

*The*  
KNOWLEDGE OF NATURE  
*and the*  
NATURE OF KNOWLEDGE  
*in* EARLY MODERN JAPAN

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*Federico Marcon*

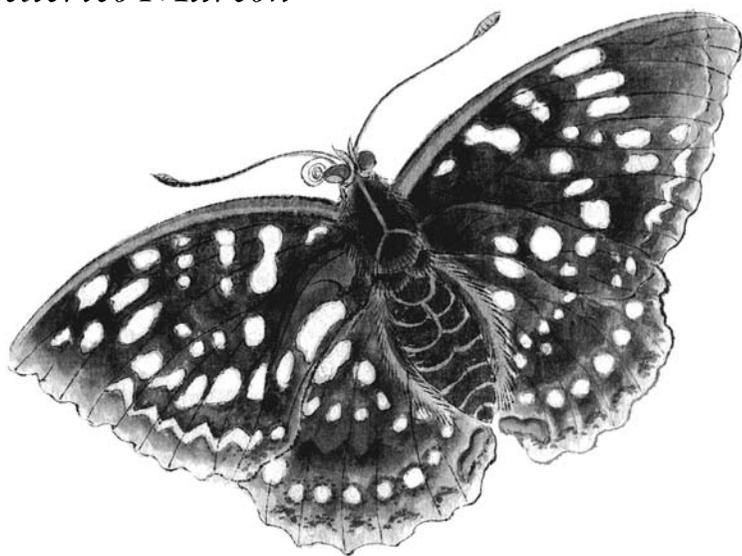
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*Federico Marcon*



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*A philosophical interpretation of world history would have to show how the rational domination of nature comes increasingly to win the day, in spite of all deviations and resistance, and integrates all human characteristics.*

— *Max Horkheimer and Theodor W. Adorno*



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## Prologue

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The Sanjō Guest House, where I spent the summer of 2013, is located in the middle of the Hongō campus of Tokyo University. It stands near a garden, the Ikutokuen, which was built in the 1630s in what was then the Edo residence of the powerful Maeda Toshitsune, domainal lord (*daimyō*) of one of the wealthiest regions of Tokugawa Japan, Kaga.<sup>1</sup> The garden expands around a pond shaped like the character 心, or *kokoro* (“heart-mind”), today known by most as “Sanshirō’s pond” (Sanshirōike) from the name of the protagonist of Natsume Sōseki’s novel.<sup>2</sup> The vegetation around the pond is so exuberant that one cannot help but perceive a sense of disordered and disquieting wilderness. At least, that is what I usually felt when I walked the narrow and uneven paths around the lake. It is populated by a variety of birds: crows, cuckoos, thrushes, woodpeckers, ibises, kingfishers, bushwarblers, rufous turtledoves, and a bevy of green parrots. One night I even met a Japanese raccoon dog (*Nyctereutes procyonoides viverrinus*), or *tanuki*, as it is called here, protagonists of a mass of folktales that describe them as creatures endowed with supernatural powers—mischievous tricksters, masters of disguise, often portrayed with portentously huge testicles.

At a closer look, however, the disordered luxuriance of the garden is far from being a sign of its wilderness. In the trunk of many trees and among short herbs, in fact, one can spot plastic labels with the names of many of the plants growing there. These tags catalog the vegetation of the garden in a precise inventory of its natural riches. They represent an odd contrast with the first impression of wilderness it gives. They suggest design, planning, artifice, and, most important, dominion over nature. If you visit the parks of Tokyo in search of an improbable relief from the sultriness of Japanese summer, you will have the same odd experience: a sense of disordered wilderness that vanquishes as soon as you notice labels bearing the name of trees and herbs, sometimes with even the Latin scientific name attached.

Knowledge of the natural world is as old as human beings. Information on the nutritional, curative, and venomous properties of plants constituted a matter of life or death for early *Homo sapiens*. Even today, biologists routinely use the “botanical” knowledge of tribes of hunter-gatherers in Southeast Asia, Africa, and South America to explore the remotest recesses of the last surviving rainforests. But the kind of knowledge natural sciences like botany and zoology produce

is distinct. It parcels an ecosystem in discrete elements, which are isolated, decontextualized, analyzed, sectioned, objectified as pictorial, dried, or embalmed samples, experimented upon, manipulated, transformed, copyrighted, and often reproduced and commercialized in mass quantities.

Although in the last decades a variety of “green” thinkers and movements have underlined the inseparability and imbrication of human societies and the environment, we are still largely confident of the modern paradigm that sees human beings as distinctly separated from the natural world. In the age of the Anthropocene, the disavowal of our embeddedness with nature prevails. We see ourselves as destined to exercise our dominion over nature. And in spite of concrete evidences of the catastrophic impact we have on the environment, today “the fully enlightened earth radiates disaster triumphant.”<sup>3</sup>

Historians of science locates the origin of this modern paradigm in the Renaissance period, part of that long and complex ensemble of social and intellectual processes clumped together in the rubric of the Scientific Revolution. Natural philosophers of early modern Europe increasingly isolated species from their ecosystems, objectified them in atlases and breeding experiments, and commodified them as resources for culinary consumption, pharmacology, agriculture, industry, and entertainment. According to this canonical view, with the expansion of European power during the age of empires this paradigm globalized as traditional (meaning “backward”) cultures like, for example, Japan and China embraced the Western sciences as integral part of their modernizing efforts in the late nineteenth century. As a result, whether to glorify or denounce the revolutionary effects of scientific modernity in the last two centuries, the “enlightening” of the world is always and indisputably a *Western* and, in particular, European undertaking.

This book aims to correct this assumption. It demonstrates that well before the modern age, during the Tokugawa period (1600–1868), Japan began a process of desacralization of the natural environment in the form of a systematic study of natural objects that was surprisingly similar to European natural history without being directly influenced by it. This process was carried out by scholars invading pristine regions to survey the vegetal and animal species living in Japan and classify them as discrete entries of dictionaries and encyclopedias or as objects to collect, analyze, exchange, exhibit, or consume as cognitive, aesthetic, or entertaining commodities. Originally framed as *honzōgaku*—a field of study of Chinese origins ancillary to medicine, devoted to the pharmacological properties of minerals, plants, and animals—this discipline evolved into a very eclectic field encompassing vast arrays of practices, theories, conceptualizations, and

goals. Its evolution, I here argue, derived from its internal development as much as from the deep transformations of Tokugawa society and of the socioprofessional trajectories of scholars in that society. Many of the practices, institutions, and knowledges of *honzōgaku* were not lost or abandoned when the Western sciences were introduced in the Meiji period (1868–1912) to sustain the modernization of Japan but would be rather translated, adapted, and incorporated in the language and forms of the new disciplines of botany, zoology, and biology.

When the Maeda compound in Hongō was turned into public land and given to the Ministry of Education to edify the new facilities of the Tokyo Igakkō and the Tokyo Kaisei Gakkō—soon to be fused in 1877 as the University of Tokyo—the Ikutokuen was a wasteland. It would be progressively reduced to its actual size and the maintenance of its vegetation put under the guidance of the center for botanical research of the university along with the Koishikawa garden in Hakusan. In all probability, the tags domesticating the wilderness of its trees and plants were placed then. However, the Maeda were domainal lords who in the Tokugawa period also practiced as amateur scholars of *honzōgaku*. Who knows if they tagged the vegetation around the heart-shaped pond too?



I *Nature without Nature*  
Prolegomena to a History of Nature Studies  
in Early Modern Japan

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DISENCHANTING NATURE

The *Hitachi no kuni fudoki* (Gazetteer of the Hitachi Province, 721 CE) narrates that during the reign of the emperor Keitai, who ruled at the beginning of the sixth century,

there was a man called Yahazu of the Matachi clan who reclaimed a marshy land in a valley west of the District Office to open up new rice-fields. Soon, a troop of Yatsu no kami gathered together to obstruct his work and hinder the opening of new fields to cultivation. According to the people of the area, Yatsu no kami are snake-like spirits. They have bodies of snakes and horns on their heads. If anyone turns to look at them while escaping, his household would be ruined and he would die without heirs. Fields neighboring the District Office harbor many of these creatures.

Matachi was furious; he put on his armor, took his halberd, and killed many of them, driving the rest away. Later, he went to the mountain entrance and erected some sticks to mark a boundary. He then said to the Yatsu no kami: “The Deities shall live in the lands above this point towards the mountain; humans shall instead cultivate their fields below it. From now on I shall become a priest to worship you and so will my descendants do forever and ever. I beseech you not to curse me or bear a grudge against me.”

He built a shrine and conducted the first ceremony. Then, he opened up more than ten *cho* of rice-fields. His descendants continued generation after generation to worship these deities, and so are still doing today.<sup>1</sup>

Matachi’s tale discloses a pattern that characterized the religious beliefs and mythological stories of various communities of early Japan, consisting of a fundamental division of human and sacred space. On one side, human dwellings and cultivated lands formed the symbiotic domain of a nature domesticated to human needs; on the other, dark forests and impenetrable mountains were the realm of wild animals and untamed spirits, a nature inhospitable to humans. In between, shrines and wooden *torii* gates marked the borders that kept the two worlds separated: they signaled to human wanderers that if they proceeded

further, they entered at their own risk in the hostile reign of wild animals and *kami* (spirits), and they reminded deities of a pact of coexistence with human beings—a pact that usually originated, as in the story from the *Hitachi no kuni fudoki*, from a violent clash of human communities and natural spirits.

The sacred space of untamed nature is inhospitable and alien to human beings. It is populated by a variety of trees, herbs, and animals but also by *kami* and other monstrous creatures like *kappa* (water goblins), *tengu* (long-nosed demons), *kitsune* (supernatural foxes), and *tanuki* (raccoon dogs), which tricked, kidnapped, challenged in wrestling matches, and sometimes killed all those humans who dared to enter their realm.<sup>2</sup> Folk tales abound of such creatures, and many Shinto shrines worship one or the other of these supernatural creatures “pacified” to allow human beings to enjoy the natural riches of an area—like in the case of Matachi’s story.<sup>3</sup> Shrines protect the impermeability of the borders between human and sacred space, and they control through ritual protocols of worship the divine forces that humans had subdued. Shinto rituals include *tama shizume* (pacification of spirits) and *jjinsai* (pacification of place), ceremonies performed even today before constructing new buildings or opening up new lands for cultivation. Shinto shrines thus function as signposts of a separation of the human and the natural worlds.

Anthropologists and ethnographers of Japan have often argued that the mountainous landscape of the major Japanese islands reproduces a similar division of space: villages and cities surrounded by cultivated lands and encircled by village mountains (*satoyama*)—reservoirs of timber, firewood, and hunting and gathering resources—constitute the human space; outside it, forest-covered mountains with sparse or no human presence. Shinto shrines punctuate this concentric organization of space with a system of village shrines (*sato no miya*), field shrines (*ta no miya*), and mountain shrines (*yama no miya*), in which people worshiped those spirits enraged by the opening up of new lands for human exploitation; small shrines (*oku no miya*), built to mark the borderline between the human space and the sacred space of untamed nature, lie on the outer ring.<sup>4</sup>

In the last century, scholars of various disciplines—from Yanagita Kunio’s ethnographical research to Nakao Sasuke’s biogeography and Sonoda Minoru’s Shinto environmentalism—have mobilized this pattern of spatial division to create and sustain an ideological constellation of beliefs according to which a unified and unique Japanese identity in empathic relation with the natural environment have always existed substantially unaffected by historical change.<sup>5</sup> Even though evidences suggest that a ritual separation of natural (or sacred) and hu-

man spheres can be retrieved throughout the history of Japan,<sup>6</sup> recent research on the environmental history of the archipelago have shown how, in actual fact, the destruction of the environment has been a constant feature of Japanese history since its earliest times precisely *because*, rather than *despite*, the existence of a religious rituality that sublimated human intervention on nature.<sup>7</sup> For example, economic and purely damage control–related concerns, rather than religious “love for nature,” were at the core of the reforestation policies of the Tokugawa shogunate in the eighteenth and nineteenth centuries.<sup>8</sup>

This book reconstructs various processes that slowly but relentlessly demolished this traditional division of space and the worldviews that sustained it.<sup>9</sup> It shows how a series of disparate intellectual and manual practices, spanning from the late sixteenth to the mid-nineteenth century, on the one hand favored the expansion of the human domain to include pristine mountains and forests as reservoirs of material and cognitive resources and on the other hand developed new ways of conceptualizing natural species and their environment. The vanishing of the invisible texture of metaphysical relations that held together sacred and human spaces was the effect of a long, unplanned, and contingent series of intellectual, economic, political, and cultural processes. A variety of disciplines of nature studies more or less directly associated with *honzōgaku*—a scholarly field that encompassed subjects ranging from *materia medica* and agronomy to natural history—knitted together these processes. The ensuing secularization of nature sprang from a parceling of nature in myriads of discrete objects to be described, analyzed, consumed, or accumulated in the form of standardized and quantifiable units as products, natural species, or collectibles.<sup>10</sup>

Because I am mainly concerned with the changing attitudes toward the material environment in early modern Japan, I do not develop here a comprehensive history of the discipline of *honzōgaku*.<sup>11</sup> Rather, I follow some genealogies of its complex history to reveal its impact on the professionalization of specialized scholars; agricultural advancements; the development of new economic policies in shogunal and domainal administrations; and the formation of various forms of popular entertainments, refined pastimes, artistic creations, and intellectual discourses related to plants and animals. I claim that these were all interrelated processes that played a critical role in the secularization of nature and the objectification of the natural species that populated Japan. On the one hand, the increasing commercialization of agricultural production—which included the farming of rice and other grains as well as protoindustrial activities like fishery,

textiles, sake brewing, dyeing, mining, and so on—led to the commodification of plants and animals and their transformation in resources to inventory and accumulate for the needs of agricultural growth and the demands of the expanding market of medicinal substances. On the other hand, *honzōgaku* scholars and amateurs tended to examine plants and animals as intellectual commodities in isolation from their ecosystems, to be cataloged as concrete samples of abstract species in encyclopedias, atlases, monographs, and collections. This tendency derived in part from the adherence of early *honzōgaku* scholars to the explanatory style of canonical texts like *Honzō kōmoku*, which tended to treat mineral, vegetal, and animal species as *meibutsu* (names) in the form of discrete encyclopedic entries revealing their pharmacological properties. The description and manipulation of individual specimens disconnected from their ecosystem developed in concomitance with the recruitment of naturalists in state-funded missions to inventory plants and animals as *sanbutsu* (products, resources) and to experiment with medicinal herbs (*yakuhin*) and pest-resistant crops in botanical gardens. A burgeoning popular interest in plants and animals contributed to their transformation into objects of curiosity (*kōbutsu*) to be collected, admired, exchanged, and exhibited as spectacles (*misemono*).

Whether to expand the encyclopedic reach of human knowledge or to be engaged in a morally uplifting practice, whether to improve agricultural production or to generate new aesthetically appealing images, or whether for social utility or simply for fun, professional and amateur scholars collected, observed, bred, exchanged, analyzed, compared, depicted, described, fantasized on, and classified the most varied assortments of insects and fish, herbs and mushrooms, and trees and flowers, following either theoretical or practical protocols in both solitary and collegial enterprises. A majority of *honzōgaku* scholars favored a lexicographical approach, accumulating knowledge and gathering information from books and encyclopedias. But from the beginning of the eighteenth century, a growing number of naturalists started to invade pristine and uncharted forests, mountains, and ravines to make complete inventories of the vegetal and animal species they contained. To these scholars, nature was no longer conceivable as an organic, meaningful, and homopoietic space of supernatural and mystifying relations but as a multitude of objects—myriads of things (*banbutsu*). As one of these naturalists, Kaibara Ekiken, put it, “I climbed tall mountains. I penetrated into deep valleys. I followed steep paths and walked through dangerous grounds. I have been drenched by rains and lost my way in fog. I endured the coldest winds and the hottest sun. But I was able to observe the natural environment of more than eight hundred villages.”<sup>12</sup>

## THE OBJECTIFICATION OF NATURE

At once material and intellectual commodities, plants and animals constituted, as *specimens*, the myriads of things that populated the world (*banbutsu*). But as *species* to be studied, produced, or exchanged, plants and animals became concrete bearers of abstract characteristics. Different social practices converted them into names (*meibutsu*) of natural kinds in encyclopedias and atlases, into products (*sanbutsu*) in agronomical manuals and agricultural enterprises, into medicinal substances (*yakuhin*) in pharmacopoeias, or into curiosities (*kōbutsu*, *misemono*) in various forms of popular entertainments or amateurish research. These social practices—intellectual, artistic, political, and economic, but more often a mixture of them all—secularized nature by transforming what was once the enchanted realm of unfathomable divine forces and metaphysical principles into a multiplicity of “objects” that could be grasped and manipulated through protocols of observational, descriptive, representational, and reproductive techniques.

In particular, the effort to produce faithful pictorial representations of plants and animals that characterized *honzōgaku* practices in the second half of the Tokugawa period had the precise aim of abstracting from the material appearances of individual plants and animals those morphological traits that were supposed to be the defining marks of species (*shu*). This was a remarkable development in East Asian natural history. In Chinese pharmacopoeias, the usage of concepts like *zhong* (*shu* in Japanese) and *lei* (*rui*)—the standard renderings respectively of species and genera in modern biological terminology—was rather loose. Both terms designated a discrete kind or group of minerals, plants, or animals in a system of signification distinctive of a text or a series of texts but without an overarching systematic consistency.<sup>13</sup> Li Shizhen’s *Bencao gangmu* (*Honzō kōmoku* in Japanese)—throughout the period the most influential canonical source—attempted to develop a coherent two-layered hierarchical order of species and genera, the *gangmu* (*kōmoku*) system.<sup>14</sup> The identification of each species depended on the names of the various plants and animals in different regions, but their grouping in a more refined taxonomy was largely based on morphological resemblances. Li inscribed his work in a Neo-Confucian framework, and therefore he theoretically assumed that the classificatory order of all species depended on their metaphysical constituents.

When at the beginning of the seventeenth century *Honzō kōmoku* was introduced in Japan, it became the foundational text of the field of *honzōgaku* until the formal institutional adoption of Western medicine by the Meiji state after 1868. Its classificatory system persisted unchallenged in its essential features

and was only subject to updates and corrections until its demise in the second half of the nineteenth century. True-to-nature illustrations, which attempted to abstract essential morphological features distinctive of each species, were also inserted in a framework that largely accepted *Honzō kōmoku*'s taxonomy or, at the very least, its notion of species. What was lost was any appeal to metaphysical foundations.

True-to-nature illustrations in atlases and encyclopedias had three basic functions. First, they distilled the results of shared protocols of observation to pictorially represent the concrete specimens under investigation in specific circumstances. Second, they aimed at revealing species-specific morphological characteristics of each species, not unlike the illustrations in many of today's bird-watcher manuals. Third, as epistemic paradigms, they trained the naturalist's eye to recognize species in nature by distinguishing morphological and quantitative features of plants and animals, which is also what bird-watcher manuals do. The practical function of these illustrations was to precisely identify plants and animals, a difficult task for scholars who had to negotiate between multilingual sources (in Chinese, Japanese, and, later, Dutch) and regional and dialectal variations in nomenclature. As such, they had the same impact of Linnaeus's *systema naturae* in teaching naturalists to "see systematically," as Michel Foucault put it, by molding the expert's observing gaze to the necessities of the system.<sup>15</sup> Their institution as the predominant form of description and explanation of natural species in the second half of the Tokugawa period represented a great change in scholars' cognitive practices, but it did not openly challenge *Honzō kōmoku*'s classificatory system.

On the one hand, we may say that there was no revolutionary paradigm shift in Tokugawa period's nature studies. These representational practices did not dismantle the taxonomical apparatus of *Honzō kōmoku* nor did they *openly* question the Neo-Confucian metaphysics that sustained its classificatory divisions. On the contrary, *honzōgaku* scholars often struggled to make their descriptions fit the established definitions of plants and animals in canonical encyclopedias, preferring to follow the conventional naming of species even when their pictorial descriptions were clearly at odds with the received knowledge.<sup>16</sup> But, on the other hand, the emphasis on morphological descriptions and juxtapositions that characterized *honzōgaku* practices in the second half of the Tokugawa period affected the way in which natural objects, qua object of knowledge, were conceived and constructed. Now manuals, encyclopedias, field notes, and monographs no longer deductively derived the properties of minerals, plants, and animals from an overarching metaphysical system, but these were inductively inferred from

a functionalistic description of their own objective materiality, without any open and direct questioning of the previous metaphysical presuppositions. In other words, Neo-Confucian metaphysics became simply irrelevant. Only visible objects remained: rocks, plants, and animals were material—they could be touched, gathered, collected, reproduced, exchanged—but abstract, insofar as they could be distilled through social practices into universal bearers of abstract qualities of species.

Through their collecting, observing, and representing, *honzōgaku* scholars reduced the material environment to a collection of material objects that were manipulated to manifest increasingly abstract qualities, species-essential morphological properties that were abstracted from the variety of individual specimens. Even mysterious and awe-inspiring supernatural creatures like *kappa*, *ningyo* (sirens), and *tengu*, once protecting the inviolability of the sacred space of untamed forests, were naturalized and treated like any other animal, with maps charting regional morphological differences and distribution.

#### WHAT IS A SPECIES?

One assumption behind true-to-nature illustrations was that the bodies of plants and animals revealed their membership in a precise species. Hence their accurate pictorial description in atlases and manuals and their preservation through increasingly refined drying and embalming techniques became standardized instruments to represent species. This accompanied and, in certain instances, replaced the traditional lexicographical approach of early *honzōgaku* scholars.

The transformation of individual, concrete specimens into material bearers of a set of universal, species-specific abstract features reified epistemological norms. The assiduous labor of *honzōgaku* scholars and their collaborators involved inventorying, collecting, growing, breeding, exchanging, drying, storing, cataloging, painting, and describing. Specimens-as-species representatives embodied intellectual and material practices contrived to convert particular examples into universal exemplars, which as “social hieroglyphics” concealed social labor.<sup>17</sup> Specimens-as-species representatives were “sensuous things which [were] at the same time supra-sensible or social.”<sup>18</sup> Their homology with the commodity-form is revealing. Like commodities, species were a product of human labor, an abstraction performed through an array of intellectual and manual practices. Species—unless perhaps considered from their cladogenetic history, which renders the very notion of species meaningless—are by no means natural kinds but social constructs.<sup>19</sup> In that sense, the operations performed by

*honzōgaku* scholars were not qualitatively different from those of contemporary Linnaean naturalists.<sup>20</sup>

Furthermore, the search for accurate, true-to-nature pictorial representations of plants and animals, in Europe as well as in Japan, concealed in the lifelike appearance of specimens-as-species representatives in atlas illustrations the fact that those representations were the result of human labor performed under historically determined social conditions. In other words, the “realism” of these illustrations masked the fact that species were the product of an operation performed by scholars under determined social circumstances, following specific protocols and shared standards of credibility, under the legitimating umbrella of determined political authorities, and for certain purposes. The same mechanism is at work in dried or embalmed samples in private collections or public expositions.

This book defends the view that this process of reification of nature—the tendency of conceptual knowledge to objectify what it seeks to describe—was coeval with and connected to deep structural transformations in the mode of production that occurred during the early modern period of Japanese history: the commodification of agriculture, the monetization of society, and the development of market-oriented mechanisms of commodity exchange. The role of scholars in this process of reification and disenchantment of the natural sphere was central.

#### A SOCIAL HISTORY OF SCHOLARS

In fact, the various forms of natural research, agronomical experimentations, and cultural diversions that involved collecting and describing plants and animals were all activities mediated by professional scholars. These scholars did not act in a vacuum but were subjected to various forms of social dominations. In narrating the development of nature studies in Tokugawa Japan, I therefore pay great attention to the social conditions of intellectual production and give a brief biographical introduction to the main *honzōgaku* specialists. These sketches, however, are not to be taken as indulgences in informational punctiliousness but have the purpose of shedding light to their sociohistorical trajectories. Indeed, like any other discipline, *honzōgaku* was a system of meanings structured by its social situatedness at the same time that it contributed to structure the society that engendered it. Its historical development mirrored changes in the structure of Tokugawa society as both symptom and cause. Moreover, *honzōgaku* scholars functioned as mediators between nature and society: the knowledge they produced gave order and meaning to the various experiences

of the natural world one could have through atlases, cultural circles, public exhibition, herbal expeditions, and the like. In Hilary Putnam's terms, in the division of linguistic labor distinctive of Tokugawa society, scholars organized and legitimated the "clear" and "distinct" standards of understanding.<sup>21</sup>

Intellectual production, like any other human activity, is subject to social constraints. Forms of scholars' organization, legitimating institutions, patronage venues, networks of information exchange, instruments of intellectual research, and markets for cultural products are all historically contingent social dynamics that help not only shape scholars' assumptions, worldviews, and dispositions—that is, the standards of social acceptability for how, what, and in which circumstances they can think, write, and inquire about—but also mold the self-fashioning strategies that scholars consciously or unconsciously adopt to establish their socioprofessional identity. "All men are intellectuals, but not all men have in society the function of intellectuals."<sup>22</sup> If intellectual and scholarly production coincides with the history of literate human societies, professional scholars emerged as socially recognizable personae only because of a heterogeneous ensemble of contingent historical events and processes in the early modern world. In Europe, the history of professional scholars active in universities, academies, or princely courts coincides with the history of modernity from the Renaissance to the present.<sup>23</sup> In Japan, there were no professional scholars socially recognizable as such before the seventeenth century. Before the Tokugawa period, intellectual production was an exclusive province of Buddhist monks, court aristocrats, and samurai elites. The history of *honzōgaku* is therefore simultaneous with the history of the emergence of professional scholars, and as such it reflects the negotiations and compromises of its specialists in establishing themselves and their credibility in the larger Tokugawa society. Hayashi Razan was the first promoter of *Honzō kōmoku* in Japan at the beginning of the seventeenth century, at the same time that he was struggling to invent a socioprofessional identity of scholar for himself (chapter 3). Kaibara Ekiken, a retainer of the Kuroda household of domainal lords, conceived and envisioned his activity as scholar and the entirety of his scholarly production as a form of service he owed, as a loyal samurai, to his lord and the people of his domain (chapter 5). Inō Jakusui's encyclopedic work aimed at boosting the glory of the Tokugawa's regime (also in chapter 5). Niwa Shōhaku's and Tamura Ransui's research was an integral part of shogunal economic policies, and as scholars they were organic members of the Tokugawa's bureaucratic apparatus (chapters 7 and 10). Ono Ranzan and Kurimoto Tanshū developed their scholarly careers negotiating among cultural circles, the market for botanical manuals, and state support

(chapters 8 and 9). Hiraga Gennai saw in scholarly excellence the only venue for upward social mobility (chapter 10). In other words, a history of *honzōgaku* is tantamount to a history of the emergence and establishment of professional *honzōgaku* scholars. This is the reason a large portion of this book on the knowledge of nature is devoted to reconstructing the nature of knowledge in early modern Japan through the self-fashioning tactics, negotiations, and struggles for social recognition of *honzōgaku* scholars.

MANUFACTURING KNOWLEDGE, CHANGING THE  
WORLD: EPISTEMOLOGICAL FOUNDATIONS

Nonetheless, it would be a mistake to reduce the knowledge that these scholars produced to the social conditions of that production. Knowledge is a social creation that depends as much on the objective structure of what is to be known as on the system of objective social relations that organizes, supports, and legitimates the production, circulation, and accumulation of knowledge itself and on the constellation of subjective discursive and conceptual choices of scholars. In different degrees and forms, this applies to every discipline that emerged in human history, *honzōgaku* included. The social production of nature knowledge has a history that can be regarded as a process that is both cumulative and punctuated by radical paradigm shifts because the social conditions of scholarly production change over time and because the accumulation of knowledge involves manipulations and interventions on the world that have enduring effects on the world itself. In a sense, knowledge, once produced, has the capacity to live its own life autonomously from the original intentions of those who produced it in the first place.<sup>24</sup>

For a history of any field of knowledge to rightfully advance claims of completeness, it should therefore have both an internalist and externalist approach, retrieving the epistemological practices and discourses as well as the strategies of self-description and justification, the social conditions of its production, its effects on the objects of cognition, and its effects on the world. While I do not nourish any ambition of completeness, in my account of the development of natural history in Tokugawa Japan, I analyze the changing practices and discourses of its practitioners between the seventeenth and nineteenth centuries, the various legitimating and self-fashioning strategies they adopted, their different social trajectories and networks of aggregation and information exchange, their conception of species, and the descriptive and manipulative techniques they adopted. I then reconstruct the intricate ways in which all these tendencies and forces interacted with each other to transform natural things into objects of

study and to intervene—sometimes with dramatic effects—in the natural environment. These transformations assumed different forms in different historical moments, often in accordance with the different purposes that sustained the production of knowledge.

