madrid, 6 March 1788: AGI, Filipinas, 723, 15, 3.
32. Manuel González Guiral to Antonio Porlier, Cadiz, 12 May 1789, on receipt of a crate of cinnamon sent from Manila by Cuéllar: AGI, Filipinas, 732, 4; Felix Berenger de Marquina to Antonio Porlier, correspondence accompanying two crates of cinnamon and nutmeg from Salgado’s hacienda, Manila, 18 January and 3 February 1790: AGI, Filipinas, 723, 21 and 22.
33. Official letter to Francisco Xavier Salgado, San Lorenzo de El Escorial, 21 October 1789: AGI, Filipinas, 723, 49. Various letters were sent to Salgado in 1789 and 1790 encouraging his efforts to cultivate cinnamon and requesting that he continue to send samples to Madrid. AGI, Filipinas, 723, 50–52.
34. Juan Díaz to Marqués de Valdecazana, Aranjuez, 30 March 1792: AGI, Filipinas, 723, 37. There is a related “Análisis de canela de Manila,” 1791, Archivo de Farmacia, Palacio Real de Oriente, Madrid, C-3-5, 1791–93.
35. Juan de Cuéllar, “Estado del número de canelas, y otras plantas útiles que existen en la Hacienda de Calavan propia de Dn. Francisco Xavier Salgado,” Manila, 27 June 1791: AGI, Filipinas, 723, 5.
36. Juan de Cuéllar to Antonio Porlier, Manila, 27 July 1791: AGI, Filipinas, 723, 43.
37. Royal Order, 19 June 1793: AGI, Filipinas; 984. Royal Order, 2 March 1794: AGI, Filipinas, 989; José de Benitua Iriarte to Cuéllar, Madrid, 14 March 1794: AGI, Filipinas, 504, number 111.
38. ARJB, III, 11, 2, 12, with Mutis’s notes on two articles, “London,” *Gaceta de Madrid*, no. 80, 12 September 1788, and “London,” *Gaceta de Madrid*, no. 76, 29 August 1788. On Bogotá tea, see Marcelo Frías Núñez, “El té de Bogotá: un intento de alternativa al té de China,” in Marie Cecile Bénassy, Jean-Pierre Clement, Francisco Pelayo, and Miguel Angel Puig-Samper (eds.), *Nouveau monde et renouveau de l’histoire naturelle*, 3 vols. (Paris: Presses de la Sorbonne Nouvelle, 1994), 3: 201–19.

39. José Celestino Mutis to Conde de Floridablanca, Mariquita, 19 November 1785: ARJB, III, 2, 2, 183; reproduced in Mutis, *Archivo Epistolar*, 1: 267–69.
40. Antonio Caballero y Góngora to José Celestino Mutis, Turbaco, 6 November 1786, and Cartagena, 11 December 1786, in Mutis, *Archivo Epistolar*, 3: 61–62 and 65–66.
41. Antonio Caballero y Góngora to José Celestino Mutis, Cartagena, 23 December 1786, in Mutis, *Archivo Epistolar*, 3: 67–68.
42. Juan Díaz, “Disertación phisico, chimica, botanica del thé de Bogotá comparado con el de Levante,” 16 August 1786: AGP, Reinados, Carlos IV, Cámara, legajo 10, caja 1 (legajo 4650).
43. José Celestino Mutis to Antonio Caballero y Góngora, Mariquita, 3 June 1787, in Mutis, *Archivo Epistolar*, 1: 390–91.
44. Antonio Porlier to Marqués de Valdecazana, Palacio, 15 February 1790: AGP, Reinados, Carlos IV, Cámara, legajo 10, caja 1 (legajo 4650).
45. Castor Ruiz del Cerro to Juan Díaz, Madrid, 21 March 1790: AGP, Reinados, Carlos IV, Cámara, legajo 10, caja 1 (legajo 4650).
46. Ibid.
47. Juan Díaz to Marqués de Valdecazana, Aranjuez, 13 April 1790, AGP, Reinados, Carlos IV, Cámara, legajo 10, caja 1 (legajo 4650).
48. The survival rate for live plants shipped across great distances remained extremely low until the introduction of the Wardian case (a sealed glass container) in the 1830s.
49. Casimiro Gómez Ortega to José de Gálvez, 24 November 1780, in Hipólito Ruiz, *Relación histórica del viage, que hizo a los reinos del Perú y Chile el botánico D. Hipólito Ruiz en el año 1777 hasta el de 1788, en cuya época regresó a Madrid*, ed. Jaime Jaramillo Arango, 2 vols. (Madrid: Real Academia de Ciencias Exactas Físicas y Naturales, 2nd. ed. 1952), 445.
50. Ruiz and Pavón’s shipments over the years are described in great detail in Ruiz, *Relación*, 430–76, and Steele, *Flowers for the King*, 137–55. The live plants are itemized in Hipólito Ruiz, “Lista y Razón de las plantas vivas remitidas en varias ocasiones a España entre los años 1779–1787,” Peru, 1787: ARJB, IV, 7, 3, 9.
51. Unsigned letter to José de Gálvez, probably from Cuéllar, Manila, 5 January 1788: AGI, Filipinas, 723, 26.
52. Casimiro Gómez Ortega, *Instrucción sobre el modo más seguro y económico de transportar plantas vivas por mar y tierra a los países más distantes ilustrada con láminas. Añádese el método de desecar las plantas para formar herbarios* [Madrid, 1779], intro. by Francisco Javier Puerto Sarmiento (Madrid: Biblioteca de Clásicos de la Farmacia Española, 1992), 22–23, and *Historia natural de la Malagueta*, 31.
53. Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge: Harvard University Press, 1999), 113–39.
54. Patrice Bret, “Le Réseau des jardins coloniaux: Hypolite Nectoux (1759–1836) et la botanique tropicale, de la mer des Caraïbes aux bords du Nil,” in Yves Laissus (ed.), *Les Naturalistes français en Amérique du Sud XVIe–XIXe siècles* (Paris: Comité des Travaux Historiques et Scientifiques, 1995), 185–216; Emma C. Spary, *Utopia’s Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000), 117–32, and “Of Nutmegs and Botanists: The Colonial Cultivation of Botanical Identity,” in Schiebinger and Swan (eds.), *Colonial Botany*, 187–203.

