

Medicine as a Hunt

Searching for the Secrets of the New World

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King Philip II, who ruled Spain from 1556 until 1598, was the first monarch in history to govern an empire, in the words of a contemporary, “over which the sun never set” (*el imperio en el que nunca se pone el sol*).¹ Administering such vast territory required immense effort and entirely new ways of managing the mountains of information that poured in from all parts of the world. So diligent was Philip about managing the daily details of government that he earned the sobriquet “paper prince.” Yet even while drowning in a sea of paperwork, Philip managed to devote his personal attention to the important affairs of state. Measured by his assiduous attention to the details of running his empire, Philip was a thoroughly modern monarch. Although one contemporary marveled that the king must have “the biggest brain in the world,” in reality it was the bureaucratic agencies Philip created to gather and sift empirical information that enabled him to rule his empire.² To the extent that, in the modern West, science serves to advance the well-being of society and the state, King Philip of Spain embodied the future of science. Coincidentally, this essay will argue, building Early Modern empires produced a revolutionary new model for the advancement of science and medicine: the idea of medicine as a hunt for the secrets of nature.

In January 1560, King Philip inaugurated one of his most ambitious imperial projects ever, ordering his *médico de cámara* (court physician), Francisco Hernández, to cross the Atlantic and search for new medicinal herbs in America—launching the first organized scientific expedition of the Early Modern era, and until then the most ambitious search for new medicinal plants ever attempted. In his instructions, Philip commanded Hernández in these words:

You shall consult, wherever you go, all the doctors, medicine men, herbalists, Indians, and other persons with knowledge in such matters, . . . and thus you will gather information about herbs, trees, and medicinal plants in whichever province you are at the time. . . . You shall test at first hand all the above-mentioned if you can, but otherwise, you are to obtain information from the said persons, and . . . you shall describe their nature, virtue, and temperament.³

After months of preparation, Hernández, a doctor from Toledo and a landlubber if ever there was one, embarked for America in September 1560. The passage took a little over a month, plenty of time for Hernández to ponder what wonders lay ahead and how to catalog them. Graced with the title of “*protomédico general* of our Indies,” he spent seven years in Mexico, compiling a massive anthology of New World plants. Besides illustrations, he provided details about their medicinal uses, which he based on his own observations and reports from indigenous sources.

About all Hernández was able to realize of King Philip’s lofty goal of cataloging the natural history of his empire was an undigested mountain of notes and drawings loosely arranged into sixteen volumes. Sadly, Hernández died without seeing his book in print. Yet, even before the work was eventually published, copies of Hernández’s text and images circulated, appearing in natural history treatises throughout Europe. Some of the images appeared in the Pomar Codex, a collection of 218 hand-colored illustrations of plants from the New World commissioned by Philip II and presented as a gift to the distinguished Valencia medical professor Jaume Honorat Pomar in an effort to lure Pomar to Madrid.⁴ So enchanted was Philip by Hernández’s illustrations that he hung many in the antechamber of his private suite at El Escorial—no doubt accounting for the eventual disappearance of many of the pictures.

Eventually Hernández’s efforts did pay off, but only by way of a skin-of-the-teeth scenario that strains the imagination. Hernández’s original manuscripts went up in flames in a fire that destroyed the Library of the Escorial, where they were stored.⁵ Fortunately, before that happened one of Philip’s court physicians had made copies, which he took with him when he returned home to Naples. A few years later, a young nobleman named Federico Cesi obtained the rights to publish the material under the auspices of the newly formed Academy of Lynxes, the private society he had founded in Rome for conducting scientific experiments and natural history investigations.⁶ In 1651, an edition of woodblock prints of Hernández’s illustrations and accompanying descriptions came off the presses under the title *Mexican Treasury* (figure 6.1).⁷

The pursuit of nature’s secrets in the New World bore fruit in the work of later explorers as well. Reports of plants and drugs brought back from America had already begun circulating in Spain as early as 1526, when Gonzalo Fernández de Oviedo published his *Sumario de la natural historia de las Indias* (Natural History of the Indies).⁸ Information about new medicinal plants also came into Spain from



FIGURE 6.1. Title page, Francisco Hernández, *Nova plantarum, animalium et mineralium mexicanorum historia* (1651). John Carter Brown Library, Providence, RI.

Jesuit missionaries in Peru, including José de Acosta and Bernabé Cobo.⁹ With a knowledge network extending from South America to India to the Philippines, Jesuit missionaries participated in a massive, organized search for medicinal plants that vastly expanded the European pharmacopoeia.¹⁰ Whereas the ancient Greek botanist Dioscorides had described around 600 herbs, the seventeenth-century French naturalist Caspar Bauhin could list 6,000 different plants.