Let me clarify this with an example. A storyline in this book is the passage from a focus on systematizing the names of natural species (*meibutsu*), in the early phase of the development of *honzōgaku*, to a focus on surveys and experiments on natural species as material products (*sanbutsu*) by naturalists often employed by the shogunal or domainal administrations. While the two forms of knowledge of natural objects were not distinct but continued to influence and assist each other, the different aims that motivated naturalists' research, their different institutional affiliation and legitimating forces, the different formats chosen to convey the results of their research, the different techniques of individuation and description of natural species (verbal and pictorial), and the like created two distinct "objects" of knowledge out of the same material reality. In other words, concrete vegetal and animal specimens became generic members of a "species," as either names (*meibutsu*) or products (*sanbutsu*), as a result of distinct conceptual operations. As material objects, they were bearers of a variety of properties that, on the one hand, responded directly to the epistemological practices that curtailed them as names or products but, on the other, they could be appropriated to respond to different social demands, classificatory or purely epistemological in the case of names, economic in the case of products (medicinal, agricultural, culinary, etc.).

This dynamic mediation of subject and object of cognition has been a central concern of the philosophy of knowledge—and of scientific knowledge, in particular—in the last two centuries, and in developing my argument, I was influenced by a great deal of research. Of particular interest to me was Adorno's attempt, in his spectacularly complex *Negative Dialectic*, to conceptualize as precisely as possible the nonidentity relation of the material and the conceptual (in the larger sense of including both discursive and material practices) and the priority he accorded to the material as being always and necessarily in excess with respect to the conceptual. This position has a number of advantages. First, it avoids the naïve belief in the possibility of unmediated knowledge, which tends to reduce the history of science into a description of the slow path toward an increasingly refined approximation to a fixed and unchanging external reality. This approximation usually coincides, especially in Japanese historiography, with Western sciences and has the double effect of dogmatically dehistoricizing modern science and transforming its non-Western precursors either in immature

forms of protoscientific knowledge or in irrationalistic forms of nationally or ethnically exclusive sensitivity toward the natural world. Second, the relation of nonidentity between the material (object) and the conceptual (subject) gives a more nuanced and nonreductionist understanding of history and nature, which allows “to comprehend historical being in its most extreme historical determinacy, where it is most historical, as natural being, or . . . to comprehend nature as a historical being where it seems to rest most deeply in itself as nature.”<sup>25</sup> That is, the material environment and society are entwined because the material world is both and at the same time natural and social: if human beings have evolved their social and intellectual instruments as a result of evolutionary pressures, “nature is always bound up with the historically and socially conditioned concepts and practices that we use to grasp and manipulate it.”<sup>26</sup> Third, it reveals the historical and social situatedness of natural knowledge, whereby, as Deborah Cook put it, “concepts are entwined with a non-conceptual whole because what survives in them by dint of their meaning is their non-conceptual conveyance or transmission under specific historical conditions.”<sup>27</sup>

Far from being just a tedious exercise in theoretical speculation, the awareness of the nonidentity of the material and the conceptual and of the dynamics that this nonidentitarian association puts in motion is the precondition for my examination of the connections of knowledge, society, and the material world. In our post-Kantian and postdogmatic situation, what happens to the knowing subject and to the known object in the process of cognition is no longer self-evident, but it is precisely what needs to be explained. On the one hand, it is the cognitive process itself that creates its objects of cognition by forcing what is to be known into a conceptual framework of discourses and practices that is essentially distinct from it but renders it intelligible. Material things like plants, insects, trees, or viruses, as well as natural phenomena like earthquakes, metamorphoses, or snowflakes become natural objects as a result of historically situated cognitive procedures that reduced them into specific conceptual apparatuses that do not exhaust their material reality but that make them nonetheless intelligible, controllable, and manipulatable. On the other hand, these material objects, insofar as, qua objects, they become intelligible, controllable, and manipulatable, are mobilized to satisfy a variety of historically situated human wants and needs (cognitive, aesthetic, or economic), and, as a result, they intervene in social dynamics that can have enduring effects in human societies, in the objects themselves, and in the environment. This is what I meant when I claimed, echoing Adorno, that nature and history cannot be separated but must be understood in their dialectic interconnectedness. As corollary, this heuristic

move implies that the knowledge that the *honzōgaku* scholars produced cannot be measured against what we now know as a result of the scientific discoveries of the last two centuries—as both *honzōgaku* and modern science are sociohistorically situated—but has to be reconstructed in its own terms, as it immanently unfolded in Tokugawa society.

Take, for example, the case of ginseng (*Panax ginseng*)—*ninjin* in Japanese and *renshen* in Chinese. This is a name given to bitter roots that originally grew only in two cool-temperate regions of the world: the northeastern portion of North America and an area comprising southern Manchuria and the Korean peninsula. Conceptualized as a panacea instilled with miraculous medicinal properties through textual authorities, mythological tales, institutions, physicians, apothecaries, herbalists, and so on, any root that was acknowledged, via specific procedures of verification, to be member of that species became an object that could be mobilized for a number of cognitive, medicinal, social, cultural, economic, and political practices (cultivation, marketization, exchange, smuggling, powdering, observation, description, consumption, etc.) that affected human beings but also affected these material objects (today's botanists acknowledge seven species to be members of the genus *Panax*, mostly the result of human selection) and the environment as well (by the clearing up, for example, of terrains for its cultivation in different parts of the world, from Japan to Germany). In short, the knowing process is never neutral, but it necessarily affects at the same time the knowing subject, the known object, and the world that contained them.

In sum, we know the world by changing it. The expansion of natural knowledge in early modern Europe and Japan entailed an array of practices, from collecting, dissecting, planting, interbreeding, and displacing to the drying, embalming, cataloging, and introduction of alien species in different ecosystems. These practices, far from being a simple collection of empirical data, emerge from a constant manipulation of material entities. Moreover, we change the world by knowing it. The age of exploration brought dramatic changes in the natural environments of all continents: horses, cattle, and a variety of bacteria and viruses were introduced in the Americas at the same time that tomatoes, potatoes, and tobacco invaded the Eurasian continent.<sup>28</sup> This effect of human knowledge on the earth has reached dramatic magnitudes in the last century: genetic engineering has introduced man-made species in the world and is now forcing us to drastically reconsider the notion of life itself. Nobel Prize-winning chemist Paul Crutzen has proposed the neologism “Anthropocene” to refer to the last three centuries of human history in consideration of the global impact of

human beings in the ecosystem.<sup>29</sup> Global warming, pollution, and the destruction of wilderness are human causes to vegetal and animal extinctions of geological magnitude as great as earthquakes, meteorites, and ice ages.<sup>30</sup>

As Hilary Putnam—before he joined the antirealist camp—put it, “The mind and the world jointly make up the mind and the world.”<sup>31</sup> In that sense, I reject both the naïve realism that conceives of knowledge as the unveiling of an unchanging nature and the skeptical antirealism that reduces knowledge to social constructions, as in David Bloor, or to instrumentalist and pragmatic fictions, as in Wolfgang Stegmüller and Richard Rorty.<sup>32</sup> For the naïve realist, the history of knowledge is the progressive development of more refined instrumental and conceptual apparatuses that allow a deeper understanding of the laws of nature, existing independently from and unaffected by human activity. For the instrumentalist or idealist antirealist, the history of knowledge is an endless reconfiguration of representational fictions that aptly respond to transformations in social power relations. Contrary to these two positions, I embrace the critical realist (or critical materialist) stance that conceives of knowledge as an active and mutual making of both the community of inquirers and their objects of study. In the case of nature knowledge, it means that nature and the naturalist continuously “make” each other. A history of natural knowledge, therefore, cannot be confined to the reconstruction of all discursive and manual practices shared by a community of naturalists. It should also retrieve the processes of legitimation of natural knowledge in the larger society; it should uncover the socially accepted scopes and functions of natural knowledge in different periods; and it should measure the effect of those cognitive practices not only in the social, political, and economic spheres but also in the natural environment. This is why I hope that this book, although narrowly focused on the development of natural history in Tokugawa Japan, will address issues common to historians of other areas and specializations.

#### NATURE WITHOUT NATURE

One of the major difficulties in reconstructing the activities of Tokugawa naturalists does not lie in understanding their conceptualizations of the objects they studied or the environment that contained them but rather in the semantic intricacies of the English concept of nature itself. Raymond Williams defined “nature” as “perhaps the most complex word in the language.”<sup>33</sup> Arthur O. Lovejoy equated the development of its meanings to the entire history of Western thought.<sup>34</sup> Its semantic capacity is staggering:<sup>35</sup> I can call “nature” the environment that surrounds me, the incontrollable impulses inside me, the laws

that sustain physical reality, all that exists in a metaphysical sense, the inner essence of things, the concept of being, God, or all of the above at the same time. Even more intimidating is to reconstruct a history of the conceptions of nature in a non-Western cultural sphere like Japan, where a single concept with a semantic capacity equivalent to “nature” did not exist until the 1880s, when the Japanese *shizen* (*ziran* in Chinese) was adopted to translate the German *Natur*.<sup>36</sup> In its place a constellation of different terms—such as *tenchi* (heaven and earth), *sansui* (mountains and waters), *shinrabanshō* (all things in the universe), *banbutsu* (ten thousand things), *honzō* (the fundamental herbs), *yakusō* (medicinal herbs), *sambutsu* (resources), and the like—were utilized to express different aspects of the environment, material reality, natural objects, and the laws that regulated them.<sup>37</sup> Does the term “nature”—and the modern Japanese *shizen* that translates it—convey such a universal idea as to justify the assumption that the sum of the Tokugawa expressions pointed to nothing other than the same human experience of reality, justifying therefore their unqualified translation with “nature”? I do not think so. There is nothing *natural* in our conceptions of “nature.” As Graham Harman put it, “Nature is not natural and can never be naturalized. . . . *Nature is unnatural*, if the world ‘nature’ is supposed to describe the status of extant slabs of inert matter.”<sup>38</sup> Besides, if we subsume under the semantic umbrella of the modern English “nature” the historically specific understanding of the relationship between human beings and the environment that the constellation of pre- and early modern Japanese terms expressed, do we not risk imposing to large chunks of the ideas and practices that defined that society meanings that are alien to it?

“What is nature?” is a question that seems impossible to answer. The challenge to fathom, even in the most general and preliminary sense, what exactly the *what* of the question refers to—A thing? A process? A logic? A field? A concept? A metaconcept? A trope? A condition? Being itself?—is daunting enough to bring to mind Augustine of Hippo’s answer to the riddle of time: “What is therefore time? If nobody asks me, I know; but if I am asked, I would like to explain it, but I can not.”<sup>39</sup> “Nature” is one of the most important concepts in the intellectual history of the Western world. And yet, if we were to look at its semantic palimpsest in one glimpse, we would discover it crammed with contradictions. When we talk about “nature,” we conjure up something that is at the same time concrete and abstract, material and conceptual, physical and metaphysical. To the modern person, “nature” can evoke breathtaking landscapes, the thick of a rainforest, or awe-inspiring natural phenomena.<sup>40</sup> And yet it stands for those landscapes—particular, material, and tangible—also as a whole, as a

totality abstracted from their concrete appearance. “Nature” encompasses the objects that populate those landscapes as well as the invisible forces that move them. “Nature” designates the essence of things, the immutable quid that makes things what they are, and contains connotations of eternity, changelessness, and ahistoricity. And yet it changes: nature evolves, unremittingly producing and extinguishing populations, species, and ecosystems. It is at the same time alien and familiar, a perfect example of that which Sigmund Freud called “*das Unheimliche*” — “the uncanny.”<sup>41</sup> “Nature” loves to hide its secrets — as in Heraclitus’s famous aphorism<sup>42</sup> — but it is also a perfectly intelligible “book,” “written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it is humanly impossible to comprehend a single word.”<sup>43</sup> Nature is the mysterious goddess Isis, Spinoza’s God, and benign Mother, but it is also “red in tooth and claw.”<sup>44</sup> It is a harmonious, autopoietic, and self-healing organism<sup>45</sup> and a field of conflicting and destructive forces. It is both within and without us. It is particular: it defines what kind of human beings we are as individuals, with our peculiar attitudes, vices, and virtues, but it is also universal, defining what it means to be a human being, endowed with inalienable rights. Human beings, for some philosophical traditions, are an integral part of nature,<sup>46</sup> while other thinkers, from Aristotle to Heidegger, via, needless to say, René Descartes, have struggled to demonstrate our substantial distinction and separateness from it. The state of nature is for human beings at the same time a nightmarish condition of continuous warfare (Hobbes) and a blissful brotherhood with the surrounding environment (Rousseau). The list of the oxymora of “nature” can be even longer. They are the symptom of the complex history of this term, passing through successive translations — from the Greek *φύσις* to the Latin *natura*<sup>47</sup> and then to the Indo-European vernacular variations — and successive reconfigurations in different philosophical schools, cultural practices, religious traditions, and socioeconomic processes. Meanings and connotations added up rather than erasing each other, thus contributing to the semantic stratification of “nature” into a palimpsest that is difficult to break apart.

The semantic complexities of the English “nature” affect our understanding of those societies that did not develop an analogous concept. Words do not merely describe but also prescribe the world we live in. This is not simply a matter of semantic punctiliousness. Even today “nature” is constantly mobilized to justify the most varied beliefs and practices. From human rights, competitive instincts, and free-market liberalism to sexual orientations, family organization, national identity, and so on, political leaders, think tanks, and media “intellectu-

als” legitimate their own views on these fundamental issues by appealing to their *naturalness*—attempting, that is, to exclude them from becoming a matter of debate or criticism.<sup>48</sup>

What I want to emphasize here is not the *lack* of a term equivalent to “nature” in traditional East Asia but rather its semantic and ideological *excesses*. In fact, “nature,” while referring to the material, *physical* environment, also stands, often without us acknowledging it, for the *metaphysical* assumptions that have been associated to it in the course of its history and are now an organic part of its semantic palimpsest. When we say that something is “natural,” in other words, we conceive of it as existing independently from human will or as standing for what is normal, what cannot be otherwise than what it appears to be; saying that something (an event, an object) is natural is attributing to it a sense of originality and authenticity. In early modern Japan, the terms expressing these connotations of “nature” did not have any semantic affinity with those that referred to the material environment and its laws. That is why to me “nature,” rather than an empty signifier—as Jean Baudrillard put it, deprived of any originality and authenticity<sup>49</sup>—is in fact overloaded with meanings that surreptitiously summon each other up: physical, metaphysical, aesthetic, religious, cognitive, economic, ethical, and political. These meanings are not eternal or universal but historically situated and socially conditioned. Very often, appeals to “nature” have ideological overtones. It suffices to think, for example, of the idea of nature as an organic, self-regulating, and homopoietic totality so common in popular culture and political discourse, from “deep ecology” environmentalists to New Age pundits.<sup>50</sup> To appropriate the political dimension of the metabolic relation of humans with the environment—to “democratize” nature, in Bruno Latour’s parlance<sup>51</sup>—we must then emancipate ourselves from the mystifying power of “nature,” as I believe, with Adorno, that “people are themselves dominated by nature: by that hollow and questionable concept of nature.”<sup>52</sup> “Nature” has acquired such an influential ideological force that some philosophers and social theorists have begun to defend an “ecology without nature.”<sup>53</sup> In short, it seems that today “nature” must die so that the environment can live.<sup>54</sup> Accordingly, when the term “nature” appears in this book—as it is a term that we cannot easily dispose of—it has to be understood with the awareness of its semantic and ideological complexity.

No single equivalent to the English “nature” is to be found in the texts of premodern and early modern East Asia. The Chinese *ziran* and the Japanese *shizen* are expressions adopted in the late nineteenth century to translate the English “nature” and the German *Natur*, but in the early modern period, they

were mostly utilized as adjectives or adverbs—in Japan also read as *onozukara*—meaning “in itself,” “spontaneously.”<sup>55</sup> Both Chinese and Japanese traditions, in fact, distinguished with different terms the various semantic spheres ambiguously encompassed by the English “nature.” “Human nature” (*sei*) was a Confucian concept with deep social, ethical, and psychological implications that acquired metaphysical connotation only in the later tradition of Zhu Xi’s thought, starting from the late twelfth century. Song period Neo-Confucianism, blending together in a novel and creative way Daoist, Buddhist, and Confucian elements, developed a complex metaphysical system of logical and material principles that provided an explanation to various physical, social, and psychological phenomena. But there was no single term like “nature” that encompassed the ordered totality of the universe. Most importantly, there was no single term like “nature” that referred to the totality of material and phenomenal reality.

In Japan, *honzōgaku* scholars and Neo-Confucian thinkers often utilized the term *tenchi* (*tiandi* in Chinese)—sometimes pronounced as *ametsuchi* and literally meaning “sky (or heaven) and earth”—to indicate the whole material world of natural phenomena. More precisely, however, *tenchi* did not encompass a generative force moving and regulating the various phenomena, nor did it include the various natural objects and phenomena—trees, herbs, fish, insects, stars, or rain. Instead, *tenchi* merely indicated “what was above and below the unfolding of the myriads of things,” as Itō Jinsai put it.<sup>56</sup> It was metaphorically associated with the image of a “vessel” or “receptacle” (*utsuwa*) for all natural phenomena. Itō Jinsai gave one of the best definitions of *tenchi* in his *Gomō jigū*:

When a person builds a box putting together six pieces of wood closing it with a cover, almost immediately the generative force [*ki*] spontaneously fills up the box. As soon as the generative force has filled up the inner space of the box, white mold is spontaneously produced. And as white mold is produced, then termites will be born. This is the way in which principle [*ri*] acts spontaneously. The material universe [*tenchi*] is just like a big box: *yin* and *yang* operate just like the generative force within the box; and the entire natural phenomena [*banbutsu*] are the white mold and the termites.<sup>57</sup>

Jinsai described heaven and earth as the boundaries within which an immanent but distinct generative force, *ki*, acted as the enzyme moving matter in a logical and coherent way (*ri*) to produce all things in the universe. Therefore, while *tenchi* indicated the boundary that human cognition could not cross, it contained but not included all physical and metaphysical things that enabled hu-

man beings to grasp the logical working of the inner forces of *tenchi*—that is, *ki, ri, yin, yang*, the Five Phases (*wu xing* in Chinese, *gogyō* in Japanese: wood, fire, earth, metal, and water) constituting the building blocks of material reality, and the like—as they unfold in the concrete materiality of natural objects and phenomena.

#### THE NAMES OF NATURE

It is as if nature had no name. It had instead plenty.<sup>58</sup> To name just a few, *kenkon* (*qiankun* in Chinese) had a meaning similar to *tenchi*, that of a container, and did not include phenomena or natural species. It was used almost exclusively in the context of divination and in the tradition of the *Yijing*. *Uchū* (*yuzhou*)—today’s astronomical term for the universe—appeared in early Daoist texts to emphasize the spatial and temporal infinity of the universe, but in premodern Japanese texts, it was only sparsely used as a synonym of *tenka* (*tianxia*), literally “all under heaven,” often in the sense of political “realm.”<sup>59</sup>

Since the Meiji period, the modern Japanese word for “world” is *sekai*, but the term was originally a translation of the Buddhist concept of *loka-dhātu*, or the phenomenal universe in a Buddhist sense. In Japan, early texts like the *Taketori monogatari* and the *Genji monogatari* used it as a synonym of *uchū*, while expressions like *kono yo* referred to “this world” in its concrete materiality and inclusive of human society.

*Sansui* or *senzui* (*sanshui*) and *sanka* (*shanhe*), respectively “mountains and waters” and “mountains and rivers,” were two terms that appeared frequently in Chinese poetry to point to a landscape, a scenery, or the natural environment in general; in both China and Japan they were often associated to landscape painting. Another interesting term was *zōke* (*zaohua*): it appeared in early Daoist texts to mean the generating power of natural things, in the sense of nature’s power to generate plants, animals, and everything existing and to continuously cause things to change, to transform, and to diversify. The *Kojiki* (compiled in 712) utilized *zōke* to refer to the creative power of the divinities, but the *haikai* poet Matsuo Bashō regularly used it to exalt the diversity of nature. More difficult to define is *fūdo* or *fudo* (*fengtu*), a term that was used in Chinese local gazetteers to refer to the climate, flora and fauna, and geographical conformations of particular regions.<sup>60</sup>

None of these terms, however, had a semantic universe as wide and all encompassing as the English “nature,” nor were they used as consistently. Also, they did not include the myriads of things and phenomena—natural, supernatural, and

artificial—that populated the universe. A whole set of terms had that function: *banbutsu*, *banji*, *banyū*, *banshō*, *shobutsu*, and others were all terms that, with only slight variations, represented the “myriads of things” that *tenchi* contained.

It is therefore not surprising that *honzōgaku* scholars, without a term encompassing both “nature” and the various objects it contained, generically conceptualized the minerals, plants, and animals that constituted the objects of their research in terms of the social function that their intellectual and manual labor performed. In other words, the generic names of rocks, plants, and animals depended on their instrumental utility. Or, more precisely, plants, animals, and all natural phenomena were the noematic forms they assumed in accordance with the intellectual activity of human beings. That is to say, they changed their names in accordance with the noetic stances and interventions of different scholars for different social function. Plants and animals for physicians, apothecaries, and orthodox *honzōgaku* scholars were therefore *honzō* or *yakusō* (medicinal herbs). For encyclopedists and lexicographers, they were *meibutsu* (names of things). For agronomists and naturalists engaged in survey projects, they were *sanbutsu* (products). Often, *honzōgaku* scholars utilized the clumsy *sōmokukinjūchūgyōkyōkudoseki* (herbs-trees-birds-beasts-insects-fish-metals-jewels-grounds-stones). And when plants and animals became the focus of popular entertainments and spectacles, they could be referred to as *misemono* (stuff for exhibitions and sideshows) or *kōbutsu* (curiosities).

Three of the five parts in which this book is divided follow this pattern. After part I, where, in chapter 2, I offer a brief historical survey of the field of pharmacology in China and Japan up to 1600, part II focuses on the production and circulation of encyclopedias in the seventeenth century and the function of lexicographical research in accurately determining natural species. Part III reconstructs the organization of the 1736 nationwide survey of natural species under Tokugawa Yoshimune and the recruitment of *honzōgaku* specialists in the state apparatus. Part IV maps the popularization of natural history in eighteenth-century cultural circles, popular entertainments, exhibitions, and collections. Lastly, part V suggests how in the latter part of the Tokugawa period, with a wider circulation and acceptance of Western knowledge and the growing intervention of bakufu and domainal administration in matters of political economy, the eclectic field of *honzōgaku* became increasingly disciplined to the necessities of economic growth and its specialists involved in economic reforms. The epilogue will sketch the double destiny of *honzōgaku* in the early Meiji period, when it lost its name but retained much of its accumulated knowledge, recodified in the language of the newly institutionalized Western sciences, at the same

time that it kept its name but erased two centuries of research in the name of a tradition buried in a distant past. The invention of *shizen* as “nature” is thus a modern story, part of the revolutionary transformations of the 1870s and 1880s, but its roots are deeply grounded in the philosophical debate of the eighteenth and nineteenth centuries.

#### TELEOLOGICAL SINS AND TOKUGAWA CONTINGENCIES

It would appear that this book offers yet another version of the story of how we came to experience the world as we do today—a local version of the global story of how we all became modern. Its chronological structure and its focus on social and cultural developments spanning through two and a half centuries of Japanese history certainly reinforces the impression of a necessary progression from an archaic world of mystical correspondences to an instrumentalist world of scientific exactness. The attention I give to the gradual unfolding of a series of intertwined social, intellectual, economic, and political transformations cannot help but strengthen the impression of inevitability of the modernizing process. I obviously reject any functionalistic or intentionalistic explanation of this kind for *longue durée* historical processes. I especially refuse to interpret the efforts, negotiations, practices, and constraints of *honzōgaku* scholars as either necessary or sufficient *causes* for the emergence and success of Western biological sciences in late nineteenth century Japan. I do, however, believe in the value and possibility of reconstructing the unfolding of historical processes that does not necessarily surrender to teleology. In this book, I try to avoid any form of schematic determinism and prefer to look at the interactions between the intellectual practices of Tokugawa naturalists, the sociopolitical conditions in which they operated, the ideas and beliefs they inherited, and the material objects they manipulated. In the background of the processes and events I describe, the prevailing attitudes toward natural objects and the environment that contained them indeed changed, on a macrosociological level and with different rhythms and reaches, from one of containment and exclusion to one of discovery and inclusion, followed, after the Meiji Restoration of 1868, by exploitation and nationalistic ideologization of a “Japanese” nature.<sup>61</sup> I do not have any problems accepting this narrative as long as it is freed of evolutionary necessity.

I consciously tried to avoid any attempt to connect *honzōgaku* and modern science in any causal sense. Instead, I preferred to reconstruct this field of study in its own terms, as it located itself vis-à-vis its pharmacological tradition and vis-à-vis other contemporary fields of knowledge. I therefore refuse, for example, to explain the development of *honzōgaku* as natural history solely in terms of its

applied instrumentality (*jitsugaku*).<sup>62</sup> Rather, I qualify its recruitment by the state for economic advantages in the second half of the Tokugawa period as only one among many functions (cognitive, moral, educational, aesthetic, recreational, etc.) it had. The fact that the economic utility of *honzōgaku* became hegemonic after the 1830s is a historical development connected to the social, political, and economic situation of Japan in the nineteenth-century world of imperialistic global markets rather than a logical development immanent to *honzōgaku* itself.

The only necessity in my history of nature studies in Tokugawa Japan is the contingency of the events and processes punctuating that history. Modern Japan's scientific advances and technological successes were not prefigured in Eki-ken's study of plants and animals, nor did Yoshimune's patronage of *honzōgaku* cause its practitioners to search for a scientific method. The fact that natural history enjoyed great popularity did not cause Japan to eagerly adopt Western science in the nineteenth century nor does the large number of professional and amateur naturalists that were active in the field exclusively explain the rapidity of the Japanese turn to science in Meiji Japan. *Honzōgaku* developed standardized protocols of observation and description of natural species, but these did not cause scholars to convert to or accept Linnaeus's methods. In other words, I do not see in the sophistication of nature studies in early modern Japan a sign of the development of an autochthonous protoscientific attitude that *predisposed* Japanese scholars to welcome Western science. Nor do I share the view that *honzōgaku* developed an alternative conception of nature opposed to the "alienating" epistemologies and environmental destructions that modern science directly or indirectly produced. We cannot find in early modern Japan the seeds of an alternative and "more human" science, just as we cannot locate there the possibilities for an alternative "East Asian" modernity. Rather, it was the achieved modernization of Japan, in the early twentieth century, that retroactively called for the reconfiguration of the Japanese past in that light, and it is therefore not surprising that the first historian of *honzōgaku* who did precisely that was also one of the first biologists of modern Japan, Shirai Mitsutarō.<sup>63</sup>

#### WHAT DO WE MEAN BY EARLY MODERN SCIENCE?

I therefore believe that there was no such thing as a Japanese *scientific revolution* in the Tokugawa period—for the same reasons given by Steven Shapin in the case of early modern Europe.<sup>64</sup> This does not necessarily imply that the descriptive and observational efforts of *honzōgaku* scholars were futile or wrong. Products of society, they shared the various contradictions characterizing and

moving Tokugawa society and ideas. *Honzōgaku* scholars were concerned with truthful and accurate descriptions of plants and animals and their classification in a system that was believed to reveal their true essences as much as European natural philosophers of that period. Furthermore, *honzōgaku* scholars were as much influenced by metaphysical preconceptions and the authority of old canonical sources as their European colleagues. For example, they both conceived of natural species as “natural kinds”—that is, taxonomical groupings or orderings of plants and animals independent of human interventions. From the point of view of modern biology, they both were wrong in different ways. Biological species are today far from being conceived of as natural kinds, but comparing the results of *honzōgaku* scholars’ inquiries to modern scientific knowledge is not only an exercise in anachronism but also an utterly sterile enterprise.