55. Emma C. Spary and Paul White, “Food of Paradise: Tahitian Breadfruit and the Autocritique of European Consumption,” *Endeavour* 28, no. 2 (June 2004): 75–80; Greg Denning, *Mr. Bligh’s Bad Language: Passion, Power, and Theatre on the Bounty* (Cambridge: Cambridge University Press, 1992); Douglas Oliver, *Return to Tahiti: Bligh’s Second Breadfruit Voyage* (Honolulu: University of Hawaii Press, 1988).
56. Juan de Cuéllar to José de Gálvez, Manila, 9 January 1787: AGI, Filipinas, 723, 15, 1. The fate of this shipment is described in Francisco de las Barras de Aragón, “Documentos de D. Casimiro Gómez Ortega referentes a un envío de plantas vivas y otros objetos de Filipinas, hecho por D. Juan de Cuéllar en 1787,” *Boletín de la Real Sociedad Española de Historia Natural* 16 (Madrid, 1916): 386–94.
57. Described in Francisco de las Barras de Aragón, “Documentos referentes a la formación de un jardín botánico y de aclimatación de plantas americanas en la península, en la ciudad de Córdoba,” paper presented on 20 October 1915 at Congreso de Valladolid, Asociación Española para el Progreso de las Ciencias (Madrid, n.d.), 107–20.
58. ARJB, I, 22, 6, 4 and 19; I, 22, 7, 4; and I, 23, 2, 7. See Francisco de las Barras de Aragón, “Noticias acerca del Jardín Experimental y de Aclimatación de Sanlúcar de Barrameda,” *Boletín de la Real Sociedad Española de Historia Natural* 10 (Madrid, 1910): 367–69, and “Noticias sobre el Jardín Botánico de Sanlúcar de Barrameda y sobre el viajero D. Francisco Badía, procedentes de los papeles de D. José Camps,” *Boletín de la Real Sociedad Española de Historia Natural* 11 (Madrid, 1911): 143–45.
59. The garden publicized its holdings by distributing copies of its *Elenchus plantarum Horti Regii Botanici Matritensis* (Madrid, 1796) and *Novarum, aut rariorum plantarum . . . descriptionum . . .* (Madrid, 1797–1800), from which its correspondents could identify desirable plants for exchange. The ARJB contains extensive documentation detailing seed shipments and participation in a vast European network.
60. Drayton, *Nature’s Government*; Spary, *Utopia’s Garden*.
61. Gómez Ortega, *Instrucción*, 9–10.
62. Ibid., 22. Gómez Ortega offered the French Jardin du Roi as the consummate model of this extractive vision, noting that all the coffee trees growing in Martinique and nearby islands could be traced back to Paris, where they had originally been planted before being shipped to the Caribbean. This project alone, Gómez Ortega imagined, must surely have repaid any initial royal investment in the garden (ibid., 7–8).
63. Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge: Harvard University Press, 1987), 215–57. For a critique of this model, see Michael Bravo, “Ethnological Encounters,” in Nicholas Jardine, James A. Secord, and Emma C. Spary (eds.), *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), 338–57.
64. Martín de Sessé to Casimiro Gómez Ortega, Mexico, 26 April 1786, ARJB, V, 1, 1, 7, and Mexico, 27 March 1788: ARJB, V, 1, 1, 18; Gómez Ortega to Pedro Acuña, Madrid, 5 November 1792: AMNCN, ítem no. 509 in Calatayud Arinero, *Catálogo*; Sessé to Viceroy Revillagigedo, Mexico, 15 March 1793: ARJB, V, 1, 4, 4. The garden’s early years are described in Harold W. Rickett, “The Royal Botanical Expedition to New Spain,” *Chronica Botanica* 11, no. 1 (1947): 1–81.