THE HUNT FOR THE SECRETS OF NATURE

In this essay I want to explore the implications imbedded in the metaphor that I have just described—the metaphor of medicine as a hunt.¹¹ I begin with a comment made more than fifty years ago by the late Paolo Rossi, one of the greatest Renaissance historians of our era. Rossi observed that during the Early Modern period “there was continuous discussion, with an insistence that bordered on monotony, about a logic of discovery conceived as a *venatio*, a hunt—as an attempt to penetrate territories never known or explored before.”¹²

Rossi’s insightful clue is worth following because the hunt metaphor occurs repeatedly in the scientific literature of the period. To take just one example, the sixteenth-century Neapolitan savant Giambattista Della Porta, author of a bestsell-



FIGURE 6.2. Title page, Giambattista Della Porta, *Magiae naturalis* (Naples, 1589). Huntington Library, San Marino, CA.

ing treatise on natural magic, organized one of Europe's first scientific societies, one whose members, he explained, were not content merely to gaze upon nature's exterior but instead aimed to discover secrets "locked up in the bosom of nature."¹³ Della Porta adopted the lynx, the keen-sighted hunter, as the emblem for his book, explaining that the investigator of nature must "examine with lynx-like eyes those things which manifest themselves." A lynx, wary and alert, appears at the top of Della Porta's title page beneath the motto *Aspiciet et Inspiciet* (Examine and Inspect). Della Porta's "Academy of Secrets" has, of course, been overshadowed by other scientific societies, such as the Royal Society of London, but the aims of the two organizations—and for that matter all of the Early Modern scientific societies—were the same: to institutionalize curiosity (figure 6.2).

Other Renaissance academies emulated the style of science advanced by Della Porta and his comrades. In fact, Della Porta's use of the lynx as an emblem for his book inspired the name of the more famous *Accademia dei Lincei*, or "Academy of Lynxes" founded in 1603 by the enthusiastic young Roman prince Federico Cesi. Explaining the choice of the lynx as the society's emblem, one of the academy's original members said that the academy's purpose was to "penetrate into the inside of things in order to know their causes and the operations of nature that work internally, just as it is said of the lynx that it sees not just what is in front of

it but what is hidden inside.”¹⁴ In other words, they believed that the workings of nature were occult, and that the investigator needed to tease them out with skill, cunning, and keen-sightedness—an ability to “see beyond” the obvious. It was the hidden *secrets of nature*, not merely nature as it appears outwardly, that fascinated Early Modern naturalists.

Since antiquity, the metaphor of the hunt provided a literary structure for all kinds of quests. In Ancient and Medieval literature the hunt was a metaphor for the seeking of spiritual and intellectual truth, the hero’s journey into the unknown, and the lover’s attempt to win a woman’s heart. Plato used the metaphor to describe geometers and astronomers, who are “hunters” after the nature of being, while for Cicero the scientist was a “seeker and hunter of nature.” Although the metaphor of the hunt for knowledge is ancient, I believe Rossi was correct in stressing its novelty in the late Renaissance. Whereas images of the chase abound in Medieval literature, they were rarely used to describe the search for secular knowledge. The Scholastics believed that the essential qualities of nature were directly accessible. One did not have to “hunt” them out because they were evident to the senses.¹⁵ What is significant about the examples I have cited is that all were premised on the idea of scientific inquiry conceived as the discovery of *new* things rather than a demonstration of the known. The themes of newness and novelty appear repeatedly in the scientific literature of the Early Modern period.

In the Renaissance the *Ne plus ultra* (“Do not go beyond”) inscribed on the ancient Pillars of Hercules became a favorite device to illustrate the tyranny of ancient philosophy over creative thought. The growing awareness that reverence for antiquity hampered progress in learning aroused a sense of the importance of new discoveries and of the value of novelty for its own sake. The frontispiece of Sir Francis Bacon’s *Great Instauration* pictures a ship passing through and beyond the Pillars of Hercules, symbolizing his age’s passing beyond the traditional limits of ancient learning. The book’s motto confidently proclaims, *Multi pertransibunt et augebitur scientia* (“Many shall pass through and knowledge shall increase”) (figure 6.3).¹⁶

Certainly the most important event contributing to Europe’s heightened consciousness of novelty was the discovery of the American continent—the New World, as Europeans called it. News of the discovery, which revealed regions and peoples completely unknown to the ancients, raised Europe’s awareness of the sheer immensity of the world. The explorers brought back specimens of exotic plants and animals, hair-raising tales of adventure, and relations of completely new peoples and cultures. Above all, the new geographical discoveries demonstrated that ancient philosophy and science were not eternal verities. The news that voyagers to America sent home seemed to confirm, in the words of the Spanish historian Francisco López de Gómara, that “experience is contrary to philosophy.” The New World itself became a metaphor for all of which the ancients were ignorant. As Sir Thomas Browne declared, ancient philoso-