It would be even worse to compare and judge Tokugawa scholars’ nature knowledge with what eighteenth-century European natural philosophers knew about plants and animals, ascribing to the latter the attributes of “science” and arguing about Japanese scholars’ failures or successes to accept the “correct” Western paradigm. Despite the fact that early modern European naturalists could be chronologically and genealogically counted as the ancestors of modern scientists, from the point of view of today’s research in genetics and biology, their natural history was not qualitatively much different from *honzōgaku*’s—sustaining the contrary and attributing to early modern European naturalists methodological and empirical positions akin to contemporary science would be committing another kind of anachronism. Moreover, as scholars like Sujit Sivasundaram, Marwa Elshakry, and Simon Schaffer have recently demonstrated, Western modern sciences have been deeply affected during their worldwide expansion in the eighteenth and nineteenth centuries by their encounters with non-European cultures.<sup>65</sup>

In short, what I want to avoid is a conception of science as an ahistorical and neutral meter of judgment. This decision inevitably leads to the question of what science is, which goes well beyond the scopes and possibilities of this study. Modern science is the cultural product of a particular historical time, fashioned under particular social conditions and within the framework of the particular conceptual constellations that conceived it. Like any other form of knowledge, today’s science is also “situated” knowledge, and as such it reflects the position of its producers in their historical, cultural, social, and material context. Science, in other words, is not an ahistorical form of knowledge that transparently reflects an ordered reality but a discipline encompassing a variety of fields of study that emerged in a particular historical moment and context under particular

sociointellectual conditions. As Peter Dear put it, “The cultural activity called ‘science’ as it developed during the nineteenth and twentieth centuries is not the same as the old natural philosophy. The changes that the latter label had undergone during the seventeenth and eighteenth centuries resulted in the establishment of a new enterprise that took the old ‘natural philosophy’ and articulated it in the quite alien terms of instrumentality—science was born a hybrid of two formerly distinct endeavors.”<sup>66</sup>

This is not equivalent to maintaining that science, because of its historical situatedness, is just a form of knowledge like any other, qualitatively not different from religious, superstitious, traditional, or folk beliefs. If in the course of the modern period science has parted ways from the absolute truth-claims of metaphysics to embrace an epistemology of empirical *accuracy* and *certainty*—that is, truth-claims that are intersubjectively determined by the justified consensus of an epistemological community sharing protocols of observation, measurement, and symbolic representation—it still shares with philosophy a dismissal for unwarranted opinions and beliefs. Affirming the historicity and social situatedness of scientific knowledge does not necessarily imply questioning the validity of its cognitive claims.<sup>67</sup>

Furthermore, modern science as it emerged in the nineteenth century was much more a global event than it has been previously thought. Even if we accept the conventional narrative whereby modern science is a product of nineteenth-century Europe, the various scientific disciplines it contained bore witness of the global nature of the age of empires: European culture was influenced by local knowledges as much as it influenced the development of new ideas and practices worldwide.<sup>68</sup> Just like the modern sciences in Europe sublated much of the content, practices, and institutions of early modern natural philosophy, many elements of *honzōgaku* were transubstantiated into the new disciplines of biology (*seibutsugaku*), botany (*shokubutsugaku*), and zoology (*dōbutsugaku*) in Meiji Japan. Itō Keisuke—formed as a *honzōgaku* scholar and later celebrated as the first Japanese scientist at Tokyo Imperial University—symbolically embodied this metamorphosis. The challenge this book embraces is to reconstruct this story without surrendering to a teleology of modernization but conceiving of it as a reflection of the social, political, economic, and cultural changes in nineteenth century Japan.

An effect of these developments in rapidly industrializing Japan was the disappearance of traditional conceptions of the natural world. This disenchantment, in turn, had two further consequences: on the one hand, it transformed the environment into a reservoir of resources exploitable for the needs of eco-

conomic growth;<sup>69</sup> on the other, it called for the development of new conceptualizations of the natural environment with the opposite ideological aims of sustaining that exploitation or condemning its cost in terms of pollution, as well as projecting into it connotations of nationalistic uniqueness.<sup>70</sup>

## 13 *Nature as Accumulation Strategy*

### Satō Nobuhiro and the Synthesis of *Honzōgaku* and *Keizaigaku*

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It is a well-established cliché to describe modernity in terms of human dominion over nature. As Horkheimer and Adorno put it in their *Dialectic of Enlightenment*, “A philosophical interpretation of world history would have to show how the rational domination of nature comes increasingly to win the day, in spite of all deviations and resistance, and integrates all human characteristics.”<sup>1</sup> The notion of human domination over nature can be found as far back as Francis Bacon. In *Novum organon* (1620), Bacon writes, “Let the human race recover that right over nature which belongs to it by divine bequest.”<sup>2</sup> His *Instauratio magna* straightforwardly conceived of learning in general and of nature knowledge in particular as practical means to guide human action. Knowing nature through the experimental sciences that were set about precisely in those decades was not an aim in itself, a self-sufficient enterprise, but was engendered as a practical labor endowed with social utility for human redemption. Descartes’s separation of extended matter (*res extensa*)—conceived as a dynamic mechanism to be explained through geometry—and mind (*res cogitans*) only reinforced that attitude. More than a century later, Carl Linnaeus explicitly linked his own scientific research on plants to economic growth: “Our own economy,” he stated in a 1741 lecture at Uppsala University, “is nothing else but knowledge about nature adapted for man’s needs.”<sup>3</sup> As Peter Dear has rightly argued, the separation of pure theoretical sciences and applied practical ones is an academic distinction that originated in the second half of the nineteenth century.<sup>4</sup> This separation of pure and applied knowledge remains contentious even today.<sup>5</sup>

In the history of modern Europe, conceptions of nature and of nature knowledge seem to be inseparable from the development of industrial capitalism. As Neil Smith has argued, “For apologists and detractors alike, the global transformation of nature wrought by industrial capitalism dominates both the physical and intellectual consumption of nature.”<sup>6</sup> The subsumption of nature under

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capitalism imbricated the already complex notion of “nature” in a dynamic and contradictory structural dualism of meanings that still survives today: nature as *external*, myriads of “objects and processes existing outside society . . . waiting to be internalized in the process of social production”—what Adorno called reified nature<sup>7</sup>—and nature as *universal*, referring to a set of ahistorically conceived characteristics of human nature that situates the human species “as one among many in the totality of nature.”<sup>8</sup>

This last chapter argues that analogous conceptions of nature as a resource for economic development arose in late Tokugawa Japan as a result of the recruitment of *honzōgaku* scholars in agricultural reform policies at both domainal and shogunal levels. The case of the Satsuma Domain is particularly illuminating, in terms of both practices and intellectual conceptions: on the one hand, in the aftermath of the economic crisis of the Tenpō era, the Shimazu leaders led a series of reforms that fostered the intensification of cash crop production and the commercialization of agriculture; on the other hand, one of the scholars involved in these reforms, Satō Nobuhiro, transformed the traditional notion of *kaibutsu*—meaning literally “the opening up of things” in the sense of “revealing the nature of things”<sup>9</sup>—into a concept akin to economic development that sustained practices leading to the exploitation, commodification, and accumulation of natural riches. These notions and practices survived in the Meiji period, where they were sustained, translated, and reconfigured into the language of Western science. The transformations of *bakumatsu honzōgaku* were at the core of the transformation of Japan into an industrialized nation-state.

#### SATSUMA’S “ECONOMIC MIRACLE”

When in 1829 the retired *daimyō* Shimazu Shigehide, Satsuma éminence grise, hired scholar Satō Nobuhiro to assist Zusho Hirosato, Satsuma’s finance magistrate (*kanjō bugyō*), to carry on a plan of economic and administrative reforms, the domain was at the margins of the economic life of the Japanese archipelago. “In 1800,” John H. Sagers argues, “Satsuma was at the periphery of the Japanese economy. It had several export commodities including rice, sugar, and processed fish. Yet, the domain could not solve its chronic trade deficits with the Tokugawa Shogunate-dominated market centers of Kyoto, Osaka, and Edo.”<sup>10</sup> By 1840, only ten years after Nobuhiro’s collaboration with Shigehide, Satsuma budget found itself with a surplus of 2.5 million *ryō*—an incredible success, considering that less than ten years earlier it was in deficit of five million *ryō*.<sup>11</sup> By the 1850s it had established one of the earliest industrial areas of Japan at Iso (the Shūseikan).<sup>12</sup>

Satsuma's economic recovery was surely impressive, but it was not the only domain that in the nineteenth century drastically reformed its administrative and economic structure, nor was it the only or the most successful one. True, we should pay attention to Satsuma's success because of the important role that it was soon to have in the downfall of the Tokugawa and because of the political hegemony that its elites enjoyed during the revolutionary decades of the Meiji period, when Japan underwent a process of radical modernization. But this is also a story of a surprising convergence. Nobuhiro's reform plan was sustained by a coherent reconceptualization of natural resources, agricultural production, labor relations, and state intervention in production that bore semblance, without being directly influenced, to similar notions that circulated in Europe at the same time. The philosophical foundations of this reform plan rested on a systematic human domination over nature that brings to mind similar notions developed in Europe and that unfolded in an analogous framework of exploitation of natural resources, labor reorganization, complete monetization of the economic life, and market-oriented productive activities. Nobuhiro invented a Japanese form of "political economy" that exercised, directly and indirectly, a considerable amount of influence among Meiji political oligarchs, economists, and intellectuals throughout its modernizing years, helping to redefine the human relations with the material environment and instrumentalizing knowledge of nature in the service of economic growth. Much of what he did independently mirrored European developments.

#### THE POLITICS OF NATURAL HISTORY: THE SATSUMA DOMAIN AND *HONZŌGAKU*

The economic crisis of the Tenpō era had devastating consequences for the population of the Japanese archipelago between 1833 and 1837. Because of the magnitude of its impact, historians have often regarded it as an important watershed in the history of Japanese modernization, which played a pivotal role in the eventual collapse of the Tokugawa regime. It was during the crisis, it has often been claimed, that there emerged those strong ties between the economic elites among wealthy commoners and educated and idealist low-ranking samurai (*shishi*) that animated the struggle against the Tokugawa bakufu after the 1853 arrival of the US Commodore Matthew Perry's black ships that forced Japan to engage in unequal trading relations with Western powers.<sup>13</sup> But if we look at the strategies adopted, with success, by a domain like Satsuma—which played a leading role in the overthrow of the Tokugawa in 1868 and in the formation of the Meiji oligarchic government—then the Tenpō crisis was the event that put in

motion new forms of economic policies that favored the emergence of transversal relations between *high*-ranking samurai and the economic elites.<sup>14</sup> These reforms, which directly engaged the samurai-led administration of Satsuma in the economic life of the domain, sprang from a recodification of Neo-Confucian political terminology, and they involved low-ranking samurai working in synergy with the domainal elites and with the economic powers of the region.

Crop failures—of rice, especially—after the unusually cold weather of 1833, followed in 1834 by Osaka brokers' speculations on the price of rice and bakufu mismanagements, produced one of the most deadly famines in Japanese history and the first modern economic crisis of Japan. Despite Susan Hanley and Kozo Yamamura's cautiousness in estimating the number of casualties, the figures easily passed one hundred thousand by 1836.<sup>15</sup> Riots and civil disturbances of various kinds followed, and attempts to cope with the social and economic crisis at the shogunal and domainal level were often uncertain.<sup>16</sup>

In domains like Satsuma, Hizen, Chōshū, and Saga, political reforms to cope with the consequences of the crisis consisted in the expansion of domainal control over agricultural production and over the nationwide commercialization of agricultural and manufactured commodities. The Shimazu leadership worked to consolidate and intensify the domainal monopoly of sugar, assuring the treasury a massive increase in profits. It also planned the expansion of both agricultural production and cottage industry, introducing "the production of silk, paper, indigo, saffron, sulfur, and medical herbs."<sup>17</sup> The reform plans carried over by the domainal lords Shimazu Narinobu (in office from 1787 to 1809), Narioki (in office from 1809 to 1851), and Nariakira (in office from 1851 to 1858) consisted in strengthening the *kokueki*, literally the prosperity of the "state" (meaning, actually, Satsuma), by assuring the agricultural self-sufficiency of the domain, cutting import expenses, acquiring zero-interest loans from local moneylenders to be repaid in 250 years, financing the development of new productions, and exploiting commercial opportunity by strengthening the trade of export goods both within Japan and, illegally, with Qing China via Okinawa.<sup>18</sup> After the Tenpō crisis, not only did Satsuma survive the economic slump as one of the wealthiest and most enterprising regions of the archipelago, but by the 1840s it "accumulated an enviable surplus of wealth."<sup>19</sup> Behind the success of Satsuma was the enterprising Lord Shimazu Shigehide, *honzōgaku* scholar and keen student of Dutch learning.<sup>20</sup>

Shigehide retired from the position of *daimyō* as early as 1787 but remained the behind-the-scenes mastermind of Satsuma politics until his death in 1833. In the long period of his leadership, he laid the foundation for the future ag-

ricultural reforms thanks to his own expertise in *honzōgaku* and his belief of its import for the economic development of the region. It was under his advice that Satsuma “invited a management consultant to give economic development advice in the late 1820s” (i.e., Satō Nobuhiro).<sup>21</sup> And it was under his suggestion that Satsuma leadership introduced new technology and knowledge from the West.<sup>22</sup> By conjugating together nature knowledge, administrative reorganization, and agricultural reforms, Shigehide’s Satsuma remodeled its feudal political apparatus—prior to and more in depth than other domains—in an attempt to take control of an economy that was now almost systemically dominated by the coercive forces of the market. As a result, Satsuma became one of the first domains to put into practice the radically new ideas of “political economy” (*keizai*) that scholar Satō Nobuhiro developed precisely in those years. Also, Satsuma became the place where the eclectic field of nature studies was more drastically domesticated to the necessities of productive growth.

Satsuma’s emergence as an economic power in the 1830s and 1840s, however, was not simply the long-term results of the enlightened administrative skills of Shigehide. There are, in fact, profound shifts in domainal economic policies from the late eighteenth century to the first decades of the nineteenth century. Shigehide himself, despite his wide range of interests, from Japanese poetry to Dutch studies and *honzōgaku*, initially implemented, while in charge as acting daimyo (1755–87), rather conventional administrative measures.<sup>23</sup> Quite in line with Confucian orthodoxy, he financed land reclamation projects, attempted to raise taxation (*reikin*) on trade licenses and monopolies, forcibly cancelled domainal debt with moneylenders, and imposed austerity measures to the population of the region with restrictive sumptuary laws; for example, in 1768 he prohibited the consumption of soup made with more than one vegetable. Diligence and frugality, the two keywords of Confucian morality, dominated the political language of Satsuma lawmakers. In practice, domainal authorities constantly attempted to squeeze more profit from agricultural surplus in a period characterized by sluggish productivity. In Satsuma, agricultural output had remained constant since the early eighteenth century and even started to fall during the Tenmei-era crisis (1782–87), despite the pressures from above to increase the production and trade of commodity crops like sugarcane (*satōkibi*). Sugarcane grew in the subtropical climate of the Ryūkyū kingdom and the Amami islands, both under Satsuma control after the military expedition of 1609. Since the mid-eighteenth century the Shimazu had pressured both directly and indirectly the population of those southern islands to develop a monocultural agriculture, to such an extent that by 1745, Ōshima peasants “had almost completely shifted

from growing rice to raising sugar cane.”<sup>24</sup> The cultivation of sugarcane was either forcefully coerced upon the local peasant populations or requested in return of monetary loans that Satsuma granted to the Ryūkyū kingdom.<sup>25</sup> The intensification of sugarcane production in the areas controlled by the Shimazu—especially in the Amami islands, closer to Satsuma and more tightly controlled than Okinawa by mainland samurai authority—was evidenced also by the local development of technological innovations to improve the extraction of sugar from the canes. In 1671, for example, a three-roller mill began to be used, “a unique case of an independent innovation within an area of strong Chinese influence.”<sup>26</sup>

The inclusion of sugarcane into Japanese agriculture was still quite recent, dating back to the seventeenth century. Miyazaki Yasusada and his friend Kaibara Ekiken had both reported about the beneficial properties of sugar. Yasusada even advocated its large-scale production to strengthen the diet of Japanese peasants in his *Nōgyō zensho*.<sup>27</sup> But it was only in the first half of the eighteenth century that *honzōgaku* scholars began researching and experimenting with sugarcanes in medicinal gardens under Tokugawa Yoshimune’s direct orders. Lord Shigehide’s interest in cultivating the sweet grass derived from his knowledge of *honzōgaku* texts. From the second half of the eighteenth century, Satsuma officials began to buy sugarcanes in exchange for rice produced in the domain mainland. Each village had an allotted quota of sugarcane that was purchased at a price of 0.63 liters (0.35 *shō*) of rice for every *kin* (600 grams) of sugarcane. Anything over the quota was purchased for 0.72 liters of rice per *kin* of sugarcane, thus encouraging peasants to engage in monoculture production.<sup>28</sup>

The commercialization of agricultural production carried over in Satsuma in the last decades of the eighteenth century was a necessary condition for its economic success in the 1830s and 1840s, but it alone is not sufficient to explain it. Throughout the first two decades of the nineteenth century, in fact, Satsuma economy remained lethargic and its domainal leaders became increasingly indebted to local moneylenders. The two events that contributed the most to make of Satsuma one of the wealthiest domains of the country were the Tenpō crisis of the 1830s and the direct involvement of samurai authority in the management of production and commercialization of its agricultural riches.

The outbreak of the Tenpō crisis—which, as we have seen, not only had beaten hard the population of the Tōhoku regions but also disrupted the life of most provinces with 465 rural disputes, 445 peasant uprising, and 101 urban riots from 1834 to 1836<sup>29</sup>—was in a sense a stroke of luck for Satsuma, which survived the turmoil in much better condition, in part because its geographic location spared it from the worst of the bad weather in 1833 and in part because

in the previous decades the domain authorities under Shimazu Shigehide had pursued an effective politics of agricultural self-sufficiency. Hence, by the end of the 1830s, Satsuma found itself in much better economic conditions than most domains. In addition, it had the chance to maximize profits from the sugar trade because, for the first time, it could evade the control of bakufu-licensed Osaka merchants, whose control over interdomainal trade had been weakened after the austerity and moralizing reforms that followed the 1837 revolt led by Ōshio Heihachirō.

In a sense, then, Satsuma found itself at the right time and with the kind of state apparatus that allowed it to take advantage of the situation: it was a result of Shigehide's reform plan that the various stages of the economic circuit were tightly put under control of Satsuma samurai managers, who began to supervise every step of the process, from production to exchange and distribution to domain-chartered wholesale traders. The direct involvement of samurai in production management, discouraged by Tokugawa authorities since the *Buke shohatto*, had become not uncommon in many domains since the mid-eighteenth century.<sup>30</sup> The commercialization of agriculture, combined with the financial recession of the post-Genroku years and crop shortages in the Kyōhō era (1732), had convinced samurai authorities of the need for each domain to achieve economic self-sufficiency. Luke Roberts has described the rise of mercantilist practices among the samurai elites of Tosa.<sup>31</sup> Similar strategies were adopted in Chōshū, Hizen, Kii, and other domains and were similarly conceptualized as *kokueki* ("national prosperity").<sup>32</sup>

In this economic context, the combination of natural knowledge and mercantilist policies that Shigehide inaugurated had two origins. One was Shigehide himself, with his lifelong passion for *honzōgaku*, which he pursued with the help of his teacher, friend, confidante, and chancellor Sōhan. The other source was Satō Nobuhiro, a pioneer of political economy—soon to be known as *keizaigaku*—whom Shigehide hired as consultant for Zusho Hirosato, Satsuma's finance magistrate (*kanjō bugyō*) throughout the first half of the nineteenth century.<sup>33</sup> By 1848, the year of Zusho's death, Satsuma sent to Osaka merchants chartered by the bakufu more than half the sugar circulating annually in Japan and, as a result, "a surplus of about 62,400 *kan* had accumulated in the Satsuma treasury."<sup>34</sup>

Around 1830, precisely when he was working as consultant on economic affairs in Satsuma, Nobuhiro developed his own definition of *keizai* in a manuscript titled *Keizai yōryaku* (Essentials of Political Economy): "*Keizai* means managing the nation, developing its products, enriching the country and rescu-

ing all its people from suffering. Thus the person who rules the country must be able to carry out his important task without relaxing his vigilance even for a single day. If this administration of *keizai* is neglected, the country will inevitable become weakened, and both rulers and people will lack the necessities of life.”<sup>35</sup>

According to Nobuhiro, samurai leaders had the duty to orchestrate the productive life of their subjects. At the beginning of another manuscript, *Suitō hiroku* (Confidential Memorandum on Government), Nobuhiro had urged the domainal elites and the bakufu to take direct control over the economy through the creation of six governmental offices (*fu*), or “ministries” as Morris-Suzuki calls them: an office of basic affairs (i.e., agriculture, *Honjifu*), an office of development (*Kaibutsufu*), an office of manufacturing (*Seizōfu*), an office of circulation (*Fukutsūfu*), an office of the army (*Rikugunfu*), and an office of the navy (*Suigunfu*).<sup>36</sup> “Each ministry,” Morris-Suzuki explains, “has substantial economic functions (the Ministry of the Navy, for example, is responsible for the shipbuilding and fishing industries), but it is the first four which are of particular interest from an economic point of view.”<sup>37</sup> The office, or ministry, of basic affairs focused on the organization of agricultural production, including technological improvements, the coordination of labor, and the clearing up of new land. It was assisted by the office of manufacturing, whose main task was to develop tools, implements, vehicles, and the like to help maximize agricultural yield, whereas the office of development, supervising farmlands, forests, and mines, had the fundamental assignment of organizing surveys, experimenting with fertilizers and new alternative crops, exploring the land for new mineral resources, and improving extractive techniques. Lastly, the office of Circulation had the responsibility to “standardize the price of goods produced by each region, conduct trade with foreign countries, and apply the profits of this trade within the nation so that posterity may flourish.”<sup>38</sup>

Nobuhiro’s system of six ministries was never institutionally implemented in Satsuma or elsewhere and remained a purely theoretical construct. But the core of his plan was de facto put into effect when the Satsuma leaders directly engaged their samurai retainers in the various productive sectors. It involved the training and education of both samurai administrators and commoner laborers on new productive technologies aimed at improving agricultural cultivation, bettering extractive techniques in mines, and developing more efficient manufacturing tools. The first books of *Seikei zusetsu* (Illustrated Explanations of the Forms of Things), an encyclopedic work on agronomy edited by Sōhan and Shigehide, treated every aspect of agricultural life, from the organization of village life and

the coordination of field labor to botanical information about grains and crop products as well as plants that could be utilized as fertilizers or insect repellants.

In *Satsuma keii ki* (On How to Administer Satsuma), Nobuhiro had laid out a strategic plan tailored for Satsuma. After emphasizing, in the introductory note, that “the study of agriculture and the development of products are fundamental to enriching the country and a vital duty for the rescue of the people,”<sup>39</sup> Nobuhiro proposed a detailed plan that included the organization of a new survey of Satsuma’s natural riches and the development of research facilities (*yakuen*) to study the conditions for large-scale production of strategic agricultural and medicinal commodities. He assigned the domainal administration a central role in orchestrating the entire process, from the research stage to the final marketing of the products. A research team, composed of both samurai and commoners, focused on the development of techniques to better the quality of the sugar extracted from sugarcanes. Samurai inspectors were dispatched to various sugarcane-producing villages to oversee the processing of sugar, as the cases of *daikan* Higo Hachinoshin at Mishima and *daikan* Higo Yaemon at Ōshima well illustrate.<sup>40</sup> In essence, Nobuhiro envisioned a productive system that conjugated productive self-sufficiency with state planning inside and market relation outside the Satsuma Domain.

Managerial centralization under the tight supervision of Zusho Hirosato proved effective to consolidate Satsuma finances. Hirosato, who had served Shigehide since the late 1780s, was the executioner of the reform plan that Nobuhiro developed.<sup>41</sup> Certainly, these administrative and technological reforms played an important role in the economic restoration of Satsuma, but they were only one among a series of strategies that Hirosato devised. New forms of long-term loans with local moneylenders and, especially, the intensification of the illicit trade with Qing and French merchants via the Ryūkyū Islands—which would be fateful for Hirosato, when, in 1848, Shimazu Nariakira denounced him to the bakufu senior counselor Abe Masahiro—were also indispensable ingredients of Satsuma’s success.<sup>42</sup>

The economic history of Satsuma under Shimazu Shigehide sheds new light on our understanding of Japan’s modernization. It was there and as a result of precise forces that close collaborations of samurai elites with *honzōgaku* experts, leading merchants, and agricultural entrepreneurs became systematic. Botanists were employed to oversee agricultural production and the cultivation of medicinal herbs to improve output, the selection of pest resistant species, and the development of new processing techniques. Merchants received from the state monopoly rights to commercialize specific products. Shigehide actively favored

the development of close collaborations between samurai retainers and the elite members of the artisan, agricultural, and merchant classes, inviting outside traders to relocate in Kagoshima and organizing cultural events to promote interclass exchanges.<sup>43</sup> Nineteenth-century Satsuma developed into a centralizing mercantilist state that orchestrated the activities of high-ranking elites, mid- and low-ranking samurai administrators and technocrats, and commoners. These collaborations created an economic dynamic that combined agricultural self-sufficiency in Satsuma mainland, protocolonial monocultural production in the southern islands it controlled, and interdomainal and international trade. It thus anticipated in many respects the active role that the Meiji state would have in the late nineteenth century in financing and directing Japan's industrialization and in creating semicolonial relations with the peripheral regions of Hokkaidō and the Ryūkyū Islands as well as full-fledged colonial exploitation in its East Asian colonies later on.

SHIMAZU SHIGEHIDE, SATŌ NOBUHIRO, AND  
THE INSTRUMENTALITY OF KNOWLEDGE

In a manuscript Nobuhiro completed in 1823, *Kondō hisaku* (Secret Strategy against Disorder), there is a passage celebrating the natural bounty of Japan:<sup>44</sup> “The climate [of Japan] is mild, the soil is fertile and many natural products grow in great abundance. Our country faces the ocean on four sides and is unsurpassed among the nations for its ease of sea transport to neighboring countries. Its people are so superior to those of other nations in their courage, and its natural conditions are outstanding amongst all nations, and thus the country is perfectly equipped to control and advance [*bentatsu*] nature and the world [*tenmen uchū*].”<sup>45</sup> The passage revealed in condensed form Nobuhiro's proposal to synthesize economic policies (*keizai*) and the study of nature (*honzōgaku*), which he deemed essential to the development of the socioeconomic potential of the country: “The economic administration of a country must begin with a survey of its lands.”<sup>46</sup> Investigating nature and accumulating information about its riches was the preliminary step toward its domination—“to control and advance nature and the world.”

Shogun Tokugawa Yoshimune, a century earlier, had laid the foundations for the development of such a view by sponsoring the first surveys of natural riches.<sup>47</sup> Since then, the value of *honzōgaku* for the state (i.e., domain or *bakufu*) had been a constant element of the field. In that respect, there was nothing uncommon in Shimazu Shigehide's love of *honzōgaku*. He authored manuals and monographs that occupied an important place in the history of the field

and sponsored herbal surveys of the Satsuma region and the Ryūkyū Islands. What distinguished Shigehide from the other *daimyō* was his conception that nature studies were inseparable from economic concerns. Shigehide would have indeed agreed with Carl Linnaeus, for whom “Natural History is the base for all Economics, Commerce, Manufacture . . . because to want to progress far in Economics without mature or sufficient insight in Natural History is to want to act a dancing master with only one leg.”<sup>48</sup> With his decision to employ Satō Nobuhiro, he institutionally recruited *honzōgaku* as a fundamental element of the state’s economic policies, both in practice and in theory.