65. John Wilton Appel, *Francisco José de Caldas: A Scientist at Work in Nueva Granada* (Philadelphia: American Philosophical Society, 1994); José Eusebio Llano Zapata, *Epítome cronológico o idea general del Perú. Crónica inédita de 1776*, ed. Víctor Peralta Ruiz (Madrid: Fundación Mapfre Tavera, 2005), and *Memorias histórico, físicas, crítico, apologéticas de la América Meridional*, ed. Ricardo Ramírez Castañeda et al. (Lima: Pontificia Universidad Católica del Perú, 2005); José Luis Peset, *Ciencia y libertad. El papel del científico ante la Independencia americana* (Madrid: CSIC, 1987); Diana Soto Arango, Miguel Ángel Puig-Samper, and María Dolores González-Ripoll (eds.), *Científicos criollos e ilustración* (Madrid: Doce Calles, 1999).
66. Martín de Sessé first suggested establishing a chair of botany and a garden in a letter to Casimiro Gómez Ortega, Habana, 30 January 1785: ARJB, V, 1, 1, 1. The following year, Sessé proposed the expedition. Both projects were officially approved within a week from each other in March 1787: ARJB, V, 1, 3, 13, and V, 1, 1, 17.
67. Martín de Sessé to Casimiro Gómez Ortega, Mexico, 27 March 1788: ARJB, V, 1, 1, 18, ff. 1r–1v.
68. *Gaceta de México*, 6 May 1788, 3: 75–77, cited in Iris H. W. Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions* (Seattle: University of Washington Press, 1981), 23.
69. Martín de Sessé to Antonio Porlier, Mexico, 27 May 1788: ARJB, V, 1, 1, 22; Sessé to Gómez Ortega, Mexico, 27 June 1788: ARJB, V, 1, 1, 23.
70. Manuscript draft of announcement of the public botanical exercises to be performed on 11 December 1788 by José Vicente de la Peña, Francisco Giles y Arellano, and José Timoteo Arsinas: ARJB, 5, 1, 1, 27.
71. ARJB, III, 2, 5, 19.
72. ARJB, III, 2, 5, 24. Investigations of New Granadan nature took place as early as the 1730s, when a series of reports were produced describing the climate, agricultural production, livestock, and yearly dues paid to the royal treasury by each of the kingdom's towns during the years 1734–38: ARJB, III, 2, 5, 1.
73. Apolinar Díez de la Fuente to José García de León Pizarro, Archidona, 18 January 1784: ARJB, III, 2, 5, 20.
74. *Real cédula*, 5 August 1799: AGI, Audiencia de Filipinas, 338, *legajo* 23, ff. 29v–36r.
75. José Basco y Vargas, “Testimonio literal de la Instrucción formada por el Sup. Gobernador de estas Islas para el Plantío, Cultivo, y beneficio de la Pimienta,” Manila, 20 January 1781: AGI, Filipinas, 732, 3; reproduced in Francisco de las Barras de Aragón, “Varios trabajos del botánico D. Juan del Cuéllar, enviado a Filipinas en el siglo XVIII. Recolectados en el Archivo de Indias de Sevilla,” *Boletín de la Universidad de Madrid* 3, no. 11 (1931): 66–82.
76. Local *instrucciones* were also printed in Mexico City: *Instrucción a que deberán arreglarse los Señores Gobernadores, Intendentes, y demás Justicias para la formación de Noticias de Geografía, e Historia Civil y Natural del Reyno de Nueva España, que quiere S.M. se inserten y publiquen en la Gazeta que se imprime en la Ciudad de México* (Mexico: [1780?]).
77. José Basco y Vargas to José de Gálvez, “Instrucción . . . para el entable del nuevo proyecto del beneficio de la Canela de que abunda la Isla de Mindanao, y su inmediata de Camiguin,” Manila, 10 May 1781: AGI, Filipinas, 723, 35. Image in AGI,

- MP-Ingenios, 179. Basco y Vargas updated José de Gálvez of progress on this project in a letter dated Manila, 12 May 1787: AGI, Filipinas, 723, 9.
78. Reports from Cuéllar to the directors of the Philippines Company, Manila, 22 December 1790: AGI, Filipinas, 723, 44, and Manila, 29 December 1791: AGI, Filipinas, 723. The financial and administrative aspects of Cuéllar's work are detailed in "Testimonio literal del memorial de D. Juan de Cuéllar," February 1798: AGI, Filipinas, 723, which includes a list of all of his expenses from his arrival to the islands in August 1786 through the end of 1788, ff. 15v–41v.
 79. D. Graham Burnett describes a comparable experience for British cartographer Sir Robert H. Schomburgk in Guyana, in *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado* (Chicago: University of Chicago Press, 2000).
 80. Policarpo Fernández, for instance, sent Mutis a list and observations of 117 plants from the Hacienda de la Vega de San Juan in March 1772: ARJB, III, 4, 11, 4.
 81. Antonio Gago, to give but one among many examples, traveled through the provinces of Darien, Portobelo, Panama, and Veragua as commissioned by the expedition, Santa Fe de Bogotá, 8 January 1795: ARJB, III, 2, 6, 84; reproduced in Mutis, *Archivo Epistolar*, 2: 111–12.
 82. Mutis to Juan José de Villaluenga, Mariquita, 10 July 1786: ARJB, III, 2, 2, 196 and 197; reproduced in Mutis, *Archivo Epistolar*, 1: 312–15.
 83. José Celestino Mutis to Juan José de Villaluenga, Mariquita, 26 December 1786: ARJB, III, 1, 2, 75; reproduced in Mutis, *Archivo Epistolar*, 1: 359–61.
 84. José Celestino Mutis to Juan José de Villaluenga, Mariquita, 11 July 1787; 26 October 1787; and 11 December 1787: ARJB, III, 1, 2, 77–79; reproduced in Mutis, *Archivo Epistolar*, 1: 392–94, 396–98, 403.
 85. The New Spain expedition received help from Ignacio de León y Pérez, "Cacique principal de San Juan Acazingo y profesor de farmacia por el Real Tribunal del Protomedicato." Ignacio de León y Pérez to Martín de Sessé, Valle de Santa Rosa, Mexico, 27 November 1792, 3 March 1793, 18 March 1793, and 30 April 1793: ARJB, V, 1, 3, 17; V, 1, 4, 2; V, 1, 4, 10; and V, 1, 4, 15.
 86. José Basco y Vargas, "Testimonio literal," reproduced in Barras de Aragón, "Varios trabajos del botánico D. Juan del Cuéllar," 66–82.
 87. Salgado to Antonio Porlier, Manila, 25 July 1791: AGI, Filipinas, 723, 39.
 88. On cinchona, see Matthew James Crawford, "'Para desterrar las dudas y adulteraciones': Scientific Expertise and the Attempts to Make a Better Bark for the Royal Monopoly of Quina (1751–1790)," *Journal of Spanish Cultural Studies* 8, no. 2 (July 2007): 193–212, "Empire's Experts: The Politics of Knowledge in Spain's Royal Monopoly of Quina (1751–1808)," Ph.D. dissertation, History Department, University of California-San Diego (2009), and "A 'Reasoned Proposal' Against 'Vain Science': Creole Negotiations of an Atlantic Medicament in the Audiencia of Quito (1776–92)," *Atlantic Studies* 7, no. 4 (2010): 397–419; Gonzalo Hernández de Alba, *Quinas amargas, el sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Academia de Historia de Bogotá, 1991); Mauricio Nieto Olarte, *Remedios para el imperio: historia natural y la apropiación del Nuevo Mundo* (Bogotá: Instituto Colombiano de Antropología e Historia, 2000); and Steele, *Flowers for the King*, esp. 187–211.
 89. The drawing was attributed to Santiesteban by the Colombian botanist José