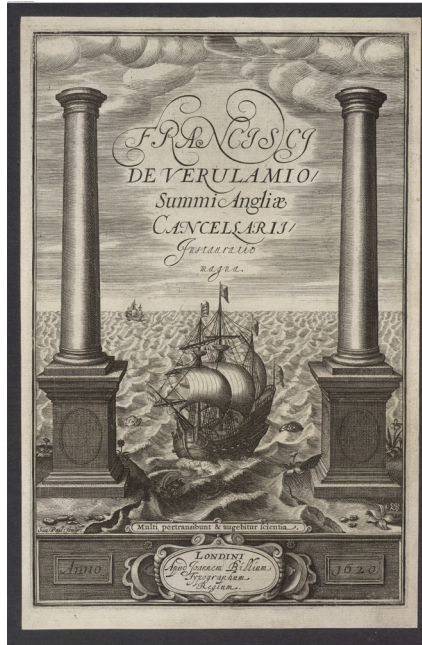


FIGURE 6.3. Title page, Francis Bacon, *Instauratio magna* (London, 1620). British Museum Images, © Trustees of the British Museum.

phy was so fraught with error that “the America and untraveled parts of Truth” still awaited discovery.¹⁷ In the mid-seventeenth century the English virtuoso Joseph Glanvill still envisioned the opening up of an “America of secrets and an unknown Peru of nature.”¹⁸ Like the New World, nature stood before investigators as uncharted territory.

Spaniards were awash in medical and botanical information from the New World. Nicolás Monardes (ca. 1508–1588), the foremost European authority on New World *materia medica*, never set foot in America. A physician involved in the New World trade, he lived in Seville, the peninsular hub of the Spanish Empire, a place buzzing with information and rumor about American *materia medica*. Monardes collected plants, seeds, and stories from travelers returning from the New World. He grew American plants in his garden and tested drugs in his home laboratory. He learned the Indian names and uses of the plants and listened to the stories of soldiers, sailors, and New World settlers.¹⁹

Monardes wove his experiments and travelers’ tales into a bestseller, *Historia medicinal* (Seville, 1565), describing hundreds of New World plants and their uses. Monardes was a fanatical promoter of New World drugs.²⁰ He was convinced that remedies originating in the Americas were worthy substitutes for any found in the classical pharmacopoeia. What need have Spaniards of exotic drugs from the Spice

Islands, he asked, when “our Indies yield them spontaneously in untilled fields and mountains?”²¹

The *Historia medicinal* was a dazzling success. To its English translator John Frampton, it was the “Joyful News from the New-Found World.”²² When Monardes died in 1588, his work had been published in seventeen Spanish, Italian, Latin, French, and English editions. Fourteen more came out the following century.²³ The Latin edition by the Flemish naturalist Carolus Clusius (1526–1609) introduced Monardes to the European academic world.²⁴ Clusius’s edition became the most authoritative scholarly work on botanical and medical discovery in the Age of the New.²⁵

THE EPISTEMOLOGY OF THE HUNT

What is the paradigm of knowledge implied in the hunt metaphor? What did it mean, and what was its appeal to Renaissance people? In an important but little-noticed essay, Carlo Ginzburg discovered in the hunter’s methodology the roots of an “evidential paradigm,” which Ginzburg contrasted to the more prestigious (and socially higher) Platonic model, a model of knowledge based on abstraction and deductive certainty.²⁶ The latter model of knowledge was, for example, the methodology employed by Galileo. In contrast, the hunter’s methodology has two essential features: It is *evidential*, and it is *conjectural*. The hunter, who follows clues that lead to an unseen quarry, uses a conjectural methodology. His lore is characterized by the ability to make the leap from apparently insignificant facts, which can be observed, to a complex reality that cannot be experienced directly. “In the course of countless chases [the hunter] learned to reconstruct the shapes and movements of his invisible prey from tracks on the ground, broken branches, excrement, tufts of hair, entangled feathers, stagnating odors. He learned to sniff out, record, interpret, and classify such infinitesimal traces as trails of spittle.” This “venatic methodology” was similar to that of the ancient diviner, who used clues found in the guts of animals, in the heavens, or in the flight of birds to look into the future, and was the forerunner of the psychoanalytic method, which Freud said “is accustomed to divine secret and concealed things from unconsidered or unnoticed details, from the rubbish heap, as it were, of our observations.”²⁷

The Greeks called this type of knowledge *mêtis*. It refers to practical intelligence based on acquired skill and experience—in other words, cunning. *Mêtis*, or practical knowledge, was entirely different from philosophical knowledge. It applied in transient, shifting, and ambiguous situations that did not lend themselves to precise measurement or logic. Its stratagems were especially applicable to situations requiring foresight: hunting, navigation, and medicine, for example, all of which were guided not by a fixed method but by the circumstances themselves, and by signs in the stars or forest. Just as the navigator conjectures his route through the raging seas by following signs in the stars and winds, so the physician looks for

signs in the fluctuating sea of symptoms to make a diagnosis of the illness he must treat. Primed with knowledge acquired through long experience, like a pilot at the tiller the physician makes his way by conjecture and seizes the right moment to apply his art. Wholly oriented toward the world of becoming, *mêtis* applied in situations demanding action rather than reflection, where intuition and quick judgment were more useful intellectual traits than facility with logic.