Shigehide, born in 1745, became *daimyō* at the age of ten after his father Shigetoshi’s death in 1755. He enjoyed a long life (he died at the age of eighty-eight) and dominated from behind the scenes Satsuma’s political and cultural life. He retired early in 1787, and in 1804 he shaved his head and took Buddhist vows but indirectly continued to influence Satsuma politics until his death, right before the outbreak of the Tenpō crisis. Fluent in Chinese, Shigehide was connected to various scholars of the period. But it was *honzōgaku* that triggered his intellectual curiosity. In 1768, he organized a catalog of plants and animals of the Ryūkyū Islands, the largest survey in Japan after Niwa Shōhaku’s country-wide inventory thirty years before. He sponsored the publication of the results in *Ryūkyū sanbutsu shi* (Flora and Fauna of Ryūkyū) in 1772. Under his reign, Satsuma had one of the most active Igakuin (Institute of Medicine) among the various domains and a celebrated medicinal garden, the Yoshino *yakuen*, which Shigehide built in the northern side of the Kagoshima castle.<sup>49</sup> In the garden, he charged the professional *honzōgaku* scholar Satō Nakaoka with the task to grow and experiment with plants he collected from another survey of the Satsuma region he organized in 1781. In *Seikei zusetsu* (Illustrated Explanations of the Forms of Things), an encyclopedia in thirty volumes, Shigehide recorded the results of his lifelong study of plants and animals in a distinctively utilitarian fashion. The scholar Sōhan edited the text. Shigehide was also renown for *Chōmei benkan* (Handbook on Bird Names), a useful guidebook on bird names, published in 1830, and *Nanzan zokugo kō* (Shigehide’s Reflections in Simple Chinese),<sup>50</sup> a collection of anecdotes and information about fish, shellfish, birds, insects, herbs, animals, and food recipes in easy Chinese for the education of his retainers, published in 1812. After his retirement, Shigehide spent more time in Edo than in Kagoshima. In the shogunal capital, he could enjoy the company of scholars, naturalists, and artists in a salon he hosted in his retirement villa in Ebara, on the outskirts of Edo. He directly engaged in the cultivation of herbs and plants in a 1,600-square-meter garden attached to the villa. It was in the

occasion of a trip to Edo that in the third month of 1826, Shigehide met Philipp Franz von Siebold.

On the ninth day of the first month of the ninth year of the Bunsei era (February 15, 1826, in the Western calendar), Siebold had left Nagasaki for the periodic visit of the Dutch mission to Edo. Siebold reported that the fourth day of the third month, after his arrival to Edo, he met Shigehide, together with his son (Narioki), and nephew (Nariakira), all of whom seemed interested in *rangaku*.<sup>51</sup> They discussed plants and animals, astronomy, and the Dutch names of insects and birds.<sup>52</sup> A few days later, Siebold and Shigehide met one more time in the house of the lord of the Nakatsu Domain Okudaira Akitaka, who was also an amateur *honzōgaku* scholar. The two met a third time a month later, on the twelfth day of the fourth month, in Shinagawa, during the Dutch envoys' return trip to Deshima.

In a collection of miscellaneous notes, *Gyōbō setsuroku* (Observational Notes), Shigehide confessed his lifelong passion for natural history: "Ever since I was young, I collected curiosities from the various provinces of our country and hunted for rare things from abroad. I cultivated herbs and trees and kept birds and animals. I have always desired to investigate the true nature (*shin*) of those things. This is why I decided to record my experience. I carry with me these notes, together with my books and poetry, as a pleasure for my tranquility."<sup>53</sup> Part of these "notes" he mentioned were posthumously collected in *Gyōbō setsuroku*; others were attached to many of the objects in Shigehide's private collection (Shuchin Sōko), which included art pieces and potteries, embalmed animals, rare insects, and dried plants; still others became part of the illustrated encyclopedia *Seikei zusetsu*, edited by Sōhan and printed in 1807.

Ueno Masuzō argued that Shigehide's commendation of *honzōgaku* in *Gyōbō setsuroku* is quite distinct from the customary celebration of the morally uplifting value of natural history as a pastime that we can read in the writings of other naturalist domainal lords—a sentiment that Shigehide too endorsed by defining it "a pleasure for my tranquility" (*seichū no ichiraku nari*).<sup>54</sup> Shigehide did not simply pay tribute to *honzōgaku* for nurturing the investigation of things (*kakubutsu chichi*) or broadening one's knowledge of the universe (*hakubutsu*), as conventional rhetoric dictated in many privately published albums and monographs. He unambiguously stressed that what led him to *honzōgaku* was a desire to know the true nature or essence of things (*ōku sono shin wo shiru koto wo hosshi*). By using a term like *shin*, he explicitly referred to a precise cognitive paradigm that included both encyclopedic exactness and true-to-nature representational practices (*shashin*). His familiarity with Dutch studies furthermore

suggests that Shigehide shared with scholars like Hiraga Gennai, Ono Ranzan, and Itō Keisuke the belief that Western learning could contribute, along with traditional *bonzōgaku*, to shed light on the innermost secrets of plants and animals. This attitude and intent pervaded the major work he sponsored, *Seikei zusetu*, which devoted large sections to the rationalization of labor organization, the innovation of agricultural techniques, and the deepening of accurate knowledge of the essential properties (*shin*) of agricultural products.<sup>55</sup> But there is more. In a previous paragraph of *Gyōbō setsuroku*, Shigehide had explicitly stated that the “study of agriculture and its products as well as knowledge of medicinal herbs is indispensable for the welfare of the people [*tami no rieki*].”<sup>56</sup> Nature knowledge, for Shigehide, was not simply a private enterprise, however praiseworthy and uplifting, but a discipline of public interest deeply connected to government and the welfare of the subjects.

*Seikei zusetu*—his most noteworthy achievement in the field of natural history—embraced and expressed the three meanings Shigehide attributed to the field of *bonzōgaku*: it is a morally uplifting pastime that offers authoritative knowledge of natural objects, which, in turn, is a fundamental element of state-planned agricultural production. Previously collected under the title of *Seikei jitsuroku* (True Records of the Forms of Things, 1773) were more than thirty years of notes on rocks, plants, and animals that Shigehide jotted down either from encyclopedias or from observations in the field. In 1793, he ordered Sōhan, the nativist scholar Shirao Kunihashira, and the Confucian scholar Mukai Tomoaki, a graduate of the Shōheikō and administrator at the time of the Yoshino *yakuen*, to reedit the collection of field notes for publication in 1804 by the presses of the Kagoshima castle.<sup>57</sup> The thirty volumes that were printed out of the projected one hundred contained an encyclopedic explanation of the various crops, vegetables, herbs, and trees; their properties and characteristics; their utility for human beings; and the best system to cultivate them. As Sōhan put it in the introductory outline in the first book of *Seikei zusetu*,

Our Lord has taught to his people [*tami*] first agriculture and sericulture and then established a medicinal garden to produce many useful medicinal substances. He investigated differences and similarities of [species] from various regions and reflected about their lifecycles through the seasons. It did all these things in order to get the most from each generation. He did not do it to satisfy his curiosity, but to make sure that people quickly followed nature’s will [*ten’i*]. Of the herbs and trees that he grew in the medicinal garden, and the

birds and animals that he kept as well as those that were brought from abroad, he produced true-to-nature illustrations [lit., he reproduced their essences, *sono shin wo utsushi*] and stored them away for their future utilization.<sup>58</sup>

The constellation of notions, information, pictures, techniques, and practices in *Seikei zusetsu*—with its “systematic arrangement [*ruiju*] of all species, all of which accurately depicted [*subete shin wo utsushite*]”<sup>59</sup>—all gravitated around the combination of a search for truthful knowledge (*shin*) of plants and animals and a concern for the applicability of this knowledge for the improvement of the economy of the domain and the life of its inhabitants. The accuracy of knowledge and its usefulness are never separated, but one required the other: only precise knowledge can serve the purpose to “save the people from salvation and despair”;<sup>60</sup> conversely, only useful knowledge realizes the *shin* of things.

After the introductory outline, which continues by explaining textual sources and complaining about the ambiguities created by regional names, the first book (*maki*) of *Seikei zusetsu* is devoted to agricultural matters (*nōji*) and begins with an argument of strong nativist overtones about the creation of the world by the *kami*. It emphasizes the blessedness of “our country” (*mikuni*) for the people of Japan, who were instructed, by divine decree of the sun goddess (Amaterasu Hinomikami), in how to correctly grow the herbs that nourished them generation after generation.<sup>61</sup> And just like *kami* provided the Japanese people with a correct way to peacefully rule the country, they also assisted them in naming correctly all things in the world and in cultivating the land in such a way (*tada-shiku*) as to actualize its productive potential.<sup>62</sup> The passage, however mythical in tone, insisted that there was a correct way to agriculture (and sericulture) and that only by following it would the land actualize its productive potential: the deities had taught people the way of agriculture (*tatsukuri no michi*)—giving them useful animal like cows and horses to assist them—in order to prevent them from starving.

There is a tension, almost a contradiction, in this argument. On the one hand, the deities had blessed the Japanese land more than any other country with immense natural riches. On the other, nature, left to itself, is parsimonious in dispensing those riches, which requires human intervention. In other words, in *Seikei zusetsu* nature is a generous dispenser of bounties only on the condition that, as Nobuhiro had also put it, it is “controlled and advanced” (*bentatsu*) to actualize its potential, and that was what knowledge of the *shin* of natural species really consisted of.

At the beginning of *Kondō hisaku*, Nobuhiro had similarly stated that the natural riches of the imperial country of Japan (Sumera Ōmikuni) derived from the fact that it had been created by the gods (Musubi-no-kami).<sup>63</sup> But their creative act was not random: rather, it followed precise laws. Understanding those laws (*hōkyō*) was indispensable, because for Nobuhiro the abundance or scarcity of the myriads species of natural products (*manshu no sanbutsu*) depended exclusively on human capacity to develop techniques and institutions capable of utilizing and enhancing them (*bentatsu*).<sup>64</sup> The term that Nobuhiro chose to render the concept of extracting from nature its riches, which Morris-Suzuki translated with “control and advance,” is *bentatsu*, which literally means “to whip with a cane,” a violent metaphor that resonated with Bacon’s notion that the sovereignty of man over nature entitled him to use violence, to rape nature of its riches. “Nature,” for Bacon as for Nobuhiro, “takes orders from man and works under his authority.”<sup>65</sup>

At the core of Shigehide’s and Nobuhiro’s thought rested the belief that the rationalization of production was grounded on mythological foundations: Nobuhiro’s plan of developing state offices directly overseeing, organizing, and orchestrating in a systematic way the study, observation, experimentation, cultivation, technological development, and commercialization of natural resources allowed humans to enjoy and accumulate the inexhaustible reserve of resources that nature contained. Blending together myth and instrumental reason, divine powers and pragmatic rationalization of labor and production, Shigehide’s Satsuma paved the way for the combination of natural knowledge and economic production that played a fundamental role in the subsequent Japanese modernization toward a “completely administered society,” in Adornian terms, which combined economic growth and the exploitation of the material environment.

The two great famines of the Tenmei and Tenpō eras had certainly forced the Japanese population to face widespread shortages in an unprecedented scale, at least during the Tokugawa period. The 1830s had furthermore shown that the commodification and commercialization of agricultural products had the capacity to intensify rather than reduce the duration and extent of the crisis itself. It is therefore not surprising that in various domains as well as in Mizuno Tadakuni’s shogunal reform of the 1830s, attempts had been made to control, more or less successfully, the system of production and distribution of agricultural goods.<sup>66</sup> In this context, Satō Nobuhiro’s transformation of the traditional concept of *kaibutsu* functioned precisely as a theoretical justification of the necessity of human intervention to rationalize both knowledge and production.

KAIBUTSU, FROM THE EXPANSION OF  
KNOWLEDGE TO ECONOMIC DEVELOPMENT

Satō Nobuhiro was the first Japanese scholar who theorized and partly put into practice a system of human dominion over nature that consisted of the state control of production and commercialization of agricultural products, an instrumentalist conception of knowledge, a notion of the material environment as a potential treasure holder of resources exploitable for human needs, and the recruitment of scholars in economic activities. Nobuhiro explained the aims of his project at the very beginning of the “General Argument” (Sōron) of *Keizai yōryaku*: “I define *keizai* as the management [*keiei*] of the national land [*kokudo*], the development of its products [*bussan wo kaibatsu shi*], the enrichment of its provinces, the salvation of its people.”<sup>67</sup> It is a responsibility of a ruler to organize and control production to create wealth and rescue his subjects from starvation. By “ruler,” here, Nobuhiro meant *shutaru mono*, conceiving of power not in personalistic terms, such as the lord, the *shōgun*, or the emperor, but as an abstract role, a social function in an impersonal system of relations. The urgency of the ruler’s duty was particularly felt in a period punctuated by crises: Nobuhiro, in fact, made clear that “if the economic policies are insufficient, the country will inevitably fall in decay and wither away and all people high and low will be deprived of the means of subsistence.”<sup>68</sup>

He duly recognized that “all Japanese and Chinese classical texts had already discussed the principles of state administration,” but he also emphatically stated that “these texts had treated these matters in a disorganized and vague manner without paying attention to the details.”<sup>69</sup> And that was the reason, scholars (*jūshi*) in Japan “were unable to enrich the country and rescue its people.”<sup>70</sup> What was needed now, he continued in the chapter, was a new organization of production (for him, the principal concern of *keizai*) that combined the knowledge of the natural world and the laws that the Musubi-no-kami embedded in it with a technology capable of activating the generative capacity inherent in things and forcing (*bentatsu*) nature to develop its full productive potential. Nobuhiro called the exploiting intervention of human beings *kaibutsu*, to which he dedicated the second chapter of *Keizai yōryaku*. *Kaibutsu* (*kaiwu*) is an ancient Chinese term connected to the *Yijing*. It literally means the “opening up of things,” and, as Saigusa Hiroto and Tessa Morris-Suzuki have pointed out, it could mean either “revealing the essence of things” or “developing the potential of things” (in the sense of “making use of”).<sup>71</sup> In Japan, the concept of *kaibutsu* was eclectically utilized throughout the Tokugawa

period by various scholars either to emphasize the role of research to reveal the inner workings of principle (*ri*) in the context of the “investigation of things,” as in the writings of Kaibara Ekiken,<sup>72</sup> or, as in the hermetic writings of eighteenth-century Confucian scholar Minakawa Kien, to reconstruct the original phonetic value of Chinese words for the sake of reactivating the meta-physical connections of words and things (given by their sharing the same universal force, *tenchi no ki*).<sup>73</sup> In Ming and Qing China, *kaiwu* was marginalized in the early modern period by other concepts practiced by the dominating philosophical systems of Zhu Xi and Wang Yangming. An exception was the *Tiangong kaiwu* (Development of the Works of Nature), an encyclopedic work compiled by scholar and provincial bureaucrat Song Yingxing. Despite Joseph Needham’s characterization of Song Yingxing as the “Diderot of China,”<sup>74</sup> the *Tiangong kaiwu*, after its publication in 1637, was not widely known during the Qing period.<sup>75</sup> It had, however, far greater success in Japan, where, after its introduction in the late seventeenth century, it was reprinted twice in 1771 and 1830 in richly illustrated editions, and it influence scholars like Hiraga Gennai, Shiba Kōkan, and Satō Nobuhiro.<sup>76</sup> The *Tiangong kaiwu* focused on technological developments, covering the instruments and techniques developed in agriculture (from irrigation to hydraulic and milling engineering), sericulture, salt making, sugar making, ceramics, the metallurgy of bronze and iron, transportation (ships, carts), coal, vitriol, sulfur and arsenic mining, military technology, ink making, fermentation, pearls and jades, and so on. The overarching argument of the work emphasized the role of human creative and instrumental intervention in increasing nature’s productivity.

The influence of the *Tiangong kaiwu* on Satō Nobuhiro’s ideas is hard to ignore. The language of its long chapter on *kaibutsu* in *Keizai yōryaku* echoed many of the methods and terms used by Song Yingxing. Satō begins, as he usually did in all his writings, with a definition:

*Kaibutsu* consists in enriching the country [*kyōnai*]<sup>77</sup> by developing its various natural products of the sea and the land, starting from grains and fruits. It means opening up mountains and valleys, rivers and seas for cultivation, turning over the ground in plains and valleys, nurturing grains and fruits to maturity, favoring the accumulation of wealth, and sustaining the expansion of the population of the country: it is the fundamental activity of the people of the land which follows the order of heaven. Although this principle has

already been explained in texts on natural knowledge, I would like here to write a short treatise to elucidate the divine will of nature.<sup>78</sup>

Nobuhiro conceptualized *kaibutsu* as the development (*kaibatsu*) of the productive capacity of the land (together with rivers and seas) through strategically directed human intervention. *Kaibutsu* hence implied a reconfiguration of the natural environment into a treasure holder that awaits human exploitation. Like the French physiocrats of the eighteenth century and following the conventional Confucian view, Nobuhiro believed that the wealth of a nation derived primarily from agriculture, and it was therefore in the expansion, diversification, and maximization of agricultural production that the ruler should intervene (in terms of his notion of *keizai*). But unlike physiocrats, Nobuhiro did not believe in individual self-interest—and the consequent *laissez-faire* attitude of the government—as the leading motor of economic growth. Rather, as I have shown before, he maintained the necessity of a central coordinating authority administering the various tasks of the economic life of the nation in order to ensure the welfare of the entire population. The agrarianist conceptions of the physiocrats and Nobuhiro converged in their shared belief that ultimately the source of wealth rested in the land, but the Japanese scholar remained true to his Confucian roots in emphasizing the communitarian well-being of a properly ordered society.<sup>79</sup>

Furthermore, he infused his writings with religious and mythological overtones. It was an axiomatic conviction of Nobuhiro that “in the beginning, the August Deity Takami Musubi had created the universe (*tenchi*), nurtured all things, and made the world a wealthy place.”<sup>80</sup> It is therefore the duty of the ruler to follow the way of the deities and make proficient use of the wealth of nature to sustain his people. Although the religious implications of Nobuhiro’s text echoed similar Christian conceptions of the earth as a garden of Eden providentially given to human beings to satisfy their needs, his belief in the inexhaustibility of nature as a resource of wealth—deriving from the constant intervention of the creative force of the two Musubi no kami—is an element that further distinguished Nobuhiro from the physiocrats.

The main task of the ruler that follows the proper way of *keizai*—that Nobuhiro understood as exercising control over productive activities to ensure a wealthy and ordered society—was to actualize a rationalization of labor in order to achieve a more effective exploitation of natural resources. For Nobuhiro, crises and famines were to be attributed not to shortages due to limits in nature’s

fertility but rather to the mismanagement of both production and distribution of agricultural goods as well as the failure of realizing the full potential of the soil.<sup>81</sup> He did not believe that there were limits in nature's productive potentiality or in the sustainability of intensive farming, because "Takami Musubi-nokami has a great love of human beings."<sup>82</sup>

Like Ricardo and Malthus, he conceived that the potential fertility of the soil was naturally given, but unlike them he believed in its limitlessness, a notion he derived from his faith in the unceasing creative power of the Shinto deities—although he was well aware of the enriching activities of fertilizers and encouraged their use. Contrary to Marx—for whom nature productivity has precise "biological" limits that intensive cultivation risks exhausting<sup>83</sup>—Nobuhiro saw the intensification of human exploitation of nature and the expansion of the accumulation of its resources as the leading strategy to make nature produce more. Inherent in Nobuhiro's belief in the divine power of nature to create, its limitless capacity to generate, was the notion that the more you squeeze nature, the more you can get from it—a conception that has characterized the ideology of Japanese modernization since the Meiji period.<sup>84</sup>

Nobuhiro shifted the meaning of *kaibutsu* from understanding the essence of things to the right to exploit them for human needs. As he put it in *Keizai yōryaku*, "The exploitation (*kaibutsu*) of natural products is the first duty of the sovereign."<sup>85</sup> But that task was impossible to realize without a preliminary study of nature. Knowledge still played a fundamental role in Nobuhiro's system, but it was no longer confined to an abstract understanding of the essence of species in the tradition of the "investigation of things." Knowledge, to be of any value, had to concretely contribute to the enrichment of the country—*fukoku*, another important concept that Nobuhiro developed and was later adopted by the Meiji oligarchs, often combined with *kyōhei* (a strong army) to sustain the modernizing effort.<sup>86</sup> Knowing the life cycles, the habits, and the ecology of plants and animals was important to realize that seeds grow differently in accordance with climatic variations and the composition of the soil.<sup>87</sup> That is why, writes Nobuhiro, "my method of *kaibutsu* begins with an analysis of the nature of the soil, including astronomical calculations,<sup>88</sup> the measurements of the national land, and geographical investigations."<sup>89</sup> From this it followed that before starting the cultivation of a grain, one should determine whether "it is appropriate or not to the climatic conditions and the composition of the soil."<sup>90</sup> The combined knowledge of the territory and the individual species was the necessary condition of a successful harvest. Insofar as the individual species are

concerned, Nobuhiro explains that “the number of products that the various deities had created with great effort is enormous, but they can all be divided into three groups: minerals, plants, and animals.”<sup>91</sup> For him, in order to achieve a thorough knowledge of nature, it did not suffice to accumulate encyclopedic information of each species, as was conventional in *honzōgaku* texts, but one should rather understand how each species interacted with the others and with the environment. Ecological knowledge, for Nobuhiro, was clearly the key to the dominion of nature. In the remaining chapter on *kaibutsu*, he laid out a plan to investigate the properties of the various species of minerals, plants, and animals—from rare stones, jewels, pigments, metals, clays, salts, and sands to the various species of vegetables, herbs, grains, fruits, lichens, and so on and the various beasts of land and sea. He listed fifty-two fundamental species (*shu*) divided into three groups (*rui*), the investigation of which was a precondition for their development (*kaihatsu*).<sup>92</sup> This was the main task of the ruler if he wanted to rescue his people.<sup>93</sup>

The semantic transformations that Nobuhiro attributed to *kaibutsu*—in associations with the ideas of *keizai* and *fukoku*—thus allowed him to use this concept to justify his understanding of nature as a reservoir of riches to be exploited for the prosperity of the country and its people, his instrumental conception of knowledge as a means to maximize agricultural production, and his project of placing centralized economic planning at the core of the political life of the state.

### CONCLUSIONS

Satsuma was one of the first domains to employ *honzōgaku* specialists to carry out a series of economic reforms that contributed to the transformation of the region in one of the wealthiest of late Tokugawa Japan. Originating in Shimazu Shigehide’s activities as domainal lord and naturalist, Satsuma leaders adopted Satō Nobuhiro’s ideas of political administration that, contrary to the received Confucian wisdom, emphasized the necessity for the ruler to keep an active control of the economy, from production and labor organization to distribution and commercialization of cash crops. This system favored the development of a new form of organically integrated society. In contrast to the received Confucian principle whereby members of different social classes had the duty to perform class-specific social functions—that is, samurai had monopoly of political power, while the commoners had the task of producing and distributing food and performing services that society needed—Nobuhiro developed a

model of society that, while it did not question social hierarchy, it synergically engaged all classes in the joint task of enriching of the country. Nobuhiro, in other words, challenged the Neo-Confucian separation of the political from the economic and developed in its stead a “political economy” (*keizai*) that envisioned a centralized administration coordinating all productive activities to ensure the prosperity of its people.

Although his project of six ministries was not realized in a literal manner, the concepts and language he developed influenced the evolution of modern Japanese political economy. His vision of a central organizing power prefigured the model upon which the Meiji state developed. The subsumption of knowledge under production and the subsumption of scholars under a state apparatus that directed those productive activities were two steps that Nobuhiro saw as fundamental to ensure the wealth of the country. They survived in the Meiji period in the form of continuous collaborations of Japanese scientists with the government to sustain industrial and agricultural growth. But it was the consequential subsumption of nature under capital accumulation after 1868 that fully realized his paradigm of *kaibutsu*. These three processes became strictly interconnected after the Tenpō crisis and unleashed their full power only after the Meiji Restoration. It is therefore not surprising that the Meiji agriculturalist Edo Tekirei recognized in Satō Nobuhiro, alongside Andō Shōeki, Ninomiya Sontoku, and Tanaka Shōzō, one of the pioneers of modern Japanese economic thought.<sup>94</sup>

The dominion (*bentatsu*) of nature and the systematic accumulation of its riches that Nobuhiro encapsulated in the notion of *kaibutsu* prescribed “goals and purposes and means of striving for and attaining them,” which differed from what was previously conceived of as the spontaneous realization of nature’s inherent principle (*tenchi shizen no ri*).<sup>95</sup> This dominion was to be executed via a bureaucratization and rationalization of productive labor and, successively, via the commercialization of agricultural commodities. Nobuhiro’s concepts can be easily understood in the light of Max Weber’s idea that “the fate of our times is characterised by rationalisation and intellectualisation and, above all, by the ‘disenchantment of the world.’”<sup>96</sup> The transformation of nature into a collection of objects to analyze, represent, manipulate, control, and produce that sprang from two and a half centuries of *honzōgaku* scholarship—of which Nobuhiro’s writings should be considered a further contribution—had unquestionably favored the tendency to abandon the Neo-Confucian principle that nature consisted of an inherently meaningful order and to practice instead an epistemic stance that conceived of the myriad of objects that constituted it as intelligible

and devoid of any metaphysical or sacred aura.<sup>97</sup> This transformation, I claim, constituted a surprising convergence with similar developments in early modern European natural history. In contrast to European mechanistic conceptions of nature, however, Nobuhiro's instrumentalist disenchantment was supported by his belief in a divine creative power sustaining an ever-expanding exploitability of natural resources. This was tantamount, I believe, to a paradoxical "re-enchantment" of nature that would later ideologically sustain the industrial expansion of Meiji Japan and the silencing of those who protested against the pollution and destruction of the environment.<sup>98</sup> Moreover, in the 1880s this re-enchantment contributed to create a new concept of *shizen* that on the one hand aimed to translate the Western notion of "nature" but on the other connoted it with an unquestionable venter of Japanese uniqueness, which mythified both Japanese relations to nature and productive relations in Japanese society.<sup>99</sup>



## Epilogue

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In a short text he wrote a century ago, “Tsuka to mori no hanashi” (Discourse on Mountains and Forests, 1912), ethnographer Yanagita Kunio joined forces with biologist and folklorist Minakata Kumagusu in a harsh critique of the Meiji government, which at the time was destroying villages, forests, and old shrines to enhance Japan’s agricultural and industrial infrastructures. The inhabitants of rural Japan, Yanagita claimed, had developed for centuries their communal identity around a precise symbiotic relation with the surrounding environment, symbolically expressed in myths and folktales that constituted their primeval (*genshiteki*) religious foundation. The destruction of the environment, to Yanagita, precipitated the erosion of Japanese communal spirit. The disappearance of *kappa*, *tengu*, *tanuki*, and other supernatural creatures from the woods, along with deer, bears, and boars, meant not only the destruction of the environment and the reduction of nature to exploitable resource but also, and in particular, the alienation of those communities from their own primeval ethos. “Without deep forest around a shrine,” he wrote, “a feeling of worship will not be induced to us,” because “as the place itself is appropriate for revering the gods, our worship of the gods originates not in some sacred body, or shrines, but in the land itself and the forest growing densely on the land.”<sup>1</sup>

Yanagita conceived of Japanese identity as originating in a primeval metabolic relation with the environment that harmoniously contained a human domain of houses, villages, shrines, cultivated lands, and the like and a mythical, sacred space of inaccessible forests, populated and protected by gods and supernatural creatures. The two spaces were adjacent but separated by almost impermeable barriers. Stories about the unfortunate outcome of the breaking of that barrier sustained the cosmology of Japanese villagers, which the modernization of Japan was now threatening to obliterate.<sup>2</sup>

Yanagita was, to a certain degree, inventing a tradition that contributed to a heterogeneous multiplicity of discourses that jointly fabricated a sense of nationhood in modernizing Japan and, conversely, a reconfiguration of nature in nationalistic sense.<sup>3</sup> In fact, the history of the Japanese archipelago is punctuated, ever since the eighth century, by the continuous destruction of the environment that is at odds with his romantic idealization of the symbiotic relation of humans and nature.<sup>4</sup> The story of Yahazu—who violently cleared up for cultivation lands that were previously the abode of divine Yatsu no kami—that

opened this book symbolizes the dialectical and often violent relation of human communities and the natural environment throughout Japanese history. It was one of the goals of this book to demonstrate that various forms of dominion of nature have been thoroughly institutionalized and routinely performed since the seventeenth century; by the early nineteenth century the natural environment was explicitly conceptualized as a limitless reservoir of resources for the prosperity of the state (*fukoku*) and the study of nature was incorporated into political economy and state administration.

The myths and legends that Yanagita spent his life collecting had in reality served the purpose of familiarizing, and thus domesticating, the otherness of wilderness: rather than securing a harmonious separation of human and sacred (natural) spaces as Yanagita conceived, they favored the expansion of the human domain through pacifying ceremonies. But for Yanagita, who, as Harootunian has shown, was engaged in a struggle to counteract and overcome the alienating effects of Japan's rapid modernization, the invention of the harmonious coexistence of Japanese communities with nature was a necessary component of a "national life that was whole, unblemished by division and harmonious."<sup>5</sup> That is, the invention of a Japanese harmonious ethnical community was necessarily linked to the invention of a natural environment that was similarly conceived in terms of wholeness and harmoniousness. Yanagita's critique of the violent modernization of Japan carried out by the state and of the alienating effects it produced thus addressed both the destruction of Japanese forests and the obliteration of the essential customs of Japanese communities.