- Jerónimo Triana, who reviewed the Mutis material in the Linnean Society of London in the second half of the nineteenth century. The image and herbarium samples are still held by the society, and catalogued in Spencer Savage, *A Catalogue of the Linnaean Herbarium* (London: Linnean Society, 1945), entries 230.2 and 230.4.
90. José Celestino Mutis, “Real proyecto del estanco de la quina,” in *Flora de la Real Expedición Botánica del Nuevo Reino de Granada (1783–1816)*, 50 vols. (Madrid: Ediciones de Cultura Hispánica, 1954–), vol. 44 (1957).
 91. Ample documentation is held under the collective title “Papeles referentes a quinas, 1771–1786,” Archivo de Farmacia, AGP, C–2–16 and C–3–16.
 92. “Informe de Quina,” August 1789, and “Quina. Noticias particulares, muy circunstanciadas que deberán tenerse presentes siempre que se tratare de este ramo,” 1789, both in AGP, Reinados, Carlos IV, Cámara, legajo 10, caja 1 (legajo 4650). On competition among Quito, New Granada, and Peru about cinchona, see Aymler Bourke Lambert, *An Illustration of the Genus Cinchona* (London, 1821); Hernández de Alba, *Quinas amargas*, esp. chs. 4 and 6–8; Nieto Olarte, *Remedios para el imperio*, 184–232; and Steele, *Flowers for the King*, 187–211.
 93. Alexander von Humboldt, “Cinchona forests of South America,” in Lambert, *An Illustration*, 32–33.
 94. “Believe, Your Excellency,” Mutis wrote to Caballero y Góngora, “that [Gómez Ortega] is full of jealousy, and has ample craftiness and tricks, and does not lack protection, to abase my glory.” Mariquita, 19 November 1785, in Mutis, *Archivo Epistolar*, 1: 270.
 95. *Quinología, o tratado del árbol de la quina o cascarilla, con su descripción y la de otras especies de quinos nuevamente descubiertas en el Perú* (Madrid, 1792). An earlier French report by La Condamine, “Sur l’arbre du quinquina,” was translated by Sebastián José López Ruiz in 1778 as “Estudio sobre la quina,” but remained unpublished until recently (Barcelona: Editorial Alta Fulla, 1986); the manuscript is held in ARJB, III, 4, 11, 10.
 96. Hipólito Ruiz and José Pavón, *Flora Peruviana et Chilensis*, 3 vols. (Madrid, 1798–1802), vol. 2 (1799).
 97. Mutis discussed the plant in a 1790 memoir, published two years later as *Instrucción formada por un facultativo existente por muchos años en el Perú, relativa de las especies y virtudes de la quina* (Cadiz, 1792) (note the geographical misattribution by the printer!); in “El arcano de la quina: discurso que contiene la parte médica de las cuatro especies de quinas oficiales,” *Papel periódico de la ciudad de Santa Fe de Bogotá*, 1793–94, available in an edition by Manuel Hernández de Gregorio (Burgos: Fundación de Ciencias de la Salud, 1994); and in an article published in the *Diario de Madrid*, 11 November 1880, no. 315, reproduced in *Flora de la Real Expedición Botánica*, 44: 42–43.
 98. Hipólito Ruiz and José Pavón, *Suplemento a la quinología* (Madrid, 1801), 35–6 and 111.
 99. Alexander von Humboldt to Sebastián López Ruiz, Quito, 4 February 1802: ARJB, III, 1, 5, 44.
 100. 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).

101. Antonio Lafuente, “Enlightenment in an Imperial Context: Local Science in the Late Eighteenth-Century Hispanic World,” *Osiris*, 2nd series, 15 (2000): 155–73, esp. 160–66; Antonio Lafuente and Nuria Valverde, “Linnaean Botany and Spanish Imperial Biopolitics,” in Schiebinger and Swan (eds.), *Colonial Botany*, 134–47; Roberto Moreno, *Linneo en México: las controversias sobre el sistema binario sexual, 1788–1798* (Mexico: UNAM, 1989); and Xavier Lozoya, *Plantas y luces en México. La Real Expedición Científica a Nueva España (1787–1803)* (Barcelona: Ediciones del Serbal, 1984).
102. Lafuente and Valverde, “Linnaean Botany”; Peset, *Ciencia y libertad*. It is important, however, to distinguish this *patria*-tism from nationalism or from a desire for independence from Spain—the useful term is from Richard Kagan, *Urban Images of the Hispanic World, 1493–1793* (New Haven: Yale University Press, 2000), 130. On the connections between Creole science and independence movements, see Thomas Glick, “Science and Independence in Latin America (with Special Reference to New Granada),” *Hispanic American Historical Review* 71 (1991): 307–34.
103. *Mercurio Peruano*, IX, 25, reproduced in Jean-Pierre Clément, *El Mercurio Peruano, 1790–1795*, 2 vols. (Madrid: Iberoamericana; Frankfurt am Main: Vervuert, 1997), 2: 118.
104. “Carta en que se comparan los antiguos y recientes descubrimientos ejecutados en el mar Pacífico al sur de la línea equinoccial . . .,” *Gazeta de Literatura*, 2 (1 November 1791): 228–96, this passage on 288. As cited in Peset, *Ciencia y libertad*, 40.
105. Cited in Lafuente and Valverde, “Linnaean Botany,” 138.
106. Lafuente and Valverde, “Linnaean Botany,” 143.