The venatic paradigm contrasted sharply with conventional philosophical knowledge. Classical Greek philosophy posed a radical dichotomy between the worlds of being and becoming. To the Greeks, the sphere of being—the unchanging world—was the domain of true and certain knowledge. The sphere of becoming—of the sensible and the unstable—was the world of changing opinion. *Mêtis* or conjectural knowledge, which is oriented toward the sensible world of becoming rather than the intelligible world of being, can have no place in the realm of philosophy understood this way. Hence the conjectural paradigm was pushed into the background, erased from the realm of knowledge and relegated to speculation and mere opinion.

Whereas the classical concept of truth framed Medieval science, the venatic paradigm re-emerged in the Renaissance. In fact, the paradigm of the hunt turns up repeatedly in Renaissance discussions of scientific method. For reasons I shall try to explain, the hunt metaphor was particularly prominent in two closely related Renaissance traditions: medicine and natural magic. In listening to the new voices booming from the printing presses in popular medical and natural magic tracts, Europeans of the day had good reason to hope that the future held great promise.

THE PROFESSORS OF SECRETS HUNT FOR SECRETS OF MEDICINE

In the therapeutic domain, the venatic paradigm undermined and ultimately subverted orthodox Renaissance medicine. Traditional Galenic medicine, which defined sickness as an imbalance of bodily humors and therapy as aiding nature's inherent power to heal (*vis medicatrix naturae*), came under attack from empirics and charlatans. They adopted a radically activist stance, insisting they had remedies that targeted specific diseases—a claim that gave them an edge in a competitive marketplace. Quick cures and quick gains were the empiric's ends. Panaceas abounded and coin purses jingled.

A major influence on the shifting medical marketplace was the threat of new and threatening contagious diseases. The Renaissance was an age of new diseases. Besides syphilis, there was plague, which first struck Europe in the form of the Black Death of 1348–50; typhus, a disease of urbanism, mobility, and warfare; and the English Sweat, a mysterious and lethal disease that struck Europe in a succession of epidemics beginning in 1485 and lasting until 1551, after which the dis-

ease mysteriously vanished, leaving in its wake memories of husbands, wives, and friends coming down with the sickness in the morning and dying by dusk.

In the age of new infectious diseases, the old rules began to show their wear. A devastating plague in Venice in 1576 tested the physicians' performance, and the results were not impressive. By 1577 tens of thousands had succumbed to the epidemic. More than just testing Galenism's competence, syphilis and plague raised skepticism, opening a crack in the medical marketplace for alternative healers who competed with the regular doctors. Unsurprisingly, the idea of disease agents appealed to irregular healers and charlatans. Panaceas were their bread and butter.

In 1555, the Venetian humanist Girolamo Ruscelli published a book that influenced vernacular culture for decades to come. The book was called *The Secrets of Alessio Piemontese*—Alessio being a pseudonym Ruscelli made up as part of an elaborate ruse. The book became a phenomenal bestseller, largely because it promised to reveal the jealously guarded "secrets" (recipes) the author had assembled over a lifetime of collecting "not just from very learned men and noblemen, but also from poor women, artisans, peasants, and all sorts of people."²⁸ His secrets included remedies unknown to ordinary doctors, exotic perfumes, techniques for making artificial gemstones and valuable dyestuffs, and rare alchemical secrets tried out by Alessio himself. With Alessio's *Secrets*, the power of the recipe became manifest, and an age of how-to opened.

Alessio's *Secrets* touched off a torrent of books of secrets. The genre was so popular that their authors became known as the "professors of secrets."²⁹ Characters like Alessio roved all over Early Modern Europe, part of a network of experimenters making up an underworld of sixteenth-century science. The professors of secrets affirmed the superiority of experience over reason in the search for scientific knowledge. They believed that nature was permeated with occult forces that lay hidden underneath the exterior appearances of things. Neither reason nor authority nor any of the traditional instruments of inquiry, they insisted, were capable of gaining access to the occult interior of nature. Some new way had to be found to penetrate nature and capture its secrets.³⁰

The new scientific epistemology advanced by the professors of secrets was in fact one of the most ancient epistemologies of all: that of the hunter. The hunter of nature's secrets experiences nature not as a text but as a dense woods in which theory offers a poor guide. Just as the hunter tracks his hidden prey by following its spoor, the hunter of secrets looks for traces, signs, and clues that will lead to the discovery of nature's deeply hidden causes. A sharp eye, intuition, and sagacity—not theoretical knowledge or cleverness at parsing a text—were the marks of the scientist as hunter.