The presupposition at the core of Yanagita's project was the belief that science and technology were Western imports that the Meiji government had uncritically embraced since 1868. James Bartholomew summarized this view that saw "the paradigms in effect in the Tokugawa period . . . all replaced by Western ones, and government policies restricting certain fields . . . not surviv[ing] the demise of the shogunate."<sup>6</sup> This notion, however, presupposed the amnesia of two and a half centuries and of *honzōgaku* history, which had developed, as I demonstrated, into a discipline similar to European natural history and organically imbricated the political economies of bakufu and domains.

The amnesia of *honzōgaku* was not exceptional. After the defeat of the Tokugawa and their allies in the Boshin War (1868–69) and the establishment of a new political order that restored power back to the emperor, Japanese politicians and scholars engaged in an effort of modernization that lasted for at least the first three decades of the Meiji period. Amnesia and erasure of the recent Tokugawa past were a vital prerequisite of this endeavor to "civilize and enlighten"

(*bunmei kaika*) Japan and the Japanese.<sup>7</sup> This was—and often still is—the dominant master narrative describing the introduction of modern sciences from the West. In fact, if we follow the fate of *honzōgaku* in the transition from the Tokugawa to the Meiji period, a more complex and nuanced picture emerges. On the one hand, *honzōgaku* lost his name but transferred to the practitioners of the new scientific fields two centuries of knowledge, research, data, images, techniques, attitudes, styles, facilities, expertise, schools, social relations, books, and specimens. Scholars active in the transitional period of the 1850s to the 1880s were able to translate Western taxonomy and observational procedures into the familiar language of *honzōgaku*, so that the terminology developed in the Tokugawa period was adapted to convey Western concepts. On the other hand, *honzōgaku* became the name—associated with that of *kanpōyaku*, now referring to *traditional* (Chinese) medicine in antagonistic opposition to Western medicine—of a lost tradition, a forgotten wisdom, alternative practices, and a repository of Asian identity.

A glance at the names and biographies of some of the best-known scientists active in the first half of the Meiji period shows that, at least in the natural sciences, the Meiji Restoration of 1868 brought more continuity than rupture. Mori Risshi, physician of the Fukuyama Domain and strong advocate of the restoration of classical Chinese *honzōgaku*, became a high-ranking bureaucrat in the Finance Ministry (1869) and the Ministry of Education (1871) who was responsible for scientific education.<sup>8</sup> Yamamoto Keigu, son of Ono Ranzan's direct disciple Yamamoto Bōyō, continued his father's work in his private school in Osaka and spent his time organizing meetings that were regularly attended by both *honzōgaku* amateurs and Japanese biologists.<sup>9</sup> Ono Motoyoshi, son of Ono Ranzan's nephew Ono Mototaka, was another high-ranking bureaucrat in the Ministry of Education.<sup>10</sup> He was responsible, together with Tanaka Yoshio, for the administration and activities of the Office of Natural History, the Hakubutsukyoku. The office was established in the ninth month of 1871 as a substitute for the shogunal Bussankyoku (Office of Products) and acted as an interministerial agency connecting the Ministry of Education with the Ministry of Agriculture and Commerce and the Home Ministry, coordinating the collaboration of natural scientists with the government. Its first act was the establishment of the Tokyo National Museum of Natural History. Tanaka Yoshio, one of Itō Keisuke's many students, was one of its founders. Tashiro Yasusada, a pioneer in the study of East Asian tropical vegetation, received a formal education in *honzōgaku* in the Satsuma Domain before he became a member of the Office of Natural History after the Meiji Restoration of 1868.<sup>11</sup> When the University

of Tokyo was founded in 1877, of the fifteen tenured professors in the new Department of Science, twelve were foreigners and the remaining three consisted of a professor of botany, Yatabe Ryōkichi; a professor of applied mathematics, Kikuchi Dairoku; and a professor of metallurgy, Imai Iwao, all of whom began their education in *honzōgaku* and Neo-Confucian studies in domainal schools and specialized, after 1868, in Western studies with periods of research abroad.

The composition of the early faculty of the science departments of the University of Tokyo reflected, in both style and method, the way science was being studied and taught in the West. Yet it was Itō Keisuke who inspired the first generation of Japanese natural scientists after his employment as adjunct professor shortly after the university was founded. This first scientific generation included Iijima Isao, son of a retainer of the Hamamatsu Domain, who graduated from Tokyo University under Itō Keisuke's supervision and became a pioneer zoologist.<sup>12</sup> The same was true for Miyoshi Manabu, a botanist born in a samurai family of the Noto Domain.<sup>13</sup> Another notable figure was the botanist Shirai Mitsutarō, whose graduating dissertation was highly praised by his advisor, Itō Keisuke, and who would become one of the first modern historians of *honzōgaku*.<sup>14</sup>

Both the social origins and the worldviews of Meiji natural scientists were more similar to the ones held by *honzōgaku* scholars before 1868 than the conventional historical narratives suggest. Tokugawa research practices were not abandoned. Indeed, the rise of modern natural sciences in Meiji Japan is better described as a transformation and adaptation of *honzōgaku* practices and theories to the language, methods, and aims of Western sciences. The classification of plants and animals changed as the scientific taxonomy derived from Linnaeus replaced the divisions established by Li Shizhen's *Bencao gangmu*. But the severity of this disruption was mitigated by the use of *honzōgaku* terminology to convey Western-derived biological concepts. For example, the names of the taxonomical divisions of the *Bencao gangmu* were carried over as the names of species (*shu*), genera (*ru*, later changed into *zoku*), families (*ka*), orders (*moku*), and classes (*kō*) of biological systematics. Chemistry and cellular biology coexisted with natural history (*hakubutsugaku*), which was still concerned with classification and fieldwork activities resembling *honzōgaku* herbalist expeditions.

This uniformity in attitudes was in part the result of the socially homogeneous background of the first Japanese scientists. Like their *honzōgaku* predecessors, they understood natural studies as a form of service for the welfare of the state. The majority of them collaborated with the Office of Natural History either as organizers of science curricula in the new national education system or

as consultants in the development of agricultural reforms and industrial planning.<sup>15</sup> The activities of Tanaka Yoshio, Itō Keisuke's student before and after the Meiji Restoration of 1868, exemplify the connection between natural history and the government. He was one of the founders of the interministerial Office for Natural History (1870), the Ueno Zoological Garden (1882), the first Museum of Natural History of Japan (1873), and the Agricultural Association of Great Japan (1881).<sup>16</sup>

Tanaka was a scholar involved in various public activities, but even more research-oriented scientists like Shirai Mitsutarō could not avoid contacts with governmental offices. After his graduation from the Imperial University in 1886, he found employment as lecturer, thanks to Tanaka's recommendation, in the Tokyo School for Agricultural and Forest Studies (Tokyo Nōrin Gakkō) administered by the Ministry of Agriculture and Commerce. After the school was annexed to the Imperial University in 1893 as its Department of Agriculture, Shirai became an associate professor there. For the remainder of his career, he was involved in survey programs organized by the Ministry of Agriculture in various regions of the country. He is remembered today as the first historian of Japanese traditional natural history but also for having authored a number of works on Japanese forests, his favorite being a survey of Japanese trees he titled *Jumoku wamyō kō* (Reflections on the Japanese Names of Trees, published posthumously in 1933). This text was conceived and written in perfect *honzōgaku* style—as the title itself suggests.<sup>17</sup> Shirai summarized his decades of field expeditions sponsored by the Ministry of Agriculture, providing a list of the various regional names of each tree and giving information on its utilization in the Tokugawa period and how it could contribute to the economic growth of the modern nation-state. The text was written in the classical Japanese style used to translate Chinese throughout the Tokugawa period (*kundoku kakikudashi*) and is indistinguishable from an early modern *honzōgaku* text, except for the scientific Latin name attached to each species.

Hence *honzōgaku*, as a name for nature studies, disappeared in the Meiji period, but in part it survived in form and content under the new rubric of *hakubutsugaku*, or “natural history.” Tokugawa scholars, called *jusha*, also disappeared. Yet their successors shared many of their inclinations, not least of which being the call to public service, though they were now known either by their professional title or generically as *gakusha* or *shikisha* (“scholars”), terms that had begun to circulate only toward the end of Tokugawa period, or as *hakase* (“scientists”), a term adopted from the old imperial school of the Daigakuryō of seventh-century Japan. Just as the *honzōgaku* spirit survived in modern *haku-*

*butsugaku*, the social role of scholar-officials of Tokugawa *jusha* continued to characterize the life of many intellectuals in modern Japan. As Andrew Baryshay put it, “The vector of national service was very powerful; thinkers who were internally alienated could often be restored to the national community.”<sup>18</sup> Many scientists were enlisted by the Meiji government in the service of modernization and directed their research activity to that purpose. They were now called biologists (*seibutsugakusha*), botanists (*shokubutsugakusha*), and zoologists (*dōbutsugakusha*), but their scholarly activities resembled those of their Tokugawa predecessors. This passage from *honzōgaku* to *hakubutsugaku*—just like the passage from *jusha* to *gakusha* and *hakase*—in the Meiji period suggests that although the names of the discipline and its practitioners changed, the Tokugawa legacy lived on and informed the modern names of nature.

At the same time and parallel to these developments, *honzōgaku* kept its name in explicitly antagonistic opposition to the modernization of medicine and pharmacology. This meant opposition to rapid institutional changes that privileged Western medicine and marginalized traditional medicine, as well as opposition to the rapid disavowal of the intellectual legacies of the Tokugawa period upon which *honzōgaku* was founded. For example, Mori Rishshi, better known under his nom de plume Kien, promoted a revival of old *honzōgaku* precisely when the majority of Japanese botanists were translating their traditional knowledge in the language of Western biology. He rejected Li Shizhen’s *Bencao gangmu* and dedicated his life to the recovery of the forms and meanings of ancient *bencao* tradition. Mori accused the *Bencao gangmu* of having abandoned the traditional conception of medicinal substances as being at the same time potentially healing and poisonous and of privileging the sorting out of natural species to the medicinal effects of their substances—that is, the object versus its subjective effects. In a quest to reconstruct the lost *Shennong bencao jing* (Shennong’s Canon of Materia Medica, a text probably compiled around the second and the first centuries BCE and now lost), Mori dedicated his life to philological studies of Tao Hongjing’s *Bencao jing jizhu* along with the *Xinxiu bencao* and Japanese classics of the Heian period like Fukane Sukehito’s *Honzō wamyō*, Minamoto no Shitagō’s *Wamyō ruijushō*, and Tanba no Yasuyori’s *Ishinbō*. Mori’s initiative was not merely philological nor was it motivated by a vane nostalgia of the past: not only did he want to restore the tripartite division of “princely,” “ministerial,” and “adjutant” drugs in the actual practice of traditional apothecaries and *kanpōyaku* physicians, but he also conceived of his work in open polemic against the modernizing fury of early Meiji Japan, so keen to reject its past.

Mori’s struggle acquired public resonance precisely when the modernizing

impulse of the early Meiji was making way for an identitarian discourse centered around the emperor, the national essence (*kokutai*), and the construction of a Japanese empire in East Asia, and it contributed to reinforce these ideas. However, that notoriety ensued independently from what he was defending of *kanpōyaku* and old-style *honzōgaku*. Indeed, I think that Kien's antiquarianism had nothing to do with identitarian constructions or nationalistic views. Instead, he defended a typically early modern East Asian cosmopolitanism—a belief in the Sinocentric cultural and intellectual sphere that deeply characterized early modern thought, especially in Japan—that was completely at odds with concepts like national essence (*kokutai*) and escape from Asia (*datsu-A*), the vision of a darkened, feudal backwardness of early modern East Asia, a lateness from which to escape that characterized the writings of the thinkers of the “Civilization and Enlightenment” movement. Returning to the original *honzōgaku*, just like preserving the ancient techniques of traditional Chinese medicine (*kanpōyaku*), meant for him to defend and preserve a sense of cultural unity that resisted the modern grammar of culturalism and national essentialism. An antiquarian in Nietzschean sense, Kien was indeed a surviving relic of a time far past.<sup>19</sup> But it was precisely for that reason that he could be later mobilized as a symbol of a past that needed to be brought back to life in order to recover the possibility of an alternative modernity, a modernity other than, and in opposition to, the West.

The survival of *honzōgaku* practices in modern life sciences, however, bears witness of the impossibility of that idea. As I have shown, *honzōgaku* had in fact already developed in the Tokugawa period into a discipline that conjugated knowledge of plants and animals with the reduction of nature to human needs. Indeed, *honzōgaku*'s history had to be forgotten or, in Mori Risshi's case, disavowed in order to maintain the delusional beliefs in a peculiar Japanese sensibility toward nature and in a harmonious coexistence of human communities and nature in traditional Japan that the writings of scholars like Yanagita Kunio, Orikuchi Shinobu, Watsuji Tetsurō, and many others disseminated at the same time that the rapid expansion of Japanese industry was progressively destroying the Japanese ecosystems.



## Notes

### PROLOGUE

1. In today's prefectures of Ishikawa and Toyama, along the western shores of Honshū. The book follows the convention of writing Chinese and Japanese proper names: last name first, given name second. So, for example, Maeda is the surname and Toshitsune is the first name. Also, it follows the convention of referring to pre-modern Japanese renown personalities by their given name: so, for example, when referring to scholar Kaibara Ekiken, I use Ekiken (first name) rather than Kaibara (surname).
2. Natsume Sōseki, *Sanshiro*, trans. Jay Rubin (London: Penguin, 2009).
3. Max Horkheimer and Theodor W. Adorno, *Dialectic of Enlightenment*, trans. John Cumming (New York: Continuum, 1989), 3.

### CHAPTER I

1. Akimoto Kichirō, "Hitachi no kuni fudoki," in *Fudoki, Nihon koten bungaku taikai*, vol. 2, ed. Akimoto Kichirō (Tokyo: Iwanami Shoten, 1976), 54–57. For a different, more literal English translation, see Mark C. Funke, "Hitachi no Kuni Fudoki," *Monumenta Nipponica* 49, no. 1 (Spring 1994): 16–17. From now on, unless specified otherwise, all translations from Japanese, Chinese, Latin, ancient Greek, German, French, and Italian are mine.
2. For an introductory essay, see Komatsu Kazuhiko, *Yōkaigaku shinkō: Yōkai kara miru Nihonjin no kokoro* (Tokyo: Shōgakukan, 1994).
3. See Komine Kazuaki, *Chūsei setsuwa no sekai wo yomu* (Tokyo: Iwanami Shoten, 1998).
4. See in particular Massimo Raveri, *Itinerari nel sacro: L'esperienza religiosa giapponese* (Venezia: Cafoscarina, 1984), 11–68; Yoneyama Toshinao, *Shōbonchi uchū to Nihon bunka* (Tokyo: Iwanami Shoten, 1989); and Hori Ichiro, *Folk Religion in Japan: Continuity and Change* (Chicago: University of Chicago Press, 1968).
5. The literature is vast. See in particular Nakao Sasuke, *Saibai shokubutsu to nōkō no kigen* (Tokyo: Iwanami Shoten, 1966); Sonoda Minoru, "Shinto and the Natural Environment," in *Shinto in History: Ways of the Kami*, ed. John Breen and Mark Teeuwen (London: Curzon, 2000), 32–46; Okatani Kōji, *Kami no mori, mori no kami* (Tokyo: Tokyo Shoseki, 1989). On the political meanings of Yanagita Kunio's ethnocentrism, see H. D. Harootunian, *Overcome by Modernity: History, Culture, and Community in Interwar Japan* (Princeton, NJ: Princeton University Press, 2000).

6. Raveri, *Itinerari nel sacro*; Yoneyama, *Shōbonchi uchū to Nihon bunka*.
7. The bibliography on Japanese environmental history is growing at a very rapid pace. See Brett Walker, Ian Miller, and Julia Adeney Thomas, eds., *Japan at Nature's Edge: The Environmental Origins of a Global Power* (Honolulu: University of Hawaii Press, 2013); Robert Stolz, *Bad Water: Nature, Pollution, and Politics in Japan, 1870–1950* (Durham: Duke University Press, 2014); Brett Walker, *Toxic Archipelago: A History of Industrial Disease in Japan* (Seattle: University of Washington Press, 2010); Conrad Totman's *A History of Japan* (Malden, MA: Blackwell, 2000) has long chapters on environmental history; William Kelly, *Water Control in Tokugawa Japan: Irrigation Organization in a Japanese River Basin, 1600–1870* (Ithaca, NY: Cornell University China-Japan Program, 1982); see also the two volumes of Kikuchi Kazuo, *Nihon no rekishi saigai* (Tokyo: Kokon Shoin, 1980–86).
8. Conrad Totman, *The Green Archipelago: Forestry in Pre-industrial Japan* (Berkeley: University of California Press, 1989).
9. As it will become clear, I do not conceive of space as neutral and empty, a preexisting Cartesian grid over which human events and natural phenomena unfold, but in the relational sense of being the product of a continuous process of social metabolism between human communities and natural environment. See Henri Lefebvre, *The Production of Space* (Oxford: Basil Blackwell, 1991); David Harvey, *Justice, Nature and the Geography of Difference* (Oxford: Basil Blackwell, 1996).
10. This description echoes Max Weber's notion of *Entzauberung*, or "disenchantment," which he adopted from Friedrich Schiller to describe the decline of the network of magical and symbolic correspondences characteristic of the premodern conceptions of the world as a result of the instrumental rationalization and bureaucratization of modern society. See Max Weber, "Science as a Vocation," in *The Vocation Lectures: "Science as a Vocation," "Politics as a Vocation,"* ed. D. S. Owen and T. B. Strong (Indianapolis: Hackett, 2004), 1–32.
11. This book does not offer a comprehensive survey of the variety and richness of *honzōgaku* practices, spanning from pharmacology to natural history and including culinary, landscaping, botany, agronomy, fishery, forestry, and so on. It offers but a cursory introduction of those scholars—like, for example, Ono Ranzan—who enjoyed great prominence in their own time but whose work is of marginal interest to my argument. For an overview on *honzōgaku*, see Yabe Ichirō, *Edo no honzō* (Tokyo: Saiensu Sha, 1984); Ueno Masuzō, *Nihon hakubutsugaku shi* (Tokyo: Kōdansha Gakujutsu Bunko, 1989); Kimura Yōjirō, *Nihon shizenshi no seiritsu: Rangaku to honzōgaku* (Tokyo: Chūōkōronsha, 1974); Sugimoto Tsutomu, *Edo no hakubutsugakushatachi* (Tokyo: Seidosha, 1985); Nishimura Saburō, *Bunmei no naka no hakubutsugaku: Seiō to Nihon*, 2 vols. (Tokyo: Kinokuniya Shoten, 1999); Sugimoto Tsutomu, *Nihon honzōgaku no sekai* (Tokyo: Yasaka Shōbō, 2011).
12. Quoted in Ueno, *Nihon hakubutsugaku shi*, 66.

13. See Carla Nappi, *The Monkey and the Inkpot: Natural History and Its Transformations in Early Modern China* (Cambridge, MA: Harvard University Press, 2009).
14. See chapter 2.
15. Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage, 1994), 132–38.
16. The activities of Udagawa Yōan and of the naturalists of the Shōhyaku-sha circle in the nineteenth century are partial exceptions. See chapters 10 and 12. See also Maki Fukuoka, *The Premise of Fidelity: Science, Visuality, and Representing the Real in Nineteenth-Century Japan* (Stanford: Stanford University Press, 2012).
17. The expression comes from Karl Marx, *Capital: A Critique of Political Economy*, vol. 1, trans. Ben Fowkes (London: Penguin Classics, 1990), 167.
18. Modified from *ibid.*, 165.
19. See Alexander Bird and Emma Tobin, “Natural Kind,” in *Stanford Encyclopedia of Philosophy* (2008), accessed October 14, 2010, <http://plato.stanford.edu/entries/natural-kinds>; Marc Ereshefsky, “Species,” in *Stanford Encyclopedia of Philosophy* (2010), accessed October 14, 2010, <http://plato.stanford.edu/entries/species>. See also John Dupré, “Natural Kinds and Biological Taxa,” *Philosophical Review* 90, no. 1 (1981): 66–90; John Dupré, “In Defense of Classification,” *Studies in History and Philosophy of Biological and Biomedical Sciences* 32, no. 2 (2001): 203–19; John Wilkins, *Species: The History of the Idea* (Berkeley: University of California Press, 2009).
20. See John Dupré, *The Disorder of Things: Metaphysical Foundations of the Disunity of Science* (Cambridge, MA: Harvard University Press, 1993); Wilkins, *Species*. See also Nishimura Saburō, *Rinne to sono shitotachi* (Tokyo: Asahi Sensho, 1997).
21. Hilary Putnam, “The Meaning of ‘Meaning,’” in *Philosophical Papers: Mind, Language, and Reality*, vol. 2 (Cambridge: Cambridge University Press, 1975), 215–71.
22. Antonio Gramsci, *The Prison Notebooks: Selections* (New York: International Publishers, 1971), 9.
23. Jacques Le Goff pushed the beginning of the professionalization of scholars to the twelfth century. See Le Goff, *Les intellectuels au Moyen Age* (Paris: Editions du Seuil, 1957).
24. Bruno Latour developed a network of relations involving human actors and the institution they live in, the discursive apparatus they shared, and the objects they directly and indirectly engage with, all three factors having similar standing and, as “actants,” being entwined with each other. See Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2005).
25. Theodor W. Adorno, “The Idea of Natural-History,” in *Things Beyond Resemblance: Collected Essays on Theodor W. Adorno*, ed. Robert Hullot-Kentor (New York: Columbia University Press, 2006), 260.

26. Deborah Cook, *Adorno on Nature* (Durham, UK: Acumen, 2011), 17.
27. *Ibid.*, 11.
28. Two excellent studies on this subject are Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007); Alix Cooper, *Inventing the Indigenous: Local Knowledge and Natural History in Early Modern Europe* (Cambridge: Cambridge University Press, 2007).
29. P. J. Crutzen and E. F. Stoermer, "The 'Anthropocene,'" *Global Change Newsletter* 41 (2000): 17–18.
30. Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35 (2009): 197–222.
31. Hilary Putnam, *Reason, Truth and History* (Cambridge: Cambridge University Press, 1981), xi.
32. This is a simplified treatment of a very contentious arena of philosophical debate that sees universalists opposed to relativists and realists opposed to antirealists. Introductory surveys of the problem abound: see, for example, Stuart Brock and Edwin Mares, *Realism and Anti-realism* (Montreal: McGill-Queen's University Press, 2007); William P. Alston, ed., *Realism and Antirealism* (Ithaca, NY: Cornell University Press, 2002); Patrick Greenough and Michael P. Lynch, eds., *Truth and Realism* (Oxford: Oxford University Press, 2006); Alfred I. Tauber, ed., *Science and the Quest for Reality* (Houndmills, UK: Macmillan, 1997). Some philosophers and historians of science have tried to mediate between the two contending positions. Ian Hacking, for example, has introduced the notion of "style of reasoning" to situate different epistemological attitudes in specific disciplinary contexts; see Hacking's "'Style' for Historians and Philosophers" and "Language, Truth, and Reason" in Ian Hacking, *Historical Ontology* (Cambridge: Cambridge University Press, 2002). See David Bloor, *Knowledge and Social Imagery* (Chicago: University of Chicago Press, 1991); Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, MA: Harvard University Press, 1987); Bruno Latour, *We Have Never Been Modern* (Cambridge, MA: Harvard University Press, 1993); Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton, NJ: Princeton University Press, 1980); Richard Rorty, *Objectivity, Relativism, and Truth: Philosophical Papers* (Cambridge: Cambridge University Press, 1981); Wolfgang Stegmüller, *The Structure and Dynamics of Theories* (New York: Springer-Verlag, 1976). See also the classic by Richard J. Bernstein, *Beyond Objectivism and Relativism: Science, Hermeneutics, and Praxis* (Philadelphia: University of Pennsylvania Press, 1983); Allan Megill, ed., *Rethinking Objectivity* (Durham: Duke University Press, 1994).
33. Raymond Williams, *Keywords* (Oxford: Oxford University Press, 1984), 219. Every time "nature" is written between quotation marks, it means the conception or idea

- of nature, the focus being on the word qua signifier itself rather than on what it signified, what it refers to.
34. Arthur O. Lovejoy, “Some Meanings of Nature,” in *Primitivism and Related Ideas in Antiquity*, by A. O. Lovejoy and George Boss (Baltimore: Johns Hopkins University Press, 1997), 447–56.
  35. For a historical survey of the “idea” of nature, see Alfred North Whitehead, *The Concept of Nature* (Cambridge: Cambridge University Press, 1930); Adorno, “The Idea of Natural-History,” 252–69; R. G. Collingwood, *The Idea of Nature* (Oxford: Oxford University Press, 1960); Maurice Merleau-Ponty’s lectures on *Nature: Course Notes from the College de France*, trans. Robert Vallier (Evanston, IL: Northwestern University Press, 2003); Hans Blumenberg, *Die Lesbarkeit der Welt* (Frankfurt: Suhrkamp, 1983); Kate Soper, *What Is Nature?* (Oxford: Blackwell, 1995); Jean Ehrard, *L’Idée de nature en France dans la première moitié du XVIIIe siècle* (Paris: Albin Michel, 1994); Mario Alcaro, *Filosofie della natura* (Roma: Manifestolibri, 2006); Gianfranco Basti, *Filosofia della natura e della scienza* (Roma: Lateran University Press, 2002); Gianfranco Marrone, ed., *Semiotica della natura (Natura della semiotica)* (Milano: Mimesis, 2012); the magnificent Philippe Descola, *Beyond Nature and Culture*, trans. Janet Lloyd (Chicago: University of Chicago Press, 2013).
  36. Yanabu Akira, *Hon’yaku no shisō: Shizen to neichā* (Tokyo: Heibonsha, 1977), 3–30. See also Yoshida Tadashi, “Shizen to kagaku,” in *Kōza Nihon shisō*, vol. 1, *Shizen*, ed. Sagara Tōru, Bitō Masahide, and Akiyama Ken (Tokyo: Tōkyō Daigaku Shuppankai, 1983), 342.
  37. See Terao Gorō, “*Shizen*” *gainen no keisei shi: Chūgoku, Nihon, Yōroppa* (Tokyo: Nōsangyoson Bunka Kyōkai, 2002) for a philological overview.
  38. Graham Harman, *Guerrilla Metaphysics* (Peru, IL: Open Court, 2005), 251. See also Graham Harman, *The Quadruple Object* (Winchester, UK: Zero Books, 2011).
  39. “*Quid est ergo tempus? Si nemo ex me quaerat, scio; si quaerenti explicare velim, nescio.*” Augustine, *Confessionum libri*, XI-14-17.
  40. See, for example, the photographs in the Wikipedia entry for “nature”: <http://en.wikipedia.org/wiki/Nature>, last accessed October 2, 2012.
  41. Sigmund Freud, *The Uncanny* (London: Penguin, 2003), 121.
  42. Φύσις κρύπτεσθαι φιλεῖ—*Phýsis krýptesthai philei*—is Fragmentum B 123 in *Fragmente der Vorsokratiker*, ed. Hermann Diels (Berlin: Weidmann, 1903).
  43. Galileo Galilei, *Il Saggiatore [The Assayer]*, quoted in Stillman Drake, ed., *The Controversy of the Comet of 1618* (Philadelphia: University of Pennsylvania Press, 1960), 183–84.
  44. Alfred Tennyson, *In Memoriam A. H. H.*, Canto 56 (1850): “Who trusted God was love indeed / And love Creation’s final law / Tho’ Nature, red in tooth and claw / With ravine, shriek’d against his creed.”