Chapter Five

1. On the thorny connections between visibility and invisibility in colonial Latin American visual culture, see Carolyn Dean and Dana Leibsohn, “Hybridity and Its Discontents: Considering Visual Culture in Colonial Spanish America,” *Colonial Latin American Review* 12, no. 1 (2003): 5–35.
2. See for instance Beth Fowkes Tobin, *Colonizing Nature: The Tropics in British Arts and Letters, 1760–1820* (Philadelphia: University of Pennsylvania Press, 2005), 168–97.
3. Two well-known exceptions to this preference for the cabinet specimen over the live creature are the work of Mark Catesby and John James Audubon, on whom see Mark Catesby, *The Natural History of Carolina, Florida, and the Bahama Islands*, 2 vols. (London, 1731–43); Henrietta McBurney, *Mark Catesby's Natural History of America*, intro by Amy R. W. Meyers (London: Merrell Holberton Publishers, 1997); Amy R. W. Meyers and Margaret Beck Pritchard (eds.), *Empire's Nature: Mark Catesby's New World Vision* (Chapel Hill: University of North Carolina Press, 1998); Annette Blaugrund and Theodore E. Stebbins, Jr. (eds.), *John James Audubon: The Watercolors for The Birds of America* (New York: New York Historical

- Society, 1993); Ann Shelby Blum, *Picturing Nature: American Nineteenth-Century Zoological Illustration* (Princeton: Princeton University Press, 1993), 88–118; and Linda Dugan Partridge, “By the Book: Audubon and the Tradition of Ornithological Illustration,” in Amy Meyers (ed.), *Art and Science in America: Issues of Representation* (San Marino, CA: Huntington Library and Art Gallery, 1998), 97–129. I thank Jennifer Roberts for sharing with me her unpublished chapter, “Audubon’s Burden: Materiality and Transmission in *The Birds of America*.”
4. For a related analysis of entomological illustrations and collections, see Janice Neri, “Fantastic Observations: Images of Insects in Early Modern Europe,” Ph.D. dissertation, University of California-Irvine, 2003; “From Insect to Icon: Joris Hoefnagel and the ‘Screened Objects’ of the Natural World,” in Mary Lindemann (ed.), *Ways of Knowing: Ten Interdisciplinary Essays* (Boston: Brill Academic Publishers, 2004); and “Between Observation and Image: Representations of Insects in Robert Hooke’s *Micrographia*,” in Therese O’Malley and Amy R. W. Meyers (eds.), *The Art of Natural History: Illustrated Treatises and Botanical Paintings, 1400–1850* (Washington: National Gallery of Art, 2008), 83–107.
 5. Carl Linnaeus, *The “Critica botanica” of Linnaeus [1737]* (London: Ray Society, 1938), 130.
 6. Georg Eberhard Rumphius, *The Ambonese Curiosity Cabinet [D’Amboinsche Rariteitkamer, 1705]*, trans., ed., anno., and with an intro. by E. M. Beekman (New Haven: Yale University Press, 1999). See also Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007), esp. 329–38. I thank Daniel Margocsy for sharing his thoughts on this and the other two frontispieces I discuss in this chapter.
 7. The portrait exalts Rumphius as an observer, despite the fact that he went blind. I discuss it and connect it to my larger argument in this chapter in Daniela Bleichmar, “Training the Naturalist’s Eye in the Eighteenth Century: Perfect Global Visions and Local Blind Spots,” in *Skilled Visions. Between Apprenticeship and Standards*, ed. Cristina Grasseni (Berghahn Books, 2007): 166–90.
 8. Benjamin Schmidt, “Inventing Exoticism: The Project of Dutch Geography and the Marketing of the World, circa 1700,” in Pamela Smith and Paula Findlen (eds.), *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (New York: Routledge, 2002), 347–69, and “Mapping an Exotic World: The Global Project of Dutch Geography, circa 1700,” in Felicity Nussbaum (ed.), *The Global Eighteenth Century* (Baltimore: Johns Hopkins University Press, 2003), 21–37.
 9. Schmidt, “Mapping an Exotic World,” 32–33, 34.
 10. Daniela Bleichmar, “Seeing the World in a Room: Looking at Exotica in Early Modern Collections,” in Daniela Bleichmar and Peter C. Mancall (eds.), *Collecting Across Cultures: Material Exchanges in the Early Modern Atlantic World* (Philadelphia: University of Pennsylvania Press, 2011), 15–30.
 11. Carl Linnaeus, *Musa Cliffortiana* (Leiden, 1736). The frontispiece to the *Hortus Cliffortianus* is briefly addressed in Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 55–57, and Richard Drayton, *Nature’s Government: Science, Imperial Britain, and the “Improvement” of the World* (New Haven: Yale University Press, 2000), 22–24.