The writings of the Bologna surgeon Leonardo Fioravanti, one of Europe's most famous professors of secrets, capture this way of thinking. Dissatisfied with traditional medical learning and determined to recover the primitive, pristine medicine of "the first physicians," he resolved to take the road of experience to learn the

secrets of true medicine. In his autobiography, he recalled the day in October 1548, when at the age of thirty, he embarked on his quest:

Many years have passed since I left my sweet home, Bologna, solely with the intention of traveling around the world in order to gain knowledge of natural philosophy, so that I might be able to practice medicine and surgery better than I could in those days when I began my work. And thus I have traveled to various and diverse provinces, always practicing the art wherever I found myself. I never ceased studying but always went looking for precious experiments, whether from learned physicians or simple empirics, yea from all kinds of people, whether peasants, shepherds, soldiers, clerics, old women, and people of all different qualities.³¹

Thus began a thirty-year pilgrimage that took him to Sicily, which he took to be the original font of empirical medicine, and from there all over Italy and finally to Spain, where he plied his trade—and when necessary pleaded his case—in Philip II's court, where he met alchemists, navigators, American Indians, and naturalists returning from the New World.³² Fioravanti said he was following in the footsteps of the ancient philosopher Apollonius of Tyana, who traveled to distant parts of the world to learn the secrets of nature. Rejecting official medicine, Fioravanti offered this advice to those who wished to be philosophers:

If you want to be called a philosopher, you must go walking the world and live among all sorts of people and understand their nature and the medicines they use. Once you've done that, you have to discover the great variety of things in nature, the diversity of people in the world, and their many different medicines. And when you've seen all these things, only then will you have acquired the name of philosopher.³³

The professors of secrets put little faith in theory. They rarely asked why particular recipes worked. Nor did they use experiments to test theories. They were guided by the conjectural methodology of the hunter rather than by the theoretical approach of the experimental scientist. Yet, for all their talk about the hollowness of theory, the professors of secrets carried out their investigations within an intellectual framework that most of their readers shared; otherwise, their books would not have sold so well. The philosophical expression of this outlook was natural magic, the science that attempted to give naturalistic explanations of occult forces. The basic assumption of natural magic was that nature teemed with hidden forces and powers that could be imitated, improved on, and exploited for human gain.

SIGNS AND SIGNATURES IN THE LABYRINTH OF NATURE

To the natural magicians, the universe was an immense network of correspondences and hidden analogies. The Neapolitan savant Giambattista Della Porta, Europe's most famous magus, envisioned an encrypted world in which nature's

secrets were locked away in a dense forest of symbols. Della Porta wrote at a time when geographical discoveries had expanded the known world and had completely altered the landscape of nature. Nature became more abundant, an almost infinite reservoir of secrets waiting to be discovered. The decoding of nature could not be accomplished using the usual tools of Scholastic natural philosophy, Della Porta insisted. Some new way of making the secrets of nature visible had to be found. Della Porta was convinced that experience was the way.

But how can experience alone weave its way through the labyrinthine network of correspondences that defines the universe of natural magic? Can nature's secrets ever be discovered? The answer, according to Della Porta, is that nature puts a mark on things. The outward appearances of objects provide clues indicating the secret properties hidden within. These "signatures," or visual likenesses, are the signs that God implanted in nature, enabling us to conjecture that certain objects have influences on other objects. Signatures are the clues leading one to see the inner workings of nature.

Signatures enable us to discern, for example, that the herb *Scorpius*, which is shaped like a scorpion, is a good remedy against insect bites and that the amethyst, the color of wine, can be used as an amulet to prevent drunkenness. Such signatures are not merely coincidences but are divinely ordained. Nor are they separable from the objects they mark. They are woven into the fabric of nature, giving it meaning and intelligibility. Without signatures, nature would be opaque and impenetrable.

Sixteenth-century intellectuals thought the doctrine of signatures was especially useful in medicine, which, driven by a competitive capitalist marketplace, increasingly aspired to identify specific drugs to treat specific ailments. Followers of the Swiss medical reformer Paracelsus were particularly enthusiastic.³⁴ One of Paracelsus's disciples, the Marburg medical professor Oswald Croll, wrote a treatise advancing the idea that signatures offer clues to discovering the specific healing powers of plants. *Basilica Chymica* (1609), Croll's treatise on the doctrine of signatures, opens with a violent attack on the physicians and herbalists who, "like plebeians without eyes," occupy themselves solely with the external face of things, neglecting to investigate their internal forms. Croll, on the other hand, hewed to "the footsteps of the invisible God in creatures," thereby seeking out the power enclosed within. These tracks, or signatures, he said, would lead the investigator to the secret virtues in things, which finally must be extracted alchemically. Croll gave this advice to the researcher:

In things occult consider the manifest footsteps of nature divinely impressed in things, and diligently enquire after the hidden dowries of herbs by inspecting their external form, and by taste perceiving the difference between the shell and the kernel, between the house and the inhabitant. . . . In all external things the exterior case is only the receptacle of innate and inherent virtues infused by God, as the soul into the human body.³⁵

These interior virtues are not easily accessed. They are revealed only by long study and careful observation. They can be extracted only with “the industrious help of Vulcan or anatomic knife,” in other words by alchemy, anatomy, and experiment. We can acquire this knowledge, Croll asserts, only by experience guided by clues in the form of the “hieroglyphic characters of things.” Signs in nature are not like those in a book. They appeal to more than the visual. They engage all the senses, as well as the emotions—in short, they embrace all experience. Thus the rough feel of the callused pedicles of ivy root signifies its virtue to heal scrofula, while the sweet smell of orchid roots indicates its power as an aphrodisiac. Rhubarb, its color indicates, expels yellow bile, while lily-of-the-valley, which droops its head, is a cure for apoplexy.