45. As in James Lovelock's Gaia hypothesis, first mentioned in James Lovelock and C. E. Giffin, "Planetary Atmospheres: Compositional and Other Changes Associated with the Presence of Life," *Advances in the Astronautical Sciences* 25 (1969): 179–93.
46. As in Baruch Spinoza's *deus sive natura*. See Hasana Sharp, *Spinoza and the Politics of Renaturalization* (Chicago: University of Chicago Press, 2011).
47. See Roger French, *Ancient Natural History* (London: Routledge, 1994); Geoffrey E. R. Lloyd, "Greek Antiquity: The Invention of Nature," in *The Concept of Nature*, ed. John Torrance (Oxford: Clarendon Press, 1992), 1–24; Charles E. Scott, *The Lives of Things* (Bloomington: Indiana University Press, 2002), 3–81; Giovanni Reale, *Storia della filosofia greca e romana*, vols. 1–4 (Milano: Bompiani, 2004).
48. For a critical analysis, see Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy* (Cambridge, MA: Harvard University Press, 2004); Timothy Morton, *The Ecological Thought* (Cambridge, MA: Harvard University Press, 2010); and Steven Vogel, *Against Nature: The Concept of Nature in Critical Theory* (Albany: State University of New York Press, 1996).
49. Jean Baudrillard, *Simulacra and Simulation* (Ann Arbor: University of Michigan Press, 1994), 4–18; see also Jean Baudrillard, *The Perfect Crime* (London: Verso, 1996), 119.
50. See, for example, the "deep ecology" manifesto, Bill Devall and George Sessions, *Deep Ecology: Living as if Nature Mattered* (Salt Lake City, UT: Gibbs Smith, 1985). A harsh critique that is, however, completely enmeshed with it is Murray Bookchin, *The Philosophy of Social Ecology: Essays on Dialectical Naturalism* (Montreal: Black Rose Books, 1990).
51. Latour, *Politics of Nature*.
52. Theodor Adorno, "Musikpädagogische Musik: Brief an Ernst Krenek," in *Theodor W. Adorno und Ernst Krenek: Briefwechsel*, ed. Wolfgang Rogge (Frankfurt am Main: Suhrkamp Verlag, 1974), 219. English translation by Susan Buck-Morss, *The Origin of Negative Dialectic: Theodor W. Adorno, Walter Benjamin, and the Frankfurt Institute* (New York: Free Press, 1977), 228.
53. See Timothy Morton, *Ecology without Nature: Rethinking Environmental Aesthetics* (Cambridge, MA: Harvard University Press, 2007); Peter C. van Wyck, *Primitives in the Wilderness: Deep Ecology and the Missing Human Subject* (Albany: State University of New York Press, 1997); John Bellamy Foster, *Marx's Ecology: Materialism and Nature* (New York: Monthly Review Press, 2000); Bill McKibben, *The End of Nature* (New York: Random House, 2006); Robert Stolz, "Nature over Nation: Tanaka Shōzō's Fundamental River Law," *Japan Forum* 18, no. 3 (November 2006): 417–37.
54. Clearly, this is a paraphrase of Maximilien Robespierre's celebrated passage in the speech of December 3, 1792: "*Louis doit mourir parce qu'il faut que la patrie vive.*" My thanks go to Robert Stolz, the author of the paraphrase.

55. This is the case with only two exceptions: The first is the *Haruma wage*, a Dutch-Japanese dictionary compiled in 1796 by Inamura Sanpaku (1759–1811) with the collaboration of Udagawa Genzui (1756–98) and Okada Hosetsu and on the basis of the second edition of the Dutch-French dictionary by François Halma (1653–1722), *Nieuw Woordenboek der Nederduitsche en Freansche Taalen. Dictionnaire Nouveau Flamand & François*, printed in Amsterdam in 1722. The three translators were all disciples of the *rangaku* scholar and physician Ōtsuki Gentaku (1757–1827), who was active participant in *bonzōgaku* intellectual circles. The *Haruma wage* is worth mentioning because, contrary to all other dictionaries compiled during the Tokugawa period, it was the only one that translated the Dutch *Natuur* as *shizen*. However, when in 1858 Katsurakawa Hoshū's (1751–1809) new edition of *Haruma wage* was finally printed with the title of *Waran jii*, the entry *Natuur* disappeared. The second exception is the works of rural thinker Andō Shōeki, whose manuscript *Shizen shin'eidō* treated *shizen* as a fundamental concept. Unfortunately, he remained largely unknown until 1899, when his manuscripts were discovered by Kanō Kōkichi (1865–1942). Shōeki's contribution in the philosophical debate of the Tokugawa period was virtually irrelevant. See Toshinobu Yoshinaka, *Andō Shōeki: Social and Ecological Philosopher in Eighteenth-Century Japan* (New York: Weatherhill, 1992); Ishiwata Hiroaki, *Andō Shōeki no sekai: Dokusōteki shisō wa ikani umareta ka* (Tokyo: Sōshisha, 2007).
56. Itō Jinsai, "Gomō jigi," in *Nihon shisō taikei*, vol. 33 (Tokyo: Iwanami Shoten, 1971), 116.
57. Ibid. For a different translation, see John Allen Tucker, *Itō Jinsai's Gomō jigi and the Philosophical Definition of Early Modern Japan* (Leiden: Brill, 1998), 73.
58. The following catalog is based upon Terao, "*Shizen*" *gainen no keiseishi*, 154–69.
59. Especially in the *Nihon shoki* (720) and the *Kaifūsō* (751). Terao, "*Shizen*" *gainen no keiseishi*, 157–58.
60. On Chinese gazetteers, see Peter K. Bol, "The Rise of Local History: History, Geography, and Culture in Southern Song and Yuan Wuzhou," *Harvard Journal of Asiatic Studies* 61, no. 1 (2001): 37–76; James M. Hargett, "Song Dynasty Local Gazetteers and Their Place in the History of Difangzhi Writing," *Harvard Journal of Asiatic Studies* 56, no. 2 (1996): 405–42. On Japanese *fudoki*, see Michiko Y. Aoki, *Records of Wind and Earth: A Translation of Fudoki, with Introduction and Commentaries* (Ann Arbor, MI: Association for Asian Studies, 1997). Modern philosopher Watsuji Tetsurō reconceptualized *fūdo* in terms of geocultural determinism in *Climate and Culture: A Philosophical Study* (Tokyo: Hakuseido, 1961). On Watsuji, see Harootunian, *Overcome by Modernity*, 202–92.
61. For a critical overview, see Julia Adeney Thomas, *Reconfiguring Modernity: Concepts of Nature in Japanese Political Ideology* (Berkeley: University of California Press, 2001).
62. This is conventional in the majority of Japanese sources.

63. Shirai Mitsutarō, *Nihon hakubutsugaku nenpyō* (Tokyo: Maruzen, 1891).
64. Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996), 1–14.
65. Simon Schaffer et al., eds., *The Brokered Word: Go-Betweens and Global Intelligence, 1770–1820* (Sagamore Beach, MA: Science History Publications, 2009).
66. Peter Dear, *The Intelligibility of Nature: How Science Makes Sense of the World* (Chicago: University of Chicago Press, 2006), 11.
67. I thus share Paul Boghossian’s discontent with what he calls “postmodernist relativism” — that is, the belief that “there are many radically different, yet ‘equally valid’ ways of knowing the world, with science being just one of them.” Paul Boghossian, *Fear of Knowledge: Against Relativism and Constructivism* (Oxford: Oxford University Press, 2006), 2.
68. In fact, the publications of Engelbert Kaempfer, Carl Peter Thunberg, and Franz von Siebold on Japanese flora and fauna in the eighteenth and nineteenth centuries were vehicles through which *honzōgaku* knowledge indirectly contributed to European natural history.
69. Satō Jin, “*Motazaru kuni*” *no shigenron: Jizoku kanōna kokudo wo meguru mō hitotsu no chi* (Tokyo: Tōkyō Daigaku Shuppankai, 2011).
70. Watsuji, *Climate and Culture*; see also Julia Adeney Thomas, “The Cage of Nature: Modernity’s History in Japan,” *History and Theory* 40, no. 1 (February 2001): 16–36; Thomas, *Reconfiguring Modernity*; Karatani Kōjin, *Origins of Modern Japanese Literature* (Durham: Duke University Press, 1993), 11–44.

## CHAPTER 2

1. In fact, the Japanese archipelago was populated by a series of migratory waves no earlier than 35,000 years ago and continuing through the fourth century CE. Mark J. Hudson, *Ruins of Identity: Ethnogenesis in the Japanese Islands* (Honolulu: University of Hawaii Press, 1999).
2. This chapter offers a brief survey of *honzōgaku* in Japan before 1600. For this reason, I rely a great deal on research on Chinese *bencao*. Among them, Joseph Needham and Lu Gwei-djen, *Science and Civilization in China*, vol. 6, bk. 1, *Botany* (Cambridge: Cambridge University Press, 1986); Peter Unschuld, *Medicine in China: A History of Pharmaceuticals* (Berkeley: University of California Press, 1986); Peter Unschuld, *Medicine in China: A History of Ideas* (1985; repr. Berkeley: University of California Press, 2010); Benjamin Elman, *On Their Own Terms: Science in China, 1550–1900* (Cambridge, MA: Harvard University Press, 2005); Benjamin Elman, *A Cultural History of Modern Science in China* (Cambridge, MA: Harvard University Press, 2006); Linda L. Barnes, *Needles, Herbs, Gods, and Ghosts: China, Healing, and the West to 1848* (Cambridge, MA: Harvard University Press, 2005); Vivienne Lo and Christopher Cullen, eds., *Medieval Chinese Medicine: The Dunhuang Medi-*

- cal Manuscripts* (London: Routledge Curzon, 2005); Elizabeth Hsu, ed., *Innovation in Chinese Medicine* (Cambridge: Cambridge University Press, 2001); Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1; Ishida Hidemi, *Chūgoku igaku shisōshi* (Tokyo: Tōkyō Daigaku Shuppankai, 1992); Okanishi Tameto, *Honzō gaisetsu* (Osaka: Sōgensha, 1977); Yamada Keiji, *Chūgoku kodai kagaku shiron* (Kyoto: Kyoto Daigaku Jinbunkagaku Kenkyūjo, 1989); Yamada Keiji, ed., *Higashi ajia no honzō to hakubutsugaku no sekai* (Tokyo: Shibunkaku Shuppan, 1995); Yamada, *Honzō to yume to tōkinjutsu*; Pan Jixing, “Tan ‘Zhiwuxue’ yi ci zai Zhingguo he Riben de youlai,” *Daiziran tansuo* 3 (1984): 167–72; Zhongyi dacidian bianji weiyuanhui, ed., *Zhongyi dacidian: yishi wenxian fence* (Beijing: Renmin Weisheng Chubanshe, 1981). On Li Shizhen, see Nappi, *The Monkey and the Inkpot*; Georges Métaillé, “Des mots et des plantes dans le *Bencao gangmu* de Li Shizhen,” *Extrême-Orient Extrême-Occident* 10 (1988): 27–43; Georges Métaillé, “The *Bencao gangmu* of Li Shizhen: An Innovation in Natural History?,” in *Innovation in Chinese Medicine*, ed. Elizabeth Hsu (Cambridge: Cambridge University Press, 2001), 221–61; Qian Yuanming, ed., *Li Shizhen yanjiu* (Guangzhou: Guangdong Keji Chubanshe, 1984); Lu Gwei-djen, “China’s Greatest Naturalist: A Brief Biography of Li Shih-Chen,” *Physis* 8, no. 4 (1966): 383–92.
3. Marius B. Jansen, *China in the Tokugawa World* (Cambridge, MA: Harvard University Press, 1992).
  4. Unshuld, *Medicine in China*, 5, 14.
  5. Literally, *bencaoxue* means the “study” (*xue*, *gaku* in Japanese) of the “fundamental” (*ben*, *hon*) “herbs” (*cao*, *sō*). See Yabe, *Edo no honzō*, 6.
  6. Translation modified from Unshuld, *Medicine in China*, 113. See a different translation in Needham and Lu, *Botany*, 237.
  7. Needham and Lu, *Botany*, 244.
  8. Masayoshi Sugimoto and David Swain, *Science & Culture in Traditional Japan* (Rutland: Charles E. Tuttle, 1989), 88.
  9. *Ibid.*, 85.
  10. For the early history of *honzōgaku* in Japan, see Yabe, *Edo no honzō*, 15–42; Ueno, *Nihon hakubutsugaku shi*, 24–63; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 223–30.
  11. Today the text is lost, but according to the eighth-century *Nihon shoki*, it was introduced twice from China and the Korean peninsula.
  12. Needham and Lu, *Botany*, 242.
  13. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 194–98.
  14. Métaillé, “The *Bencao gangmu* of Li Shizhen,” 224–25.
  15. Needham and Lu, *Botany*, 266.
  16. Fukane no Sukehito, *Honzō wamyō*, 2 vols. (Edo: Izumiya Shōjirō, 1796). Reprinted in Fukane no Sukehito, *Honzō wamyō*, ed. Yosano Hiroshi et al., 2 vols. (Tokyo:

- Nihon Koten Zenshū Kankōkai, 1926). See also Mayanagi Makoto, “*Honzō wamyō inyō shomei sakuin*,” *Nippon ishigaku zasshi* 33, no. 3 (1986): 381–95.
17. Yabe, *Edo no honzō*, 15–24.
  18. Koremune Tomotoshi, *Honzō iroha shō* (Tokyo: Naikaku Bunko, 1968). See also Needham and Lu, *Botany*, 282–83.
  19. See Yabe, *Edo no honzō*, 28–31 for a complete list.
  20. For Chinese medicine, see *Medicine in China: A History of Ideas* and Joseph Needham and Lu Gwei-djen, *Science and Civilization in China*, vol. 6, bk. 6, *Medicine* (Cambridge: Cambridge University Press, 2000). For Japanese medicine, see Sugimoto and Swain, *Science & Culture in Traditional Japan*; Hattori Toshirō, *Edo jidai igakushi no kenkyū* (Tokyo: Yoshikawa Kōbunkan, 1978).
  21. Sugimoto and Swain, *Science & Culture in Traditional Japan*, 215.
  22. See chapter 3.
  23. Needham and Lu, *Botany*, 308. For a lively biographical portrait of Li Shizhen, see Nappi, *The Monkey and the Inkpot*, 12–49; see also Chen Xinqian, ed., *Li Shizhen yanjiu lunwen ji* (Wuhan: Hubei Kexue Jishu Chubanshe, 1985).
  24. See Liu Hongyao, ed., *Lidai mingren yu Wudang, Wudang Zazhi Zengkan*, 1994. See also Nappi, *The Monkey and the Inkpot*, 136–49.
  25. As Elman reminds us, Li failed the provincial examinations “like 95 percent of the candidates empirewide.” Elman, *On Their Own Terms*, 30. On civil examinations, see Benjamin A. Elman, “Political, Social, and Cultural Reproduction via Civil Service Examinations in Late Imperial China,” *Journal of Asian Studies* 50, no. 1 (February 1991): 7–28; Benjamin A. Elman, *A Cultural History of Civil Examinations in Late Imperial China* (Berkeley: University of California Press, 2000).
  26. Needham and Lu, *Botany*, 310.
  27. Quoted in *ibid.*, 311.
  28. *Ibid.*, 316; Elman, *On Their Own Terms*, 32–33. Yabe counts 1,903 entries, in *Edo no honzō*, 47. The different numbers probably depend on which edition Needham and Yabe took into consideration for their analyses. While Needham bases his count on the 1596 first edition, Yabe considers the second edition of 1603, the so-called Jiangxi edition, which had a far wider diffusion thanks to the larger number of printed copies. At present, it is impossible to establish with any certainty whether the copy that Hayashi Razan purchased for Tokugawa Ieyasu in Nagasaki in 1607 was the first or the second edition, even though the majority of Japanese scholars favor the latter option. A third edition, the Hubei, followed in 1606, named as was usual in Chinese custom after the region where it was printed. As Elman notes, “The huge work sold out rapidly enough that eight reprints were issued in the seventeenth century alone.” Elman, *On Their Own Terms*, 30–31.
  29. Nanjing was at the time called Jinling, from which the *Bencao gangmu* was also known as *Jinling ben*.

30. Translated by Nappi, *The Monkey and the Inkpot*, 20.
31. Needham translates it as “The Great Pharmacopoeia” (Needham and Lu, *Botany*, 312), but a more literal rendition is “Pharmacopoeia Divided into Classes and Orders,” or the more concise “Systematic Materia Medica,” the translation I adopt here following Elman, *On Their Own Terms*, and Nappi, *The Monkey and the Inkpot*. Georges Métaillé prefers “Classified Materia Medica,” in Métaillé, “The *Bencao gangmu* of Li Shizhen,” 221.
32. Needham and Lu, *Botany*, 312.
33. In Nappi, *The Monkey and the Inkpot*, 20.
34. Métaillé, “The *Bencao gangmu* of Li Shizhen,” 241.
35. Needham and Lu, *Botany*, 312.
36. Li Shizhen, *Bencao gangmu* (Beijing: Renmin Weisheng Chubanshe, 1977–81). I use the modern Japanese edition *Kokuyaku Honzō kōmoku: Shinchū kōtei*, ed. Shirai Mitsutarō and Kimura Kōichi, trans. Suzuki Shinkai, 15 vols. (Tokyo: Shun’yōdō Shoten, 1973). For an English translation, see *Compendium of Materia Medica*, trans. and ann. Luo Xiwen, 6 vols. (Beijing: Foreign Languages Press, 2003).
37. Métaillé argues that Li Shizhen might have been inspired by the title of *Tongjian gangmu*, published in 1189 by Zhu Xi. Given Li’s explicit reverence for Zhu Xi, it is a persuasive hypothesis. Métaillé, “The *Bencao gangmu* of Li Shizhen,” 226.
38. Quoted in Métaillé, “The *Bencao gangmu* of Li Shizhen,” 226.
39. Quoted in Needham and Lu, *Botany*, 315. A more literal translation in Métaillé, “The *Bencao gangmu* of Li Shizhen,” 227.
40. See Nappi, *The Monkey and the Inkpot*, 50–68 for an analysis of the entry for “dragon” (*long*). See also Métaillé, “The *Bencao gangmu* of Li Shizhen,” 250–52.
41. Needham and Lu, *Botany*, 282. Known also in its abbreviated form of *Zhenglei Bencao*. The 1640 reprint of the encyclopedia displayed major changes in its illustration. The 1885 edition replaced the original illustrations with new ones based largely on the *Jiubuang bencao* and Wu Qijun’s *Zhiwu mingshi tukao* (1848). See Nappi, *The Monkey and the Inkpot*, 52–53; Xie Zongwan, “*Bencao gangmu* tuban de kaocha,” in *Li Shizhen yanjiu lunwen ji* (Wuhan: Hubei Kexue Jishu Chubanshe, 1985), 145–99.
42. Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006), 219–21; Scott Atran, *Cognitive Foundations of Natural History: Towards an Anthropology of Science* (Cambridge: Cambridge University Press, 1990); Brent Berlin, *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies* (Princeton, NJ: Princeton University Press, 1992).
43. Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution and Inheritance* (Cambridge, MA: Belknap, 1982), 147–48.
44. Mayr, *The Growth of Biological Thought*, 148.

45. Ibid.
46. Mayr, it seems to me, suggests that the first type of classification (identification schemes) leads to deductive identifications (aprioristic), while the second produces inductive inferences (scientifically empiricist), but this epistemological division is philosophically weak: to be purely inductive, a taxonomy should be prone to continuous adaptation not only of its structure but also of its inquiring principles on the basis of subsequent empirical discoveries, but this never actually happens, as the survival of Linnaeus's binominal nomenclature (a deductive identification scheme) in today's phylotaxonomies shows. See Mark Ridley, "Principles of Classification," in *Philosophy of Biology*, ed. Michael Ruse (Amherst, NY: Prometheus Books, 1998), 167–79; Ritvo, *The Platypus and the Mermaid*; Martin Mahner and Mario Bunge, *Foundations of Biophilosophy* (Berlin: Springer, 1997) for different overviews.
47. John Dupré, "Are Whales Fish?," in Medin and Atran, *Folkbiology*, 461–76.
48. See Umberto Eco, "Interpreting Animals," in *The Limits of Interpretations* (Bloomington: Indiana University Press, 1994), 111–22.
49. Also called phylogenetic systematics. See Willi Henning, *Phylogenetic Systematics*, trans. D. Dwight Davis and Rainer Zangerl (Urbana, IL: University of Illinois Press, 1999).
50. On the scientific debate, see Quentin Wheeler, *Species Concepts and Phylogenetic Theory: A Debate* (New York: Columbia University Press, 2000); David L. Hull, "The Limits of Cladism," *Systematic Zoology* 28 (1978): 416–40; Mayr, *The Growth of Biological Thought*; Claude Dupuis, "Willi Hennig's Impact on Taxonomic Thought," *Annual Review of Ecology and Systematics* 15 (1984): 1–24; Edward O. Wiley, D. Siegel-Causey, Daniel R. Brooks, and V. A. Funk, *The Compleat Cladist: A Primer of Phylogenetic Procedures* (Lawrence: University of Kansas Museum of Natural History Special Publication No. 19, 1991); Ian J. Kitching, Peter L. Forey, Christopher J. Humphries, and David M. Williams, eds., *Cladistics: Theory and Practice of Parsimony Analysis* (Oxford: Oxford University Press, 1998). On the philosophical debate, see David L. Hull, "The Ontological Status of Species as Evolutionary Units," in Ruse, *Philosophy of Biology*, 146–55; David L. Hull and Michael Ruse, eds., *The Philosophy of Biology* (Oxford: Oxford University Press, 1998), 295–347; Mahner and Bunge, *Foundations of Biophilosophy*, 213–70. For a popular introduction, see Carol Kaesuk Yoon, *Naming Nature: The Clash between Instinct and Science* (New York: W. W. Norton, 2009).
51. Jorge Luis Borges, "John Wilkins' Analytical Language," in *Jorge Luis Borges: Selected Non-fictions*, ed. Eliot Weinberger (New York: Penguin Books, 1999), 231. Borges plays with the taxonomy of a "certain Chinese encyclopedia" that divided animals into "(a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) *et*

- cetera*, (m) having just broken the water pitcher, (n) that from a long way off look like flies.” The passage is quoted also in Foucault, *The Order of Things*, xv.
52. See Geoffrey C. Bowler and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999).
  53. Ian Hacking, “Biopower and the Avalanche of Printed Number,” *Humanities in Society* 5 (1982): 280.
  54. Foucault, *The Order of Things*, xv–xvi.
  55. Ritvo, *The Platypus and the Mermaid*.
  56. Marcel Proust, *Swann’s Way*, trans. Lydia David (London: Penguin, 2004), 403.
  57. I here use “encyclopedia” in metaphorical sense to mean the semantic competency of a community of speakers. Umberto Eco, *Kant and the Platypus: Essays on Language and Cognition* (New York: Harcourt Brace, 2000).
  58. Edward Sapir, *Selected Writing of Edward Sapir on Language, Culture, and Personality* (Berkeley: University of California Press, 1949).
  59. Martin Heidegger, *Poetry, Language, Thought* (New York: Harper & Row, 1971), 146.
  60. *Correlationism* is a term coined by French philosopher Quentin Meillassoux. “By ‘correlation,’” he explains, “we mean the idea according to which we only ever have access to the correlation between thinking and being, and never to either term considered apart from the other.” Quentin Meillassoux, *After Finitude: An Essay on the Necessity of Contingency*, trans. Ray Brassier (London: Continuum, 2008), 5.
  61. Theodor W. Adorno, *Metaphysics: Concepts and Problems*, trans. E. F. N. Jephcott (Stanford: Stanford University Press, 2001), 68.
  62. Since “the peculiarity of the concept of  $\psi\lambda\eta$ , or matter, is that we are using a concept . . . which, by its meaning, refers to something which is not a concept or principle.” Adorno, *Metaphysics*, 67.
  63. Cook, *Adorno on Nature*, 11.
  64. See Elman, *On Their Own Terms*, 24–60 for a treatment of Neo-Confucian theory of knowledge and materia medica.
  65. Quoted in Needham and Lu, *Botany*, 320–21.
  66. For Zhu Xi’s metaphysics, see Yamada Keiji, *Shushi no shizengaku* (Tokyo: Iwanami Shoten, 1978); Shimada Kenji, *Shushigaku to yōmeigaku* (Tokyo: Iwanami Shinsho, 2000); Yasuda Jirō, *Chūgoku kinsei shisō kenkyū* (Tokyo: Chikuma Shobō, 1976); Fung Yu-Lan, *A History of Chinese Philosophy*, vol. 2 (Princeton, NJ: Princeton University Press, 1953), 533–672. For the Japanese understanding of Zhu Xi’s cosmology, see Wajima Yoshio, *Nihon Sōgakushi no kenkyū*, rev. ed. (Tokyo: Yoshikawa Kōbunkan, 1988); Iwasaki Chikatsugu, *Nihon kinsei shisōshi josetsu*, vol. 1 (Tokyo: Shin Nihon Shuppansha, 1997), 116–76. “Heterodox” interpretations of Japanese Zhu Xi Neo-Confucianism can be found in Koyasu Nobukuni, *Edo shisōshi kōgi* (Tokyo: Iwanami Shoten, 1998); Koyasu Nobukuni, *Hōhō toshite no Edo: Nihon*

- shisōshi to hibanteki shiza* (Tokyo: Perikansha, 2000); Kurozumi Makoto, *Kinsei Nihon shakai to jukyō* (Tokyo: Perikansha, 2003). See also Robert Bellah, *Tokugawa Religion: The Cultural Roots of Modern Japan* (London: Free Press, 1985); Wm Theodore de Bary, *The Unfolding of Neo-Confucianism* (New York: Columbia University Press, 1975); Benjamin Elman, John Duncan, and Herman Ooms, eds., *Rethinking Confucianism: Past and Present in China, Japan, Korea, and Vietnam* (Los Angeles: UCLA, 2002); Maruyama Masao, *Studies in the Intellectual History of Tokugawa Japan*, ed. Mikiso Hane (Tokyo: University of Tokyo Press, 1974); Tetsuo Najita, *Vision of Virtue in Tokugawa Japan: The Kaitokudō Merchant Academy of Osaka* (Honolulu: University of Hawaii Press, 1987); Tetsuo Najita and Irwin Scheiner, eds., *Japanese Thought in the Tokugawa Period, 1600–1868: Methods and Metaphors* (Chicago: University of Chicago Press, 1968); Peter Nosco, ed., *Confucianism and Tokugawa Culture* (Honolulu: University of Hawaii Press, 1984); Herman Ooms, *Tokugawa Ideology: Early Constructs, 1570–1680* (Princeton, NJ: Princeton University Press, 1985); Samuel Hideo Yamashita, “Compasses and Carpenter’s Squares: A Study of Itō Jinsai (1627–1705) and Ogyū Sorai (1666–1728)” (PhD diss., University of Michigan, 1981).
67. In Japan, Ishida Baigan — who founded the *shingaku* school of Neo-Confucianism — and Satō Naokata are two scholars that emphasized introspective practices. See Bellah, *Tokugawa Religion*; Paolo Beonio-Brocchieri, *Religiosità e ideologia alle origini del Giappone moderno* (Milano: Ispi, 1965); John Allen Tucker, “Quiet-Sitting and Political Activism: The Thought and Practice of Satō Naokata,” *Japanese Journal of Religious Studies* 29, nos. 1–2 (2002): 107–46.
68. Neo-Confucian scholars mainly carried on the “scientific” movement in Edo Japan. On this regard, see Karatani Kōjin, *Kotoba to bigeki* (Tokyo: Kōdansha Gakujutsu Bunko, 1993), 161–84; Tsuji Tetsuo, *Nihon no kagaku shisō* (Tokyo: Chūkō Shinsho, 1973), 25–61; Sugimoto and Swain, *Science & Culture in Traditional Japan*, 291–395; Itō Shuntarō and Murakami Yōichirō, eds., *Nihon kagakushi no shatei, Kōza kagakushi* 4 (Tokyo: Baifūkan, 1989), 64–89, 121–41.
69. Needham and Lu, *Botany*, 315.
70. Elman, *On Their Own Terms*, 5.
71. Métaillé, “The *Bencao gangmu* of Li Shizhen,” 233.
72. *Ibid.*, 234.
73. *Bencao gangmu*, *juan* 34, 1911. Translated in Métaillé, “The *Bencao gangmu* of Li Shizhen,” 236.
74. Needham and Lu, *Botany*, 177.
75. Métaillé, “The *Bencao gangmu* of Li Shizhen,” 238. “Folk classification” in Métaillé is taken from Scott Atran, “Origin of the Species and Genus Concepts: An Anthropological Perspective,” *Journal of the History of Biology* 20, no. 2 (1987): 195–279. See also Atran, *Cognitive Foundations of Natural History*.