12. See Drayton, *Nature's Government*, 22–24. On European allegorical frontispieces and exoticism, see Peter Mason, *Infelicities: Representations of the Exotic* (Baltimore: Johns Hopkins University Press, 1998), 90–109.
13. For comparison with the British empire, see David Arnold, *The Tropics and the Traveling Gaze: India, Landscape, and Science, 1800–1856* (Seattle: University of Washington Press, 2006); and Beth Fowkes Tobin, *Picturing Imperial Power: Colonial Subjects in Eighteenth-Century British Painting* (Durham: Duke University Press, 1999), and *Colonizing Nature*.
14. Though a less renowned painter than his brother Francisco, Vicente Albán was a recognized artist best known for his religious paintings for various institutions in Quito and throughout New Granada. See Santiago Sebastián, “Arte: Cali,” *Gran Enciclopedia Rialp* (Madrid: Rialp, 1991), and José María Vargas, *Arte quiteño colonial* (Quito: Romero, 1944), 156.
15. The term was applied at one point to Mexican casta paintings: Francisco de las Barras de Aragón, “Noticia de varios cuadros pintados en el siglo XVIII representando mestizajes y tipos de razas indígenas de América y algunos casos anormales,” *Memorias de la Real Sociedad Española de Historia Natural* 15 (1929): 155–68, and “Documentos referentes al envío de cuadros representando mestizajes humanos y varios productos naturales del Perú, hallados en el Archivo de Sevilla,” *Actas y memorias de la Sociedad española de antropología, etnografía y prehistoria* 9, nos. 2 & 3 (1930): 78–81. The term was also recently used to describe the casta paintings from Peru in Natalia Majluf (ed.), *Los cuadros de mestizaje del virrey Amat. La representación etnográfica en el Perú colonial* (Lima: Museo de Arte de Lima, 2000).
16. Flowers and animals most often appear in European and Spanish American portraiture as decoration or allegory, without the starring role they have in the *cuadros de mestizaje*. Among countless examples, see for instance Jean Ranc's portrait of the infant Charles III examining a flower (1727) at the Museo del Prado, and many Spanish American instances in Elizabeth P. Benson et al., *Retratos: 2,000 Years of Latin American Portraits* (New Haven: Yale University Press, 2004), 73–146.
17. The word *yapanga* (or *llapanga*) is a variant of *ñapanga*, from the Quechua for barefoot. It is defined as “mestiza, mulata” in the *Diccionario de la Lengua Española*, 22nd ed. (2001), available online at <http://buscon.rae.es>. Other sources suggest that the term might have referred to a prostitute, for instance, Thérèse Bouysson-Cassagne argues that the capuli fruit that the yapanga in Albán's painting presents to the viewer carries sexual connotations; see “In Praise of Bastards: The Uncertainties of Mestizo Identity in the Sixteenth- and Seventeenth-Century Andes,” in Olivia Harris (ed.), *Inside and Outside the Law: Anthropological Studies of Authority and Ambiguity* (New York: Routledge, 1996), 103. Both meanings are discussed in Humberto Toscano Mateus, “La llapanga o bolsicona” [1960], in Paulo de Carvalho Neto (ed.), *Antología del folklore ecuatoriano, 1653-1963: Trescientos diez años de estudios sobre la cultura tradicional del Ecuador* (Quito: Universitaria, 1964), 219–21. I have located two other pictorial depictions of yapangas, neither of which connotes prostitution (though they are produced later than Albán's painting): a watercolor

- by the French artist Ernest Charton de Treville done in Quito in the 1860, and a watercolor of “Llapangas de Popayán” from the Colombian Expedición Corográfica in the 1850s.
18. I owe this point to Kate Heckmann Hanson, “Visualizing Culinary Culture at the Medici and Farnese Courts,” Ph.D. dissertation, University of Southern California, 2010, 48–49.
 19. The fruits depicted include the guava, avocado, mamey, chamburo (“mountain papaya”), chilguacan, passion fruit, loquat, coconut palm, capuli, chirimoya, strawberry, plantain, papaya, pineapple, and pitaya.
 20. For a detailed description of the jewelry worn by the four women in this series, see Letizia Arbeteta Mira, “Precisiones iconográficas sobre algunas pinturas de la colección del Museo de América, basadas en el estudio de la joyería representada,” *Anales del Museo de América* 15 (2007): 141–72.
 21. Magali Carrera, *Imagining Identity in New Spain: Race, Lineage, and the Colonial Body in Portraiture and Casta Paintings* (Austin: University of Texas Press, 2003); Efraín Castro Morales, “Los cuadros de castas de la Nueva España,” *Jahrbuch für Geschichte von Staat, Wirtschaft und Gesellschaft Lateinamerikas* 20 (1983): 671–90; Susan Deans-Smith, “Creating the Colonial Subject: Casta Paintings, Collectors, and Critics in Eighteenth-Century Mexico and Spain,” *Colonial Latin American Review* 14, no. 2 (December 2005): 169–204; María Concepción García Sáiz, *Las castas mexicanas: un género pictórico americano* (México: Olivetti, 1989); and Ilona Katzew (ed.), *New World Orders: Casta Painting and Colonial Latin America* (New York: Americas Society, 1996) and *Casta Painting: Images of Race in Eighteenth-Century Mexico* (New Haven: Yale University Press, 2004).
 22. Castro Morales, “Los cuadros de castas,” 678–81; Deans-Smith, “Creating the Colonial Subject”; and Katzew, *Casta Painting*, 69, 94, 109.
 23. Majluf (ed.), *Los cuadros de mestizaje del virrey Amat*; and Pilar Romero de Tejada (ed.), *Frutas y castas ilustradas* (Madrid: Museo Nacional de Antropología / Ministerio de Educación, Cultura y Deporte, 2004).
 24. Barras de Aragón, “Documentos referentes al envío,” 79, 81.
 25. Elena Isabel Estrada de Gerlero, “The Representation of ‘Heathen Indians’ in Mexican Casta Painting,” in Katzew (ed.), *New World Orders*, 42–57.
 26. On the relationship between purity of blood and the casta system, see María Elena Martínez, *Genealogical Fictions: Limpieza de Sangre, Religion, and Gender in Colonial Mexico* (Stanford: Stanford University Press, 2008).
 27. Katzew, *Casta Painting*, 81, 106.
 28. Katzew, *Casta Painting*, 107–9.
 29. There are at least three other examples, reproduced in Katzew, *Casta Painting*, 6 (figure 1), 36 (figure 61), and 182 (figure 240).
 30. David Brading, *Mexican Phoenix: Our Lady of Guadalupe: Image and Tradition, 1531–2000* (New York: Cambridge University Press, 2001); Serge Gruzinski, *Images at War: Mexico from Columbus to Blade Runner (1492–2019)*, trans. Heather MacLean (Durham, NC: Duke University Press, 2001), 96–207; Jeanette Favrot Peterson, “The Virgin of Guadalupe: Symbol of Conquest or Liberation?,” *Art Journal* 51, no. 4 (Winter 1992): 39–47; William B. Taylor, *Magistrates of the Sacred: Priests and*