Croll compares this methodology to that of the treasure-hunter, who follows clues on the surface to discern what lies beneath:

For as men who in digging find a treasure are wont to note the place by a certain sign, so God himself has placed signs in many things in nature, which He has not manifested, that we can only discover through the signature. . . . It pleased the Almighty furtively to create metals in the lowest places so we might know that in them are concealed occult virtues of nature.³⁶

In the labyrinthine cosmos of spagyric physicians, nature was as opaque as the densest forest. Only by following the signs and clues that God implanted in things might the investigator be led, like the hunter, to his quarry, the secrets of nature.

THE QUEST FOR SIGNATURES IN THE NEW WORLD

It has been argued that the European encounter with the New World struck an irreparable blow to the doctrine of signatures. The plants and animals of America were entirely new. Anteaters and sloths, tobacco and chocolate, are all missing from the writings of antiquity. They had no known similitudes. As one historian observes, “They come to the Old World naked, without emblematic significance.” Thus, the argument holds that naturalists could not approach this new flora and fauna in the manner of earlier humanists. Instead, they were forced to limit their descriptions to discussions of appearance, habitat, and the reports of native peoples.³⁷

If the New World flora and fauna came to the Old World naked, they were soon clothed with layer upon layer of correspondences and signatures. Few works better illustrate this than the compendious natural history of the Americas published by the Spanish Jesuit Juan Eusebio Nieremberg. Of all people, Nieremberg might be expected to have viewed natural history objectively. The Spanish explorers had far greater firsthand knowledge of American natural history than had other Europeans, and Nieremberg had access to their writings.³⁸ Yet this zealous Jesuit was obsessed with signatures. For Nieremberg, signatures were signs of Spain’s divinely ordained destiny in the Americas.

Nieremberg was born in Madrid of German parents. He entered the Society of Jesus at an early age and studied at the universities of Salamanca and Alcalá, one a renowned center of Renaissance humanism and the other Spain's greatest medical school. His best-known Spanish works were deeply spiritualist tracts exploring the relation between the temporal and eternal. So it is somewhat surprising to encounter two massive works dedicated to natural philosophy and, in particular, to the natural history of the New World. Nieremberg, who had never been to America, confidently expounded on the subject in two massive, densely documented works dedicated to the natural history of the New World: *Historia naturae* (1635) and *Curiosa y oculta filosofia* (1649).

Confronting these works, one cannot help but ask: How could such a deeply religious author—one who disdained earthly affairs—be so interested in nature? For one who sought eternal truths, what was the point of studying things that were apparent and ephemeral? The answer is that, to the Jesuits, observing natural phenomena was a means of coming closer to God. To decipher facts of nature was to unveil the mysteries of the Creator. As Nieremberg put it, “all nature is something of an image, or better, an enigma of the divinity.”³⁹ The task of the natural philosopher, therefore, was to read and interpret the universe, which by definition is apparent and deceptive. “If all contemplation of nature is quiet and pleasing even at first sight,” Nieremberg wrote, “how much more enjoyable and pleasant will it be when one penetrates its secrets and enters the depths of its mysteries.”⁴⁰

Here the metaphor of *theatrum mundi* came into play; that is, the view that nothing was as it seemed and everything acquired another meaning, a sense going *beyond* the apparent. The idea permeates Spanish Golden Age poetry, painting, and philosophy.⁴¹ The natural world, like human existence, was a representation, the result of a divine plan, a code to be deciphered, a labyrinth to negotiate and resolve. Nature's manifestations, in Nieremberg's words, were a copy of God: “By them we make Him out and by them we venerate Him, and thus they had to have much that is admirable, much that is incredible, and of which we are ignorant.”⁴²

Time and again Nieremberg deploys the hunt metaphor to describe his prescribed methodology for discovering the divine in nature. It is a method guided by clues, enigmas, and signs. “In all the works of nature there are proofs of the Godhead,” Nieremberg writes. “There are also evident riddles [*aenigmata*] of the Divine Intelligence from the plan of nature.” Therefore, while hunting—that is, inquiring into—wild beasts, “one hunts for God (*per feras venari Deum*).”⁴³

This is a cosmos governed by analogy, sympathies, and correspondences—similitudes, as Renaissance scholars called them. For Nieremberg, celestial movements are to be found in animals, and animals are inscribed on the stars.

Stones take organic forms, and the vegetable pharmacopoeia announces through its physical features the illness or organ it is designed to cure. It is a universe similar to the one expounded by Nieremberg's Jesuit contemporary Athanasius Kircher, who believed that nature was God's poetical labyrinth and a reflection of the supernatural. Kircher, one of the greatest polymaths and most learned men of the Early Modern period, wrote voluminously on virtually every imaginable aspect of ancient and modern knowledge. In every work, he demonstrated the motto that guided his work and his view of the world: "The world is bound by secret knots."⁴⁴

The Spanish historian Juan Pimentel characterizes Nieremberg's work as an exemplar of "Baroque science."⁴⁵ It is an apt description. By the time Nieremberg wrote in the 1630s, the Baroque was in full swing. Among the peculiarities of the Baroque was an obsession with reading signs in nature that pointed to higher meanings, such as the Passion of Christ, redemption, and so on. The Baroque was also characterized by a fascination with change and novelty. To Nieremberg, the emergence of novelties was explained by the unfurling of the principle of plenitude. What was sought out and appreciated was in fact the strange rather than the new, and the stranger the better. Few cases seemed as promising for revealing the strange and novel as the New World. America was a black hole to one, like Nieremberg, who saw all of nature as a labyrinth, a code to be cracked.