76. The Neoplatonic philosopher Porphyry explained Aristotle's logical-ontological model of *eidos-genos* with a hierarchical schema that revealed the logical, ontological, and empirically observable structure of reality. Roughly, it consisted in dividing what Aristotle called *genos* (genera) into *eidos* (species) in accordance with a hierarchical system of differences (*διαφορά*) that shows how species shared the essence of a genus and each individual of one species shared the essence of the species. The system was supposed to construct a treelike structure (*arbor porphyriana*) that visualized the hierarchical series of logical and ontological differences that allowed distinguishing all things in the universe. See Umberto Eco, "Dall'albero al labirinto," in *Dall'albero al labirinto. Studi storici sul segno e l'interpretazione* (Milano: Bompiani, 2007), 13–96.
77. See Wilkins, *Species: A History of the Idea* (Berkeley: University of California Press, 2009), 47–96.
78. See Wheeler, *Species Concepts and Phylogenetic Theory*.
79. See Aristotle, *De generation et corruptione* (On Generation and Corruption). See an English translation by H. H. Joachim at <http://ebooks.adelaide.edu.au/a/aristotle/corruption> (accessed October 21, 2010).
80. Ever since Parmenides, Greek philosophy was caught in the paradox of being and change. Democritus's atomism was an attempt to circumvent the problem of a being identical with itself and change, but Aristotle rejected it, and his deductive system became the dominant paradigm of Western philosophical tradition until the early modern period. For a juxtaposition of Greek and Chinese systems of thought in regard to the human body, see Shigehisa Kuriyama, *The Expressiveness of the Body, and the Divergence of Greek and Chinese Medicine* (New York: Zone Books, 2002).
81. See Nappi, *The Monkey and the Inkpot*, 69–135.
82. *Ibid.*, 140.
83. Elman, *On Their Own Terms*, 5.
84. Métaillé, "The Bencao gangmu of Li Shizhen," 241.
85. Elman, *On Their Own Terms*, 37. See also, John Makeham, *Name and Actuality in Early Chinese Thought* (Albany: State University of New York Press, 1994); and Fung, *History of Chinese Philosophy*, vol. 1, 59–62, 302–11.
86. *Luyun*, pian 13, zhang 3.
87. *Luyun*, pian 12, zhang 17.
88. Burton Watson, *Xunzi: Basic Writings* (New York: Columbia University Press, 2003), 154.
89. Dan Robins, "Xunzi," *Stanford Encyclopedia of Philosophy*, accessed October 21, 2010, <http://plato.stanford.edu/entries/xunzi>.
90. Fung, *History of Chinese Philosophy*, vol. 2, 631–36.
91. Métaillé, "The Bencao gangmu of Li Shizhen," 241.
92. Nappi, *The Monkey and the Inkpot*, 140.

93. A similar belief in the homology of names and things also characterized European natural history of the Renaissance period. Foucault, *The Order of Things*, 129. See also William B. Ashworth Jr., “Emblematic Natural History of the Renaissance,” in *Cultures of Natural History*, ed. Nicholas Jardine, James A. Secord, and Emma C. Spary (Cambridge: Cambridge University Press, 1996), 23.
94. Note, for example, that the terms to classify things into classes (*gang*) and orders (*mu*) were also utilized to name entries (*gang*) and chapters (*mu*).
95. William Shakespeare, *Romeo and Juliet*, II, ii, 1–2, accessed August 14, 2014, [http://shakespeare.mit.edu/romeo\\_juliet/full.html](http://shakespeare.mit.edu/romeo_juliet/full.html).
96. Bernard of Cluny, *De Contemptu Mundi*, in *Bernard le Clunisien: De contemptu mundi. Une vision du monde vers 1144*, ed. André Cresson (Turnhout: Brepols, 2009), 126. More famous today is Umberto Eco’s variation: *Stat rosa pristina nomine, nomina nuda tenemus*, in *Il nome della rosa* (Milano: Bompiani, 1980).

## PART II

1. See Peter Kornicki, *The Book in Japan: A Cultural History from the Beginnings to the Nineteenth Century* (Honolulu: University of Hawaii Press, 2001), 277–305. See also Lucille Chia, *Printing for Profit: The Commercial Publishers of Jianyang, Fujian (11th–17th Centuries)* (Cambridge, MA: Harvard University Asia Center, 2002); Lucille Chia, “Of Three Mountains Street: The Commercial Publishers of Ming Nanjing,” in *Printing and Book Culture in Late Imperial China*, ed. Cynthia Brokaw and Kai-wing Chow (Berkeley: University of California Press, 2005), 107–51.
2. Fukuo Takeichirō, *Ōuchi Yoshitaka* (Tokyo: Yoshikawa Kōbunkan, 1989), 93–115.
3. See chapter 10.

## CHAPTER 3

1. Yabe, *Edo no honzō*, 43; Ueno, *Nihon hakubutsugaku shi*, 65; Kimura, *Nihon shizen-shi no seiritsu*, 33; Sugimoto, *Edo no hakubutsugakushatachi*, 38; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 106.
2. The debate over the ideological role of Neo-Confucianism in the foundation of the Tokugawa shogunate is immense. See in particular Wm. Theodore de Bary, *The Unfolding of Neo-Confucianism* (New York: Columbia University Press, 1975); Kurozumi, *Kinsei Nihon shakai to jukyō*; Yamada, *Shushi no shizengaku*; Shimada, *Shushigaku to yōmeigaku*; Yasuda, *Chūgoku kinsei shisō kenkyū*; Wajima Yoshio, *Nihon Sōgakushi no kenkyū*; Iwasaki, *Nihon kinsei shisōshi josetsu*, vol. 2; Robert Bellah, *Tokugawa Religion: The Cultural Roots of Modern Japan* (London: Free Press, 1985); Maruyama, *Studies in the Intellectual History of Tokugawa Japan*; Tetsuo and Scheiner, *Japanese Thought in the Tokugawa Period, 1600–1868*; Kate Wildman Nakai, “The Naturalization of Confucianism in Tokugawa Japan: The Problem of Sinocentrism,” *Harvard Journal of Asiatic Studies* 40, no. 1 (June 1980): 157–99;

Nosco, *Confucianism and Tokugawa Culture*; Samuel Hideo Yamashita, *Compasses and Carpenter's Squares: A Study of Itō Jinsai (1627–1705) and Ogyū Sorai (1666–1728)* (Ann Arbor, MI: University Microfilms International, 1981); Watanabe Hiroshi, *A History of Japanese Political Thought, 1600–1901*, trans. David Noble (Tokyo: International House of Japan, 2012).

3. Yabe, *Edo no honzō*, 44; Ueno, *Nihon hakubutsugaku shi*, 65; Kimura, *Nihon shizenshi no seiritsu*, 34; Sugimoto, *Edo no hakubutsugakushatachi*, 38–46; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 106.
4. See Robert L. Backus, “The Relationship of Confucianism to the Tokugawa Bakufu as Revealed in the Kansei Educational Reform,” *Harvard Journal of Asiatic Studies* 34 (1974): 97–162; Robert L. Backus, “The Kansei Prohibition of Heterodoxy and Its Effects on Education,” *Harvard Journal of Asiatic Studies* 39, no. 1 (June 1979): 55–106; Robert L. Backus, “The Motivation of Confucian Orthodoxy in Tokugawa Japan,” *Harvard Journal of Asiatic Studies* 39, no. 2 (December 1979): 275–338.
5. For example, Inoue Tetsujirō and Muraoka Tsunetsugu. Maruyama Masao, *Studies in the Intellectual History of Tokugawa Japan*, xv–xxxvii. Published in Japanese as *Nihon seiji shisōshi kenkyū* (Tokyo: Tokyo Daigaku Shuppankai, 1952).
6. To justify his claim, Maruyama quoted the *Tokugawa jikki*: “Ieyasu had conquered the nation on horseback, but being an enlightened and wise man, realized early that the land could not be governed from a horse. He had always respected and believed in the way of the sages. He wisely decided that in order to govern the land and follow the path proper to man, he must pursue the path of learning. Therefore, from the beginning he encouraged learning.” Maruyama, *Studies in the Intellectual History of Tokugawa Japan*, 15.
7. On the one hand, I respect Ooms’s diminution of the role Neo-Confucianism played in the ideological foundation of the Tokugawa shogunate. On the other, I recognize that a Neo-Confucian worldview pervaded the study of nature throughout the period. See Kurozumi, *Kinsei Nihon shakai to jukyō*; W. J. Boot, *Keizers en Shōgun: Een Geschiedenis van Japan tot 1868* (Amsterdam: Amsterdam University Press/Salomé, 2001).
8. Ooms, *Tokugawa Ideology*, 73.
9. Information about Hayashi Razan may be found not only in the *Tokugawa jikki* but also in two manuscripts written shortly after his death by two of his sons: *Razan Rin sensei gyōjō* (Eulogy of Master Hayashi Razan, 1658) and *Razan sensei nenpu* (Biography of Master Razan, 1659); Kyoto Shiseki Kai, ed., *Razan sensei bunshū*, 2 vols. (Kyoto: Heian Kōko Gakkai, 1918). Hayashi Morikatsu’s (Shuntoku) *Razan Rin sensei gyōjō*, in one volume, is an eulogy Shuntoku wrote the year after his father’s death. *Razan sensei nenpu* is a biographical account of Razan’s life divided into entries organized chronologically by year. It was compiled two years after Razan’s death by his third-born son Shunsai, better known as Hayashi Gahō.

- Modern references for Razan's life and work are Hori Isao, *Hayashi Razan* (Tokyo: Yoshikawa Kōbunkan, 1964); Suzuki Ken'ichi, *Hayashi Razan sensei nenpu kō* (Tokyo: Perikansha, 1999).
10. Mayanagi Makoto, "Honzō kōmoku no denrai to kinryōbon," *Nihon ishigaku zasshi* 37, no. 2 (1991): 41–43; Isono, *Nihon hakubutsushi nenpyō*; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 106–8.
  11. Mayanagi, "Honzō kōmoku no denrai to kinryōbon," 108.
  12. *Razan Rin sensei gyōjō* and *Razan sensei nenpu*, in *Razan sensei bunshū*; also Hori, *Hayashi Razan*; Suzuki, *Hayashi Razan sensei nenpukō*.
  13. Medieval yeoman warriors who retained power as local magnates not in service of the Shogunate. Their origins are associated with the decline of shogunal power late in the Kamakura period, when landholders (known as *myōshu*) started loosening their ties to the central government and seizing actual ruling power in the villages. Many of them organized militarized units for self-protection. In the warring state period, the most powerful of these *jizamurai* gradually took military control of an entire region. Their retainers were usually called *gōshi*, or "village warriors." The background of the Hayashi family, before they moved to Osaka and then to Kyoto, is that of minor yeomen whose holdings were nonetheless enough to grant them the possibility of a comfortable urban life in the capital. On *jizamurai*, see Pierre François Souyri, *The World Turned Upside Down: Medieval Japanese Society*, trans. Käthe Roth (New York: Columbia University Press, 2001).
  14. Quoted in Hori, *Hayashi Razan*, 9.
  15. Martin Collcutt, *Five Mountains: The Rinzaï Zen Monastic Institution in Medieval Japan* (Cambridge, MA: Harvard University Press, 1981).
  16. For Zhu Xi's metaphysics, Yamada, *Shushi no shizengaku*; Shimada, *Shushigaku to yōmeigaku*; Yasuda, *Chūgoku kinsei shisō kenkyū*. For the Japanese understanding of Zhu Xi's cosmology, see Wajima, *Nihon Sōgakushi no kenkyū*; Iwasaki, *Nihon kinsei shisōshi josetsu*, vol. 1, 116–76. For "heterodox" interpretations of Japanese *shushigaku*, see Koyasu Nobukuni, *Edo shisōshi kōgi* (Tokyo: Iwanami Shoten, 1998); Kurozumi, *Kinsei Nihon shakai to jukyō*. See also Bellah, *Tokugawa Religion*; de Bary, *The Unfolding of Neo-Confucianism*; Elman, Duncan, and Ooms, *Rethinking Confucianism*; Maruyama, *Studies in the Intellectual History of Tokugawa Japan*; Nosco, *Confucianism and Tokugawa Culture*; Ooms, *Tokugawa Ideology*.
  17. For example, the case of the so-called Harima and Tosa schools of Neo-Confucianism. See Wajima, *Nihon Sōgakushi no kenkyū*.
  18. The Tokugawa attempted to link their family to the Minamoto; see Nakamura Kōya, *Tokugawa ke: Ieyasu wo shūshin ni* (Tokyo: Shibundō, 1961). After their deaths, Toyotomi Hideyoshi and Tokugawa Ieyasu were transformed into Buddhist avatars; see Mary Elizabeth Berry, *Hideyoshi* (Cambridge, MA: Harvard University

- Press, 1982); Ooms, *Tokugawa Ideology*. For culture as a legitimating instrument, see William H. Coaldrake, “Edo Architecture and Tokugawa Law,” *Monumenta Nipponica* 36, no. 3 (Autumn 1981): 235–84; William H. Coaldrake, *Architecture and Authority in Japan* (London: Routledge, 1996); Peter F. Kornicki, *The Book in Japan*; Timon Screech, *The Shogun’s Painted Culture: Fear and Creativity in the Japanese States, 1760–1829* (London: Reaktion Books, 2000).
19. Hori, *Hayashi Razan*, 18.
  20. *Ibid.*, 20.
  21. *Ibid.*
  22. In the 1599 entry of *Razan sensei nenpu*, also quoted in Hori, *Hayashi Razan*, 27.
  23. *Ibid.*, 25–38.
  24. In Ming and Qing China, “the late imperial examination system,” Elman explains, “was not a premodern anachronism or an anti-modern monolith. Classical examinations were an effective cultural, social, political, and educational construction that met the needs of the Ming–Qing bureaucracy while simultaneously supporting the late imperial social structure whose elite gentry and merchant status groups were defined in part by examination degree credentials.” Elman, *A Cultural History of Civil Examinations in Late Imperial China*, xx. According to Elman, “local elites and the imperial court continually influenced the government to reexamine and adjust the classical curriculum and to entertain new ways to improve the institutional system for selecting those candidates who were eligible to become officials. . . . Civil examinations, as a test of educational merit, . . . were a cultural arena within which diverse political and social interests contested each other and were balanced.” Elman, *A Cultural History of Civil Examinations*, xxiii–xxiv.
  25. Ooms, *Tokugawa Ideology*, 73.
  26. *Ibid.*
  27. On Fujiwara Seika, see Ōta Seikyū, *Fujiwara Seika* (Tokyo: Yoshikawa Kōbunkan, 1985).
  28. See Nakai Riken, *Shin’i zukai* (Illustrated Explanation of *shin’i*, 1795), electronic copy at <http://wsv.library.osaka-u.ac.jp/tenji/kaitokudo/kaitok09.htm> (accessed June 2007). Nakai Riken was a scholar of the Kaitokudō academy of Confucian studies. See also Najita, *Vision of Virtue in Tokugawa Japan*, 186–220 for further details on Nakai Riken.
  29. In the 1603 entry of *Razan sensei nenpu*, quoted also in Hori, *Hayashi Razan*, 38. Zhu Xi’s commentary on the *Analects* is read in Japanese *Rongo shitchū*.
  30. Kondō Seisai, *Kōsho koji*, quoted in Hori, *Hayashi Razan*, 222–23.
  31. Sermons were called *seppō*, *sekkyō*, or *dangi*. See Sekiyama Kazuo, *Sekkyō no reki-shi: Bukkyō to wagaï* (Tokyo: Hakusuisha, 1992); Nakamura Yukihiko, “Taiheiki no kōshakushi-tachi,” in *Nihon no koten: Taiheiki* (Tokyo: Sekai Bunkasha, 1975);

- Hyōdō Hiromi, *Taiheiki “yomi” no kanōsei: Rekishi to iu monogatari* (Tokyo: Kōdansha, 1995); Wakao Masaki, “*Taiheiki yomi*” no *jidai: Kinsei seiji shisōshi no kōsō* (Tokyo: Heibonsha, 1999).
32. Hori, *Hayashi Razan*, 40.
  33. Ooms, *Tokugawa Ideology*, 75. If we compare the 200 *ryō* and the 5,340 *tsubo* of land (little less than four acres) to the 50,000 *ryō* that Tenkai received to build his temple, we can appreciate how trivial the grant was. Tenkai, a monk of the Tendai school of Buddhism, enjoyed Ieyasu’s patronage and was involved in the political organization of the bakufu. Also, he actively participated from his temple, the Enryakuji, and later from the Tokugawa mausoleum in Nikkō, in the divinization of Tokugawa Ieyasu after his death as Tōshōdaigongen.
  34. For further details on anti-Buddhist rhetoric in early modern Japan, see Tamamuro Fumio, *Edo bakufu no shūkyō tōsei* (Tokyo: Hyōronsha, 1971); Ōkuwa Hitoshi, *Nihon kinsei no shisō to bukkuyō* (Kyoto: Hōzōkan, 1989); Ōkuwa Hitoshi, *Nihon bukkuyō no kinsei* (Kyoto: Hōzōkan, 2003).
  35. In particular of Go-Yōzei and Go-Mizunō.
  36. *Keichō nikkenroku* (Diary of the Keichō Era, 1596–1615), also quoted in Hori, *Hayashi Razan*, 41.
  37. Wajima Yoshio, “Kinsei shoki jugakushi ni okeru ni-san no mondai,” *Ōtemae Joshi Daigaku ronshū* 7 (1973): 92–94.
  38. Since, according to Japanese measures of age, Razan was twenty-one in 1603, the events he is narrating took place in 1604 and 1605. Moreover, we know from *Razan sensei nenpu* that Razan adopted the custom of dressing in a *shin’i* from Fujiwara Seika, whom he met the eighth month of 1604.
  39. Quoted in Hori, *Hayashi Razan*, 41–42. The versions proposed in *Razan sensei nenpu*, *Razan Rin sensei gyōjō*, *Tokugawa jikki* and Razan’s direct recollection of the incident in *Nozuchi*, a commentary on the Japanese classic *Tsurezuregusa* he wrote in 1621, differ in some details. According to *Razan Rin sensei gyōjō* and *Tokugawa jikki*, the Razan-Hidekata’s dispute started in 1603. They omit mentioning Razan’s attempts to gain Hidekata’s patronage—which would have been contradictory with the subsequent struggle against the court monopoly over the interpretation of Confucian classics. Instead, they emphasize Ieyasu’s plea for freedom of intellectual pursuit, which would eventually be granted to Razan. Moreover, an overt support from Ieyasu—who, it is worth remembering, at the time had yet to meet the young scholar—would have been contradictory with Ieyasu’s appointment of Hidekata as bakufu consultant in matters of court procedure. For further details, see Hori, *Hayashi Razan*, 40–48.
  40. Quoted in *ibid.*, 43.
  41. *Ibid.*, 49. Mitigated by Ieyasu’s comment to Hidekata that “he should not be concerned by Razan’s lecturing any more than he would be by a housefly (*aobae*).”

Quoted in *ibid.*, 44, from a letter Seika wrote to Razan referring to the result of Ieyasu's deliberation, as heard by the master of shogunal ceremony (*sōshaban*) Jō Izumi-no-kami Masamochi, who became in early 1605 Razan's student at Seika's suggestion.

42. *Ibid.*; Wajima, "Kinsei shoki jugakushi ni okeru ni-san no mondai"; Iwasaki, *Nihon kinsei shisōshi josetsu*, vol. 1.
43. Ooms, *Tokugawa Ideology*, 74.
44. Hiromi, *Taiheiki "yomi" no kanōsei*.
45. Mikael S. Adolphson, *The Gates of Power: Monks, Courtiers, and Warriors in Premodern Japan* (Honolulu: University of Hawaii Press, 2000); Souyri, *The World Turned Upside Down*; Kuroda Toshio, *Kenmon taiseiron*, in *Kuroda Toshio chosakushū*, vol. 1 (Kyoto: Hōzōkan, 1994).
46. In the 1607 entry of *Razan sensei nenpu*, quoted also in Hori, *Hayashi Razan*, 128–29.
47. Later generations of Confucian scholars like Nakae Tōju harshly criticized Razan's obedience to Ieyasu's order, describing him as a Confucian scholar only in manner (in *Rinshi teihatsu juiben*). Jean-François Soum, *Nakae Tōju, 1608–1648, et Kumazawa Banzan, 1619–1691: Deux penseurs de l'époque d'Edo* (Paris: De Boccard, Diffusion, 2000). It should also be remembered that in the Hayashi school, the Kōbun'in, teachers and students alike shaved their heads and wore black Buddhist robes until 1690. For further details, see Wajima Yoshio, *Shōheikō to hangaku* (Tokyo: Shibundō, 1962).
48. Nakai, "The Naturalization of Confucianism in Tokugawa Japan," 157.
49. As Kondō Morishige, head librarian of Shogunal library of Momijiyama, wrote in a 1817 entry of his *Yūbun koji*. Quoted in Hori, *Hayashi Razan*, 133.
50. Mayanagi, "Honzō kōmoku no denrai to kinryōbon."
51. *Meibutsugaku* is a Confucian discipline originating in China in the Han period, inspired by Confucius's precept of "rectifying names" (thirteenth book of the *Analects*). See Sueki Takehiro, *Tōyō no gōri shisō* (Kyoto: Hōzōkan, 2001).
52. *Honzō kōmoku jochū* (The Annotated Introduction to *Honzō kōmoku*), printed posthumously in 1666, consisted of an annotated edition of Li Shizhen's original introduction and the 1603 introduction added to the Jiangzhi edition.
53. There are six versions of *Tashikihen* surviving, a manuscript and five printed editions (1630, 1631, 1649, plus other two with no date). The earliest printed edition of 1630 consists of two small folio volumes with a total of 141 leaves. The 1631 edition is the revised edition titled *Shinkan Tashikihen*, published by Kyoto booksellers Murakami Sōshin and Tanaka Chōzaemon, and consists of three block-printed *hanpon* volumes, a copy of which is now at Waseda University and which I consulted.
54. *Man'yōgana* is a writing system based on Chinese characters taken only for their phonetic values to represent Japanese sounds. Used since the seventh century, it takes its name from the poetic anthology *Man'yōshū*, compiled around 759.

55. The *furigana*—the Japanese reading of a Chinese compound written in phonetic characters—is attached to *man'yōgana* only in the first pages of the text and is soon abandoned after the implied reader has familiarized with Razan's usage.
56. *Diospyros kaki*.
57. *Diospyros eriantha*.
58. *Lanshi*, a kind of persimmon jam.
59. A convergence with early modern European encyclopedias up to Buffon's *Histoire naturelle, générale et particulière* (1749–88).
60. *Haemopsis marmorata*.
61. The term *tabako* derives from the Portuguese word *tabaco* after the introduction of the plant sometime between 1596 and 1614 in the Satsuma Province. Its introduction in East Asia is usually dated to 1571, when Spanish merchants brought it into the Philippines from Cuba.
62. To complicate matters further, scientists today identify *lang* with *Scopalia Japonica maxima*, which is not at all related to *H. niger* but to tobacco, being *Nicotiana tabacum*, like *lang*, also a species of the Solanaceae family.
63. The lexicographical approach informed all the entries of *Tashikiben*, including those on “human beings.” In this section, there is the earliest attempt to compare Japanese and Chinese monsters. The last entry of the section, for example, was the following:

飛頭蛮 呂久呂久毘”  
*Feitouman: rokurokubi*

This seems to be the earliest extant source that translated the Chinese *feitouman* (*hitōban* in Japanese pronunciation)—a ghostly creature consisting only of the head of a diseased person, believed to have haunted abandoned houses—with the Japanese *rokurokubi*, identifying a gruesome creature able to stretch its neck at will haunting uninhabited houses.

64. John Knoblock, ed., *Xunzi: A Translation and Study of the Complete Works*, vol. 3, books 17–32 (Stanford: Stanford University Press, 1994), 129.
65. Elman, *A Cultural History of Civil Examinations*; Elman, *From Philosophy to Philology: Intellectual and Social Aspects of Change in Late Imperial China*, 2nd rev. ed. (Los Angeles: UCLA Asian Pacific Monograph Series, 2001).
66. Nakai, “The Naturalization of Confucianism in Tokugawa Japan,” 159.
67. Fujimura Tsukurū, ed., *Nihon bungaku daijiten*, 8 vols. (Tokyo: Shinchōsha, 1932–35), vol. 2.
68. Yet the image of *Tashikiben* eventually changed from that of a dictionary to the earliest text of natural history written in Japan. In the 1930s, Shirai Mitsutarō, biology professor of Tokyo Imperial University, repeated this interpretation on the publication of the complete translation of *Honzō kōmoku* into Japanese. He criticized

the treatment of *Tashikiben* in Kameda Jirō's encyclopedia and stressed instead its status as natural history. See Shirai Mitsutarō, *Shirai Mitsutarō chosakushū*, ed. Kimura Yōjirō, 6 vols. (Tokyo: Kagaku Shoin, 1985–90), 6:369. Shirai's interpretation has never been repudiated, and contemporary historians of science continue to classify *Tashikiben* as natural history. For example, Sugimoto Tsutomu's comments in "Kaisetsu," Hayashi Razan, *Shinkan Tashikiben*, ed. B. H. Nihongo Kenkyū Gurupu (Tokyo: Bunka Shobō Hakubunsha, 1973), 1.

#### CHAPTER 4

1. Quoted in Daniel Rosenberg, "Early Modern Information Overload," *Journal of the History of Ideas* 64, no. 1 (January 2003): 1.
2. It is therefore not surprising that totalitarian regimes always exercised a tight control over the production, editing, and dissemination of encyclopedias.
3. *Wikipedia*, in this sense, is an ever-lasting work-in-progress that challenges this notion of the modern encyclopedia. See Erik Olin Wright, *Envisioning Real Utopias* (London: Verso, 2010), ch. 7.
4. Jorge Luis Borges, "On Exactitude in Science," in *Collected Fictions*, trans. Andrew Hurley (New York: Penguin, 1999), 325.
5. I here use the term *encyclopedia* quite improperly—certainly not in the sense given to the term by Enlightenment thinkers—to group together different genres of books that introduced various topics in a systematic manner. On the printing industry of Chinese encyclopedias, see Chia, *Printing for Profit*; Joseph P. McDermott, *A Social History of the Chinese Book: Books and Literati Culture in Late Imperial China* (Hong Kong: Hong Kong University Press, 2006). See also Craig Clunas, *Superfluous Things: Material Culture and Social Status in Early Modern China*, 2nd ed. (Honolulu: University of Hawaii Press, 2004).
6. See Carol Gluck, "The Fine Folly of the Encyclopedists," in *Currents in Japanese Culture: Translations and Transformations*, ed. Amy Vladeck Heinrich (New York: Columbia University Press, 1996), 223–51; Yamada, *Honzō to yume to renkinjutsu to*.
7. On the meaning of "architext," see Gérard Genette, *The Architext: An Introduction*, trans. Jane E. Lewin (Berkeley: University of California Press, 1992).
8. Chinese texts were not translated into Japanese but were edited with a system of markings and phonetic annotations that allowed Japanese to read the text in classical Japanese (*kundoku*).
9. The attribution, not unanimously shared by Japanese scholars, derives from the analysis of an explanatory note attached at the end of every volume, in which appeared detailed speculations on the correspondences between Chinese and Japanese terms similar to the ones Ekiken wrote in his *Yamato honzō*. See Yabe, *Edo no honzō*, 50 for further details.
10. It is difficult to track down the history of Japanese editions of Chinese books,

- since, as Kornicki reminds us, bibliographical works like the *Kokusbo sōmokuroku* (Complete Index of Japanese Books) and its sequel *Kotenseki sōgō mokuroku* (Comprehensive Index of the Classics) usually record only “Japanese books” (*kokusho*), excluding all Chinese books reprinted in Japan. See Kornicki, *The Book in Japan*, 1–2. For Japanese editions of *Honzō kōmoku*, Mayanagi, “*Honzō kōmoku no denrai to kinryōbon*”; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1; Yabe, *Edo no honzō*; Isono, *Nihon hakubutsushi nenpyō*; Isono Naohide, ed., *Egakareta dōbutsu shokubutsu: Edo jidai no hakubutsushi* (Tokyo: Kinokuniya Shoten, 2005).
11. Despite the fact that they did not organize themselves into guilds (*za*), their social organization resembled that of specialized artisans and merchants.
  12. Mary Elizabeth Berry, *Japan in Print: Information and Nation in the Early Modern Period* (Berkeley: University of California Press, 2006).
  13. Mayanagi Makoto counts more than four hundred titles of manuscripts and printed books on medicine and *honzōgaku* published by Japanese scholars in the seventeenth century. See Mayanagi Makoto, “*Nihon no iyaku, hakubutsu chojutsu nenpyō*” (2006), accessed June 2007, <http://www.hum.ibaraki.ac.jp/mayanagi/paper01/ChronoTabJpMed.html>.
  14. Brian W. Ogilvie, “The Many Books of Nature: Renaissance Naturalists and Information Overload,” *Journal of the History of Ideas* 64, no. 1 (January 2003): 39.
  15. Ōba Osamu, *Edo jidai ni okeru Karafune mochiwatarisho no kenkyū* (Suita: Kansai Daigaku Tōzai Gakujutsu Kenkyūjo, 1967).
  16. Leibniz is quoted in Richard Yeo, “A Solution to the Multitude of Books: Ephraim Chambers’s *Cyclopaedia* (1728) as ‘the Best Book in the Universe,’” *Journal of the History of Ideas* 64, no. 1 (January 2003): 61–72. Gessner, *Bibliotheca universalis* (Zurich, Switzerland: Christoph Froschauer, 1545), sig. \*3<sup>v</sup> is quoted in Ann Blair, “Reading Strategies for Coping with Information Overload ca. 1550–1700,” *Journal of the History of Ideas* 64, no. 1 (January 2003): 11–28. See also Blair, *Too Much to Know: Managing Scholarly Information Before the Modern Age* (New Haven: Yale University Press, 2010).
  17. See Jansen, *China in the Tokugawa World*; for a “post-modern” interpretation, David Pollack, *The Fracture of Meaning: Japan’s Synthesis of China from the Eighth through the Eighteenth Centuries* (Princeton, NJ: Princeton University Press, 1986). For a more thorough study of the reception of Chinese culture in Tokugawa Japan, see Ōba Osamu, *Edo jidai ni okeru Chūgoku bunka juyō no kenkyū* (Kyoto: Dōhōsha Shuppan, 1984). For a comparison with Europe, see Anthony Grafton, *Bring Out Your Dead: The Past as Revelation* (Cambridge, MA: Harvard University Press, 2001).
  18. Scholars such as Nicolò Leoniceno, for example, based their knowledge of the natural world almost entirely upon ancient Greek and Roman texts. A professor of medicine and moral philosophy at the University of Ferrara, Leoniceno possessed

one of the largest collection of books on natural history and materia medica of his time. The majority of the texts he owned were Greek and Latin classics, from Aristotle's *Περὶ Τῶ Ζῴων Ἱστορίαι* ("Inquiries of Animals" in Greek, or *Historia animalium* in Latin translation) to Theophrastus's *Περὶ φυτῶν ἱστορία* (*De historia plantarum*) and Pliny's *Historia naturalis*. He owned a total of 482 texts, as Daniela Mugnai Carrara gathered from a posthumous inventory; see Daniela Mugnai Carrara, *La biblioteca di Nicolò Leonicensino. Tra Aristotele e Galeno: Cultura e libri di un medico umanista* (Firenze: Olschki, 1991), 44. See also Atran, *Cognitive Foundations of Natural History*, 83–122; Ogilvie, *The Science of Describing*, 31.