- Parishioners in Eighteenth-Century Mexico* (Stanford: Stanford University Press, 1996), 277–300.
31. Francisco de las Barras de Aragón, “Una historia del Perú contenida en un cuadro al óleo de 1799,” *Boletín de la Real Sociedad Española de Historia Natural* 11 (Madrid, 1911): 224–85; and Fermín del Pino (ed.), *El Quadro del Perú (1799). Una joya ilustrada del Museo Nacional de Ciencias Naturales* (Lima: Congreso del Perú, forthcoming).
 32. On Martínez Compañón see Emily Berquist, “The Science of Empire: Bishop Martínez Compañón and the Enlightenment in Peru,” Ph.D. dissertation, University of Texas at Austin, 2007, and “Bishop Martínez Compañón’s Practical Utopia in Enlightenment Peru,” *Americas* 64, no. 3 (January 2008): 377–408.
 33. José Ignacio Lequanda, “Descripción corográfica de la provincia de Chachapoyas,” *Mercurio Peruano* 5, no. 165 (Lima, 2 August 1792); “Descripción geográfica de la ciudad y partido de Trujillo,” *Mercurio Peruano* 8, no. 247 (Lima, 16 May 1793); “Descripción geográfica del partido de Piura perteneciente a la intendencia de Trujillo,” *Mercurio Peruano* 8, no. 263 (Lima, 11 July 1793); “Descripción del partido de Saña o Lambayeque,” *Mercurio Peruano* 9, no. 285 (Lima, 26 September 1793); “Descripción geográfica del partido de Caxamarca, en la intendencia de Trujillo,” *Mercurio Peruano* 10, no. 333 (Lima, 13 March 1794); *Idea sucinta del comercio del Perú y medios de prosperarlo con una noticia general de sus producciones* [1794, British Library, Ms. Egerton 771] (Lima: Universidad Nacional Mayor de San Marcos, 1977). See also Guillermo Lohmann Villena, “Las relaciones de los virreyes del Perú,” *Anuario de Estudios Americanos* 16 (1959): 315–532; and Carlos Deustua Pimentel, “José Ignacio de Lecuanda y la memoria del virrey Gil de Taboada y Lemos,” *Mercurio Peruano* 436 (Lima, 1963): 276.
 34. Charles Walker and Víctor Peralta, “Viajeros, naturalistas, científicos, y dibujantes. De la ilustración al costumbrismo en las artes (siglos XVIII y XX),” in Ramón Mujica Pinilla et al., *Visión y símbolos: del virreinato criollo a la República Peruana* (Lima: Banco de Crédito, 2006), 243–73.
 35. My biographical sketch comes from Víctor Peralta Ruiz, “El virreinato peruano y los textos de José Ignacio de Lequanda,” in del Pino (ed.), *El Quadro del Perú*.
 36. Lequanda’s uncle Martínez Compañón proposed a project for renovating this mine, and in 1786 presented a “Plan sobre las mejoras de las minas de Hualgayoc” to Teodoro de Croix, viceroy of Perú, to which Lequanda may have contributed.
 37. See for instance Jean-Paul Duviols, *Le miroir du nouveau monde: images primitives de l’Amérique* (Paris: Presses de l’Université Paris-Sorbonne, 2006); and Surekha Davis, “Representations of Amerindians on European Maps and the Construction of Ethnographic Knowledge, c. 1506–1624,” Ph.D. thesis, Warburg Institute, London, 2008.
 38. The connections among collecting, visual instruction, and encyclopedias in the eighteenth century are marvelously explored in Anke te Heesen, *The World in a Box: The Story of an Eighteenth-Century Picture Encyclopedia* (Chicago: University of Chicago Press, 2002).
 39. Barras de Aragón, “Una historia del Perú,” 226.
 40. This is the case as well with the paintings in Jan van Kessel’s four-part series on

the continents as collections, including *America* (1666; see figure 5.6 in this chapter), where each work is also composed of several smaller paintings, each of them framed. Van Kessel also used this format for a work that provides a collection of animals, held at the Prado Museum. More suggestively, the format is similar to one used in a genre of painting that was popular in eighteenth-century Peru, which traced the Inca and Spanish royal dynasties and seamlessly connected the two regimes: see for example *Effigies of the Incas or Kings of Peru*, painted around 1725 and held at the Convent of Our Lady of Copacabana in Lima, reproduced in Joseph Rishel (ed.), *The Arts in Latin America, 1492–1820* (New Haven: Yale University Press, 2006), fig. VI-115.

41. See Daniela Bleichmar, “Peruvian Nature Up Close, Seen from Afar,” *Res* 59/60 (Spring/Autumn 2011), 82–95.
42. José Celestino Mutis to Eloy Valenzuela, Santa Fe de Bogotá, 15 March 1784, in José Celestino Mutis, *Archivo Epistolar del Sabio naturalista Don José C. Mutis*, ed. Guillermo Hernández de Alba, 2nd ed., 4 vols. (Bogotá: Instituto Colombiano de Cultura Hispánica, 1983), 1: 174.