Nieremberg had never visited America; in fact, he never left Spain. But that did not prevent him from reading into the natural history of those distant regions the signs of God's plan for the world, nor from deciphering the American signs to confirm Spain's divinely ordained imperial destiny in the New World. In dealing with America, Nieremberg relies entirely on the testimony of others, drawing information from the works of José de Acosta, Peter Martyr, Fernández de Oviedo, and the great chroniclers of the Americas. Above all, he quotes extensively from Francisco Hernández, one of the most astute sixteenth-century observers of the New World. All these empirical reports Nieremberg enveloped in the rhetoric of novelty and wonder.

In approaching the gigantic wonderland called America, Nieremberg saw signs everywhere, and he read many of them in a distinctly imperial fashion. Thus, the *manucodiata* (bird of paradise) to him augured a new paradise to come, a promised land of the future, not the biblical paradise of the past. America, of course, would be that new paradise. In another American plant, the *granadilla* (Passion-flower), he was able to locate the chalice, nails, and other signs of the death of Jesus Christ—emblems of the Eucharist, the sacramental motif brandished by the Counter-Reformation as the emblem of the true faith.⁴⁶ Nieremberg's main concern, of course, was to give meaning to a world that was to Europeans entirely new, to tell a story of America that aligned it with Holy Scripture—and with Spain's imperial destiny (figure 6.4).



FIGURE 6.4. Granadilla (Passionflower), Juan Eusebio Nieremberg, *Historia naturae maxime peregrinae* (Antwerp, 1635). John Carter Brown Library, Providence, RI.

BACON AND PAN'S HUNT

The Spanish works on New World natural history and medicine circulated widely in Europe. Beyond Iberia, they had particular appeal in England. Despite the searing anti-Spanish propaganda that streamed from the popular press, Englishmen were clearly envious of the Iberian accomplishments, and advocated for similar colonial ventures in their own country.⁴⁷ Among the avid readers of the Spanish colonial literature was the English Lord Chancellor Sir Francis Bacon. The expansion of the geographical limits of the known world by recent overseas explorations riveted Bacon's imagination. In the *Novum Organum*, he warned, "Surely it would be a disgrace to mankind if, while the expanses of the material globe—of lands, seas, and stars—have in our times been opened up and illuminated, the limits of the intellectual globe were confined to the discoveries and narrow limits of the ancients."⁴⁸ In a brilliant tour de force, Bacon described his methodology by reference to an ancient myth, the myth of Pan, the god of hunting. Bacon compared his method—an inductive and conjectural method—to Pan's hunt for the hidden goddess Ceres. According to the legend, Pan, while hunting, accidentally discovered Ceres after all the other gods had failed in their quest for her.

Bacon interpreted the Pan myth to mean that “the discovery of things useful to life . . . is not to be looked for from the abstract philosophies, as it were the greater gods, . . . but only from Pan; that is, from sagacious experience, which will often by a kind of accident, and as if while engaged in hunting, stumble upon such discoveries.”⁴⁹ As a scientific methodology, Pan’s hunt proceeds from one experiment to another in the same way a hunter tracks his prey step by step, guided by footprints and signs. Bacon called this method “a kind of hunting by scent, rather than a science.” Serendipity is what scientists nowadays call discovery by such means.⁵⁰

In comparing his scientific method to Pan’s hunt, Bacon provided the most detailed elaboration of the hunt metaphor. Bacon saw himself as an intellectual Christopher Columbus, the discoverer of a new world of natural science just as Columbus had discovered a New World across the Atlantic. Columbus had “conjectured” his way across the ocean, said Bacon; similarly, Bacon’s new scientific methodology would be founded, like that of the Great Discoverer, on conjecture from evident clues. At the same time, Bacon acknowledged the difficulty of understanding nature. In the *Novum Organum*, he wrote:

The universe to the eye of the human understanding is framed like a labyrinth, presenting as it does on every side so many ambiguities of way, such deceitful resemblances of objects and signs, natures too irregular in their lines and so knotted and entangled. And then the way is still to be made by the uncertain light of the sense, sometimes shining out, sometimes clouded over, through the woods of experience and particulars; while those who offer themselves for guides are themselves also puzzled, and increase the number of errors and wanderers.⁵¹

Nature’s opaqueness was a source of profound discouragement to natural philosophers, thought Bacon. Whenever they try to weave their way through the labyrinth of nature, philosophers “complain about the subtlety of nature, the hiding places of truth, the obscurity of things, and the weakness of the mind.” Too easily investigators bow to authorities instead of striking out on their own, as Columbus did. To Bacon, natural philosophy was in the same situation as navigation before the invention of the compass:

As in former ages, when men sailed only by observation of the stars, they could indeed coast along the shores of the old continent or cross a few small and Mediterranean seas; but before the ocean could be traversed and the new world discovered, the use of the mariner’s needle had to be found out; in like manner the discoveries which have been hitherto made in the arts and sciences . . . lay near to the senses and immediately beneath common notions; but before we can reach the remoter and more hidden parts of nature, it is necessary that a more perfect use and application of the human mind and intellect be introduced.⁵²

Bacon devoted the bulk of *The Advancement of Learning* to elaborating such a methodology of discovery. He called his method “learned experience.” The

method was meant to give order and direction to experimentation, so that scientists would not have to waste time “groping in the dark.”⁵³ According to Bacon’s method, “new knowledge is discovered by ingenious adaptation of existing knowledge, rather than by formal inference from fundamental principles.”⁵⁴ Baconian induction was, in a sense, an attempt to translate *mêtis*—whether the artisan’s cunning or the hunter’s intuition—into a method. As I indicated earlier, *mêtis* was a kind of knowledge for which no recognized method existed in the philosophical tradition. For the ancient philosophers, *mêtis* was little more than guesswork and could not possibly lead to certainty. Bacon’s learned experience, by contrast, was essentially an attempt to define a rigorous methodology for conjecturing from the seen to the unseen parts of nature, from effects to causes—or, in sixteenth-century parlance, from the manifest to the occult.

Bacon condemned natural magic, which supposedly conjectured by a sort of cunning that was beyond ordinary intelligence. He wanted to reduce cunning to a rule and to provide an orderly and systematic way of proceeding from particulars to axioms. This required extensive experience with nature, which could only be gained through the combined efforts of many researchers working together. Such efforts, Bacon believed, would enable investigators to discover in experiments clues that would lead them to nature’s interior, just as Pan, having long experience in the ways of nature, fell upon Ceres apparently by accident, but in reality by a kind of “sagacity.” Only, in Bacon’s scheme Pan’s sagacity would be replaced by learned experience, an orderly method that began with the compilation of experiments and observations, and ended with the education of laws of nature.

The hunt metaphor was extremely resilient and versatile. Because it described a method of investigation rather than a philosophical worldview, it traveled easily among different theoretical positions, from the raw empiricism of the post-Columbus explorers and the professors of secrets to the carefully regulated experimentalism of the seventeenth-century mechanical philosophers. The hunter’s methodology was both empirical and conjectural, and therefore neatly coincided with the ambitions of empirical healers such as Leonardo Fioravanti, who was suspicious of conventional medicine. To empirics, medicine itself was a hunt for secrets. “I’ve spent forty years roaming the world, searching for the *Magna Medicina*,” Fioravanti said toward the end of his life.⁵⁵ Although he never found the “Great Medicine” he was looking for, his quest, like that of Alessio Piemontese, was legendary, inspiring generations of empirics and professors of secrets.

The Renaissance naturalists and the professors of secrets advanced a radically new vision of the future of medicine. It was one in which the tyranny of ancient authority was forever abolished; a future in which newly discovered herbs from distant parts of the world promised new cures; and most of all a future in which exploration—the hunt—would always be the way to new discoveries. Indeed, the

"hunt" metaphor remains a common metaphor for scientific research. Investigators "hunt" for cancer genes, chemical elements, and new cures for deadly diseases. But whereas modern scientific quests seek out phenomena whose existence is already supposed, the Baconians took a plunge into the thickets of nature to see what might be found there. For Bacon's generation, the hunt was an exploration of uncharted territory, with the goal not simply to explain what was already known but to discover new things.

It is not easy to find new knowledge, Bacon observed, since nature so jealously guards her secrets. As a result the scientist cannot simply rely on the traditional tools of logic, but must instead be a wary and cunning hunter, like a lynx alert to every sign of his prey. As Bacon assured his readers: "There are still laid up in the womb of nature many secrets." To discover them, "you have to hound nature in her wanderings."

When in the mid-seventeenth century Joseph Glanvill envisioned the opening up of "an America of secrets and an unknown Peru of nature," he had in mind the New World explorers, as well as armchair travelers like Monardes. The navigator and the explorer provided the virtuosi with a heroic self-image as the model empiricist, unpretentious in his learning and skeptical of the opinions of the schoolmen. "The simple sailors of today have learned the opposite of the opinion of the philosophers by true experience," asserted Jacques Cartier.⁵⁶ Such pronouncements turn up again and again in the relations of the explorers. The brilliant achievements of the modern navigators brought into sharp relief the limited intellectual horizons of the ancients, and demonstrated the superiority of empirical observation over bookish knowledge. From the standpoint of *materia medica*, Glanvill and his contemporaries had every reason to turn their backs on antiquity and look toward an "America of secrets." The hunt for "new worlds of secrets" was not a mere hackneyed metaphor; it literally described a new vision of the future of science.