Conclusion

1. The large-scale investigation of the New World also entailed its human history, as described in 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).
2. A. Federico Gredilla, *Biografía de José Celestino Mutis* [1911], prol. by Guillermo Hernández de Alba (Bogotá: Plaza & Janés, 1982), 42–43.
3. Louis de Bougainville, *A Voyage Round the World . . . in the Years 1776 . . . [to] 1769*, trans. John Forster (London, 1772), xxvi, and Jean-François de Galaup de la Pérouse, *A Voyage Round the World . . .* ed. M. L. A. Milet-Mureau (London, 1799), 441; both quoted in Richard Sorrenson, “The Ship as a Scientific Instrument in the Eighteenth Century,” *Osiris*, 2nd ser., vol. 11 (1996): 223.
4. Jean-Baptiste-Christophe Fusée-Aublet, *Histoire des plantes de la Guiane Française*, 4 vols. (London, 1775), 1: xiii, xxvi.
5. Quoted in Lorenzo Uribe Uribe, “La Expedición Botánica del Nuevo Reino de Granada: su obra y sus pintores,” *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 19 (1953): 6.
6. Alexander von Humboldt and Aimé Bonpland, *Plantes équinoxiales*, in *Voyage de Humboldt et Bonpland. Sixième Partie: Botanique*, vol. 1 (Paris, 1808).
7. Luisa Elena Alcalá, “Sources and Meaning in Colonial Historical Images: The Case of the Paracas and Pantasma Reducciones,” unpublished manuscript.
8. Examples include a collection of almost 1400 watercolors known collectively as *Trujillo del Perú*, commissioned by Baltasar Jaime Martínez Compañón and closely related to the *Quadro del Perú*; two sets of drawings that Lázaro de Ribera, governor of the region of Moxos in Peru, sent to Madrid between 1786 and 1794 to accompany his reports to the Crown; Joaquín Antonio de Basarás, *Origen*,

- costumbres, y estado presente de mexicanos y philipinos* (1763); Pedro Alonso O’Crowley, *Idea compendiosa del reino de la Nueva España* (1774); and Buenaventura José Guiol, *Pájaros de México* (ca. 1770–80), among many others. See Baltasar Jaime Martínez Compañón, *Trujillo del Perú en el siglo XVIII* [ca. 1779–89], facs. ed., 9 vols. + 3 vols. appendix (Madrid: Ediciones Cultura Hispánica del Centro Iberoamericano de Cooperación, 1978–94) and <http://www.cervantesvirtual.com/portal/patrimonio/catalogo.shtm>; Lázaro de Ribera, *Moxos: descripciones exactas e historia fiel de los indios, animales y plantas de la provincia de Moxos en el Virreinato del Perú por Lázaro de Ribera, 1786–1794*, facs. ed. by Mercedes Palau and Blanca Sáiz (Madrid: Ediciones El Viso, 1989); Ilona Katzew, *Casta Painting: Images of Race in Eighteenth-Century Mexico* (New Haven: Yale University Press, 2004), 163–200; and Ilona Katzew (ed.), *Una visión del México del siglo de las luces: la codificación de Joaquín Antonio de Basarás* (México: Landucci, 2006).
9. *Banks’ Florilegium* (London: Alecto Historical Editions / British Museum [Natural History], 1988). See Brian Adams, *The Flowering of the Pacific: Being an Account of Joseph Banks’ Travels in the South Seas and the Story of His Florilegium* (London: Collins and Natural History Museum, 1986), 125–82.
 10. On this last chapter of Malaspina’s life, see Juan Pimentel, *La física de la monarquía. Ciencia y política en el pensamiento colonial de Alejandro Malaspina (1754–1810)* (Madrid: Doce Calles, 1998), 367–85. Malaspina’s political writings from the expedition are transcribed in Alejandro Malaspina, *Descripciones y reflexiones políticas*, ed. Juan Pimentel, vol. 7 of *La expedición Malaspina, 1789–1794*, 9 vols. (Madrid: Lunwerg Editores, 1987–96).
 11. Pedro de Novo y Colson, *Viaje político-científico alrededor del mundo: por las corbatas Descubierta y Atrevida al mando de los capitanes de navío D. Alejandro Malaspina y Don José de Bustamante y Guerra, desde 1789 a 1794* (Madrid: Impr. de la viuda e hijos de Abienzo, 1885).
 12. Née’s botanical work for the expedition is transcribed in Née, “Diarios y trabajos botánicos de Luis Née,” ed. Félix Muñoz Garmendia, vol. 3 of *La expedición Malaspina, 1789–1794*, 9 vols. (Madrid: Lunwerg Editores, 1987–96).
 13. In the visual realm see for instance the agenda-setting collection edited by Claire Farago, *Reframing the Renaissance: Visual Culture in Europe and Latin America, 1450–1650* (New Haven: Yale University Press, 1995), as well as more recently Julie Berger Hochstrasser, *Still Life and Trade in the Dutch Golden Age* (New Haven: Yale University Press, 2007); Jill Casid, *Sowing Empire: Landscape and Colonization* (Minneapolis: University of Minnesota Press, 2005); Thomas DaCosta Kaufmann, *Toward a Geography of Art* (Chicago: University of Chicago Press, 2004); Kay Dian Kriz, *Slavery, Sugar, and the Culture of Refinement: Picturing the British West Indies, 1700–1840* (New Haven: Yale University Press, 2008); and Mary D. Sheriff (ed.), *Cultural Contact and the Making of European Art Since the Age of Exploration* (Chapel Hill: University of North Carolina Press, 2010).

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AGI	Archivo General de Indias, Seville
AGP	Archivo General de Palacio, Madrid
AMNCN	Archivo del Museo Nacional de Ciencias Naturales, Madrid
ARABASF	Archivo de la Real Academia de Bellas Artes de San Fernando, Madrid
ARJB	Archivo del Real Jardín Botánico, Madrid
LS	Linnean Society, London

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