19. Ogilvie, *The Science of Describing*, 28.
20. On *pulu*, see Martina Siebert, *Pulu: "Abhandlungen und Auflistungen" zu materieller Kultur und Naturkunde im traditionellen China*, *Opera Sinologica* 17 (Wiesbaden: Harrassowitz Verlag, 2006).
21. The two characters of the title are of difficult interpretation. It has been translated variously as "The Literary Expositor," "The Ready Rectifier," "Progress toward Correctness," or "Approaching Elegance/Refinement."
22. On *Erya*, see W. South Coblin, "Erb ya," in *Early Chinese Texts: A Bibliographic Guide*, ed. Michael Loewe (Berkeley: Society for the Study of Early China, 1993); Elman, *On Their Own Terms*, 38–41.
23. The study of *Erya* was in earlier centuries conducted in the Daigakuryō. The text, since its introduction into Japan, inspired the compilation of similar anthologies of essays and commentaries. The most famous was probably Minamoto no Shitagō's *Wamyō ruijushō* (Thematic Dictionary of Japanese Terms), compiled between 931 and 938 in *man'yōgana*. Five manuscript versions of *Wamyō ruijushō* circulated during the Edo period, until it was printed in 1801 and 1821.
24. Bernhard Karlgren, "The Early History of the *Chou Li* and *Tso Chuan* Texts," *Bulletin of the Museum of Far Eastern Antiquities* 3 (1931): 1–59.
25. Dividing them into the categories of herbs, trees, insects, fish, birds, and animals. See Roel Sterckx, *The Animal and the Daemon in Early China* (Albany: State University of New York Press, 2002), 30–32.
26. Yoshifuru's *Wajiga* is notable as the first East Asian source to mention peanuts, imported at the end of the Genroku era (1688–1704) from western Africa by Dutch merchants and henceforth identified by the Japanese term *rakkasei* (*Arachis hypogea*). *Wajiga* was also the first Japanese text to quote and briefly describe the cactus, a similarly exotic plant imported into Japan with the name *saboten* (a subspecies of *Opuntia maxima*). The same is true for sedum, called *benkeisō*, and sorghum, named *morokoshikibi* (*Hylotelephium erythrostictum*). A copy of the first edition of *Wajiga* by Kyoto bookseller Tamashiken is conserved at Waseda University. See Kaibara Yoshifuru (Chiken), *Wajiga* (Manuscript, 1694), [http://www.wul.waseda.ac.jp/kotenseki/html/h002/h002\\_04324/index.html](http://www.wul.waseda.ac.jp/kotenseki/html/h002/h002_04324/index.html) (accessed June 2007).

27. Arai Hakuseki, *Tōga: Eiin, honkoku*, ed. Sugimoto Tsutomu (Tokyo: Waseda Daigaku Shuppanbu, 1994); Arai Hakuseki, *Tōga: Kaitai, sakuin*, ed. Sugimoto Tsutomu (Tokyo: Waseda Daigaku Shuppanbu, 1994). *Tōga* was influential among mid-Tokugawa *kokugaku* scholars Kamo no Mabuchi and Motoori Norinaga.
28. See Harold Bolitho, “Travelers’ Tales: Three Eighteenth-Century Travel Journals,” *Harvard Journal of Asiatic Studies* 50, no. 2 (December 1990): 485–504; Constantine N. Vaporis, *Breaking Barriers: Travel and the State in Early Modern Japan* (Cambridge, MA: Harvard University Press, 1994); Marcia Yonemoto, *Mapping Early Modern Japan: Space, Place, and Culture in the Tokugawa Period, 1603–1867* (Berkeley: University of California Press, 2003); Berry, *Japan in Print*.
29. On *Shanhaijing* see Richard E. Strassberg, *A Chinese Bestiary: Strange Creatures from the Guideways through Mountains and Seas* (Berkeley: University of California Press, 2002).
30. Kagawa Masanobu, *Edo no yōkai kakumei* (Tokyo: Kawade Shobō Shinsha, 2005).
31. Yamada Keiji, *Honzō to yume to renkinjutsu to*, 27–101. See also Gluck, “The Fine Folly of the Encyclopedists.”
32. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 216.
33. The term was not in large use in Japan until the modern period.
34. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 218.
35. See part IV.
36. Indeed, the 1895 entries of the *Honzō kōmoku*—excluding synonyms and vernacular names—far outnumbered the species named and described by sixteenth-century European naturalists of that day. Nicolò Leonicensi and Valerius Cordus, perhaps the most knowledgeable naturalists of their generation, classified no more than five hundred species in their texts, while Carolus Clusius (Charles de l’Écluse) described seven hundred. Ogilvie, *The Science of Describing*, 52.
37. “Introduction” in Nakamura Tekisai, *Kinmō zui*, ed. Sugimoto Tsutomu (Tokyo: Waseda Daigaku Shuppanbu, 1975), 1.
38. Of the four books treating animals, book twelve listed 64 images of animals, book thirteen had 76 images of birds, book fourteen had 64 illustrations of fish and amphibians, and book fifteen had 108 pictures of insects. Five books were dedicated to plants: book sixteen had 36 illustrations of various grains, book seventeen had 56 pictures of vegetables, book eighteen listed 52 illustrated entries of fruits and fruit trees, book nineteen focused on 84 species of trees and bamboos, and book twenty had 128 pictures of flowers and herbs.
39. Yabe, *Edo no honzō*, 57–60; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 112–15. Interestingly, a recent new edition of *Kinmō zui* is subtitled “The First Illustrated Encyclopedia of Japan.” Kobayashi Yōjirō, ed., *Edo no irasuto jiten: Kinmōzui, waga kuni hatsu no irasuto hyakka* (Tokyo: Bensho Shuppan, 2012).

40. In order, *Impatiens balsamica*, *Narcissus tazetta*, *Abelmoschus manihot* (improperly referred to also as *Hibiscus japonicus*), and *Leucanthemum coronarium*.
41. *Artemisia vulgaris*.
42. The “three realms” (*sancai, sansai* in Japanese) are heaven, earth, and human beings (culture).
43. Sixteenth- and seventeenth-century European naturalists similarly relied upon information provided by workers and commoners not involved in scholarly activity. See Pamela H. Smith and Paula Findlen, eds., *Merchants & Marvels: Commerce, Science, and Art in Early Modern Europe* (New York: Routledge, 2002); Ogilvie, *The Science of Describing*. In the eighteenth and nineteenth centuries, scholars like Cuvier, Linnaeus, and Darwin also relied upon information gathered from workers.
44. The fact that he did not name names reveals the status of illustrators in the seventeenth century. The situation changed in the following century. In a later edition of *Kimmō zui* (Kyoto, 1789), the illustrations were edited by Shimokawabe Jūsui, active in the eighteenth century.
45. *Kabutogani* (*Tachypleus tridentatus*). See also Kajishima Takao, *Shiryō Nihon dōbutsushi* (Tokyo: Yasaka Shobō, 2002), 194–95.
46. The freshwater turtle is the *Amyda japonica*, which Tekisai named *iogame* or *dōgame* but today is usually called *suppon*.
47. The last “working” edition was Terajima Ryōan, *Wakan sansai zue*, 2 vols. (Tokyo: Nihon Zuihitsu Taisei Kankōkai, 1929).
48. See Ronald Dore, *Education in Tokugawa Japan* (Ann Arbor: University of Michigan Press, 1985); Richard Rubinger, *Private Academies of Tokugawa Japan* (Princeton, NJ: Princeton University Press, 1982); and especially Richard Rubinger, *Popular Literacy in Early Modern Japan* (Honolulu: University of Hawaii Press, 2007). See also Umihara Tōru, *Kinsei no gakkō to kyōiku* (Tokyo: Shibunkaku Shuppan, 1988); Tsujimoto Masashi, *Kinsei kyōiku shisōshi no kenkyū: Nihon ni okeru “kōkyōiku” shisō no genryū* (Kyoto: Shibunkaku Shuppan, 1990).
49. Yabe, *Edo no honzō*, 59.
50. *Ibid.*
51. *Ibid.*, 60.
52. Rubinger, *Popular Literacy in Early Modern Japan*; Ishikawa Matsutarō, *Hankō to terakoya* (Tokyo: Kyōikusha, 1978).
53. The original English title was *The History of Japan, Giving an Account of the Ancient and Present State and Government of That Empire; of Its Temples, Palaces, Castles and Other Buildings; of Its Metals, Minerals, Trees, Plants, Animals, Birds and Fishes; of the Chronology and Succession of the Emperors, Ecclesiastical and Secular; of the Original Descent, Religions, Customs, and Manufactures of the Natives, and of*

*Their Trade and Commerce with the Dutch and Chinese. Together with a Description of the Kingdom of Siam.*

54. Nakamura's success in life and obscurity in modern historiography reminds us of the similar case of Nicolas-Claude Fabri de Peiresc (1580–1637), one of the most well-known intellectuals in his lifetime but soon forgotten after his death. See Peter Miller, *Peiresc's Europe: Learning and Virtue in the Seventeenth Century* (New Haven: Yale University Press, 2000).
55. See Ihara Saikaku, *Saikaku gohyakuin* (Tokyo: Benseisha, 1976).
56. See <http://www2.ntj.jac.go.jp/dglib/ebook01/mainmenu.html> (accessed June 2007).
57. The *rokuroku* at the beginning of the title suggests that the anthology was compiled in the *rokkasen* tradition, which refers to the six great poets of the *Kokinshū*, a poetic anthology compiled in the early tenth century. *Rokuroku* may be also a pun for an adjective often used with the meaning of “ordinary,” “common,” “tiny,” usually associated with small objects.
58. Emma C. Spary, “Rococo Readings of the Book of Nature,” in: *Books and the Sciences in History*, ed. Marina Frasca-Spada and Nick Jardine (Cambridge: Cambridge University Press, 2000), 255–75. See also Gould, *The Hedgehog, the Fox, and the Magister's Pox*, 157–63.
59. Spary, “Rococo Readings of the Book of Nature,” 260. For the connection of social status and truth telling in early modern England, see Shapin, *A Social History of Truth*. The epistemological separation of aesthetic concerns and scientific enterprise is a modern development, according to Spary. I will argue about the interconnection of artistic ideals and the knowledge of the natural world in part IV, where I focus on private collectors and amateur naturalists. From a different perspective, Eiko Ikegami has focused on the bonds of civility that characterized early modern Japan—that is, the formation of aesthetic networks and communities that, in the course of the Tokugawa era, formed of themselves an identity that would have, at the dawn of the modern world, political implications. See Eiko Ikegami, *Bonds of Civility: Aesthetic Networks and the Political Origins of Japanese Culture* (Cambridge: Cambridge University Press, 2005).
60. Kornicki, *The Book in Japan*; Mayanagi, “Nihon no iyaku, hakubutsu chojutsu nenpyō” for *honzōgaku*.

## CHAPTER 5

1. Information on Ekiken's life is taken from *Kaibara Ekiken sensei nenpu* and *Kaibara Ekiken sensei den*, both in Kaibara Ekiken, *Ekiken zenshū*, vol. 1, ed. Ekikenkai (Tokyo: Ekiken Zenshū Kankōbu, 1910–11). See Inoue Tadashi, *Kaibara Ekiken* (Tokyo: Yoshikawa Kōbunkan, 1989); Okada Takehiko, *Kaibara Ekiken* (Tokyo: Meitoku Shuppan, 2012) for secondary sources. In English, see Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, ch. 2.

2. *Kaibara Ekiken sensei den*, in *Ekiken zenshū*, vol. 1, 10.
3. Okada, *Kaibara Ekiken*, 19.
4. *Ekiken zenshū*, vol. 1, 3.
5. On Mototada, see Inoue, *Kaibara Ekiken*, 13–15. Mototada, once back from his training as a physician in 1643, served as attending physician for Kuroda Mitsuyuki and later opened a private school in the countryside, where he lectured on Neo-Confucianism.
6. Inoue, *Kaibara Ekiken*, 19. It was in those years that Ekiken wrote his first short treatises, *Shikaidōhō*, literally “World Brotherhood,” inspired by the chapter 12 motto of the *Analects* saying that “people of the world are all brothers” (*shihai zhi nei jie xiongdī ye*). Inoue argued that the universalistic ideals of a brotherhood linking all human beings in the world maintained in the text were at odds with the seclusion politics of the government (p. 20). Conversely, to me the text compels reconsideration of the notion of seclusion (*sakoku seido*) in the Tokugawa period. See Ronald P. Toby, *State and Diplomacy in Early Modern Japan: Asian in the Development of the Tokugawa Bakufu* (Stanford: Stanford University Press, 1991); Iwashita Tetsunori, *Edo no kaigai jōhō nettowāku* (Tokyo: Yoshikawa Kōbunkan, 2006); Adam Clulow, *The Company and the Shogun: The Dutch Encounter with Tokugawa Japan* (New York: Columbia University Press, 2014).
7. *Ekiken zenshū*, vol. 1, 10. See also Inoue, *Kaibara Ekiken*, 22; Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 52.
8. In 1659 Mitsuyuki, then visiting Kyoto, presented Ekiken with clothes and books. See Inoue, *Kaibara Ekiken*, 46.
9. The Laws for Military Households was a code of rules and laws of proper moral conducts for samurai that Tokugawa Ieyasu issued in 1615. It would be later expanded in 1629, 1635, 1663, 1683, and 1710.
10. This educational politics did not originate with the Tokugawa shogunate but can be traced back to the Muromachi shogunate. The correlation of *bun* and *bu* was a central issue in the redefinition of social role of samurai under the new Tokugawa order.
11. Especially after the more “militaristic” rule of Kuroda Tadayuki was replaced by the civil administration-oriented rule of Kuroda Mitsuyuki, and as a portion of domainal monetary budget was reinvested into the sponsorship of cultural education and practices. Inoue, *Kaibara Ekiken*, 29–38; Okada, *Kaibara Ekiken*, 24–25.
12. Inoue, *Kaibara Ekiken*, 29; Okada, *Kaibara Ekiken*, 25; Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 54.
13. Whose lectures Ekiken followed for a period, although without particularly appreciating his severe and dogmatic attitude. Okada, *Kaibara Ekiken*, 25.
14. Ekiken later criticized Jinsai’s interpretation of Confucianism in *Dōjimon higo*, in particular his rejection of Zhu Xi’s philosophy. See Inoue Tadashi, “Kaibara Ekiken no *Dōjimon higo* ni tsuite,” *Kyūshū Daigaku kenkyū hōkoku* (1977): 121–77.

15. For more information, see Thomas C. Smith, *The Agrarian Origins of Modern Japan* (Stanford: Stanford University Press, 1959); Inuma Jirō, *Kinsei nōsho ni manabu* (Tokyo: Nihon Hōsō Shuppan Kyōkai, 1976). On the friendship and collaboration between Ekiken and Yasusada, see Inoue, *Kaibara Ekiken*, 39–44.
16. It continued to be published until the last edition of 1894.
17. Kaibara Ekiken, *Kafu, Saifu* (Tokyo: Yasaka Shobō, 1973), 91.
18. Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 58. Ekiken's portrait as a workaholic was first introduced by Inoue Tetsujirō in *Nihon shushigaku no tetsugaku* (Tokyo: Fuzanbō, 1926), 271–73, where he anecdotally told that Ekiken often complained about having forgotten to sleep. More recently, Haga Tōru has proposed a similar image, presenting Ekiken as a scholar very difficult to get in touch with; see Haga Tōru, “Kaibara Ekiken,” in *Saishiki Edo hakubutsugaku shūsei*, ed. Shimonaka Hiroshi (Tokyo: Heibonsha, 1994), 25–40.
19. See Plutschow, *Edo no tabinikki*, 21–31; Okada, *Kaibara Ekiken*, 28–38.
20. Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 58; Dore, *Education in Tokugawa Japan*, 69.
21. Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 227.
22. *Ibid.*
23. Okada, *Kaibara Ekiken*, 129.
24. *Yamato honzō*, book 1, in Kaibara, *Yamato honzō* (Kyoto: Nagata Chōbei, 1709), vol. 1, 5.
25. Kaibara, *Yamato honzō*, vol. 1, “Yamato honzō hanrei,” 1. The meaning that Ekiken attached to the word *kuni*—today referring to “state” but at the time used primarily for “province”—remains to be investigated.
26. “Yamato honzō hanrei,” 2.
27. *Ibid.*, 3.
28. *Ibid.*, 4.
29. Kaibara, *Yamato honzō*, vol. 1.
30. *Prunus donarium* Sieboldi, according to Shirai Mitsutarō, in Kaibara, *Yamato honzō*, vol. 2, 3.
31. *Betula grossa*.
32. *Prunus cerasoides* var. *campanulata*.
33. *Prunus lannesiana*.
34. Fourteenth-century poet monk also known as Shōtetsu.
35. In a note, Shirai Mitsutarō confessed that he did not understand what Ekiken is referring with *usuzakura*, but he is sure it is not what in modern Japanese is called *ususakura*, which corresponds to *Prunus sachalinensis* var. *udzuzakura*.
36. *Prunus donarium* var. *spontanea*.
37. Shikishima is *makura-kotoba* (pillow word) of Yamato; Yamato is the ancient name of Japan; *asahi* is “the rising sun,” actually a paraphrase of the Japanese name “Japan,”

- Nihon*, “at the origin of the sun,” symbolizing the sun goddess Amaterasu ōmikami. The story of these four words is interesting in itself: Shikishima, Yamato, Asahi, and Yamazakura were four brands of cigarettes in the market since June 29, 1904. The four names reappeared some years later, during the Pacific War, in connection with the Shinpū Tokubetsu Kōgekitai, literally Special Attack Force, or Kamikaze (Divine Wind). See Tanaka Kōji, *Motoori Norinaga no Daitōa sensō* (Tokyo: Perikansha, 2009).
38. Kaibara, *Yamato honzō*, vol. 2, 270–71.
  39. Historians often regard the curiosity for uncanny and wondrous phenomena and their naturalization as an important step in the development of a new interest on physical phenomena that eventually opened the way for a scientific revolution in the seventeenth century. See Lorraine Daston and Katharine Park, *Wonders and the Order of Nature, 1150–1750* (New York: Zone Books, 1998). The Swiss naturalist Conrad Gessner included in his *Historiae animalium* chapters on the *monoceros* (unicorn) and the *satyrus* (satyr). The French royal surgeon Ambroise Paré wrote an entire monograph on *Des Monstres et prodiges*, which evidenced, as Pallister has shown, an “interest in experiment, embryonic though it may be,” and a “tendency to collect specimens and to pose question,” Ambroise Paré, *On Monsters and Marvels*, trans. and ed. Janis L. Pallister (Chicago: University of Chicago Press, 1983), xxii. See also Stephen T. Asma, *On Monsters: An Unnatural History of Our Worst Fears* (Oxford: Oxford University Press, 2009), 123–79.
  40. Quoted in Ueno, *Nihon hakubutsugaku shi*, 66.
  41. *Ibid.*
  42. Kaibara, *Yamato honzō*, vol. 1, “Hanrei,” 4. Translated by Samuel Yamashita in William Theodore de Bary and Irene Bloom, eds., *Principle and Practicality: Essays in Neo-Confucianism and Practical Learning* (New York: Columbia University Press, 1979), 270.
  43. *Ibid.* Translation is mine.
  44. *Shinshiroku* (manuscript completed in 1714; it consists in a collection of various “thoughts humbly recorded”). De Bary and Bloom, *Principle and Practicality*, 271.
  45. *Yamato honzō*, “Hanrei,” 4.
  46. *Shinshiroku*, quoted in Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 124.
  47. *Taigiroku* (undated manuscript). Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 114.
  48. The 1708 introduction, Kaibara, *Yamato honzō*, vol. 1, “Jijo,” 1.
  49. *Ibid.*
  50. Kaibara, *Yamato honzō*, “Hanrei,” 4.
  51. *Ibid.*
  52. See Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 107; Tetsuo Najita, “Intellectual Change in Early Eighteenth-Century Tokugawa Con-

- fucianism,” *Journal of Asian Studies* 34, no. 4 (August 1975): 931–44; Olof G. Lidin, *From Taoism to Einstein: Ki and Ri in Chinese and Japanese Thought, a Survey* (Folkestone: Global Oriental, 2006), 108–13.
53. Ekiken, it is worth noting, was also strongly influenced by Song Yingxing’s *Tian-gong Kaiwu* (1637). See chapter 13.
  54. See, for example, Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1992); Bruce T. Moran, ed., *Patronage and Institutions: Science, Technology, and Medicine at the European Court, 1500–1750* (Woodbridge, Suffolk: Boydell, 1991); Lisa Jardine, *Ingenious Pursuits: Building the Scientific Revolution* (New York: Anchor Books, 1999).
  55. Pierre Bourdieu, *Pascalian Meditation* (Stanford: Stanford University Press, 2000), 123.
  56. Slightly modified from Tucker, *Moral and Spiritual Cultivation in Japanese Neo-Confucianism*, 252–53.
  57. Ueno Masuzō, in *Hakubutsugakusha retsuden* (Tokyo: Yasaka Shobō, 1991), 5, explicitly states that Abe’s work was the inspiration of Tokugawa Yoshimune’s national surveys of the 1730s (see chapter 8). Yasuda Ken, however, credits Abe Shōō with the first censuses of plants and animals, but since they were geographically delimited to the northern part of Honshū (the provinces of Mutsu and Dewa) and independently organized, he also specifies that they were neither of the scale of later ones nor officially endorsed by the shogunate. See Yasuda Ken, *Edo shokoku sanbutsuchō* (Tokyo: Shōbunsha, 1986), 22.
  58. See Ueno, *Hakubutsugakusha retsuden*, 5–7, for a biographical summary.
  59. Scholars have, however, questioned the authenticity of this document. *Ibid.*, 81.
  60. Quoted in *ibid.*, 81.
  61. He later changed his name into the more Chinese-sounding Tō Jakusui. Yodo is a province at the outskirts of Kyoto, today part of Fushimi district of Kyoto.
  62. Ueno, *Hakubutsugakusha retsuden*, 8.
  63. *Ibid.*
  64. The letter was included in the introductory part of his *Shobutsu ruisan* and dated the tenth month of 1694. Quoted in Ueno, *Hakubutsugakusha retsuden*, 9.
  65. *Ibid.* *Shobutsu ruisan* is reproduced in Inō Jakusui, Niwa Shōhaku, *Shobutsu ruisan*, 11 vols. (Tokyo: Kagaku Shoin, 1987).
  66. Shōhaku, *Shobutsu ruisan*, introduction. Quoted in Ueno, *Hakubutsugakusha retsuden*, 10.
  67. *Ibid.*
  68. An earlier and unauthorized edition of *Gomō jigī* was published in Edo in 1695. See Itō Jinsai, *Gomō jigī*, in *Nihon shisō taikēi*, vol. 33, ed. Yoshikawa Kōjirō and Shimizu Shigeru (Tokyo: Iwanami Shoten, 1971). On Itō Jinsai, see Yamashita, *Compasses and Carpenter’s Squares*; Samuel Hideo Yamashita, “The Early Life and Thought of

- Itō Jinsai,” *Harvard Journal of Asiatic Studies* 43, no. 2 (December 1983): 453–80; Yoshikawa Kōjirō, *Jinsai Sorai Norinaga* (Tokyo: Iwanami Shoten, 1975); Koyasu Nobukuni, *Itō Jinsai: Jinrinteki sekai no shisō* (Tokyo: Tōkyō Daigaku Shuppankai, 1982); Naoki Sakai, *Voices of the Past: The Status of Language in Eighteenth-Century Japanese Discourse* (Ithaca, NY: Cornell University Press, 1992). For an English translation of *Gomō jigi*, see Tucker, *Itō Jinsai’s Gomō jigi* and McMullen’s review article of Tucker’s translation in James McMullen, “Itō Jinsai and the Meanings of Words,” *Monumenta Nipponica* 54, no. 4 (Winter 1999): 509–20.
69. On my use of palimpsest, see Gérard Genette, *Palimpsests: Literature in the Second Degree*, trans. Channa Newman and Claude Doubinsky (Lincoln: University of Nebraska Press, 1997).
  70. Another similarity with Itō Jinsai’s rejection of Zhu Xi’s conception of “humanity” (*jin*). See Yamashita, “The Early Life and Thought of Itō Jinsai,” 468–73.
  71. In Japanese, *ki ichigen ron*. The bibliography of sources that focused on Japanese monism is extremely rich. A short list would include Yamashita, “The Early Life and Thought of Itō Jinsai”; Yoshikawa, *Jinsai Sorai Norinaga*; Tucker, *Itō Jinsai’s Gomō jigi*; Koyasu, *Itō Jinsai*; Koyasu, *Edo shisōshi kōgi*; Iwasaki, *Nihon kinsei shisōshi josetsu*, vol. 1.
  72. Although, this interpretation tends to ignore the works of Ming scholars like Wang Tingxiang and Song Yingxing. See Ge Rongjin, *Wang Tingxiang he Ming dai qi xue* (Beijing: Zhonghua shu ju: Xin hua shu dian Beijing fa xing suo fa xing, 1990).
  73. Yamashita, “The Early Life and Thought of Itō Jinsai,” 471.
  74. Quoted and translated in *ibid.*, 471.
  75. Yamashita, *Compasses and Carpenter’s Squares*.
  76. Quoted in Ueno, *Hakubutsugakusha retsuden*, 9–10.
  77. Sugimoto and Swain, *Science & Culture in Traditional Japan*, 279–90.
  78. See Kosoto Hiroshi, *Kanpō no rekishi: Chūgoku, Nihon no dentō igaku* (Tokyo: Taishūkan Shoten, 1999); Hattori, *Edo jidai igakushi no kenkyū*.
  79. Sugimoto and Swain, *Science & Culture in Traditional Japan*, 280–81.
  80. *Ibid.*, 282; Ishida Ichirō, *Kami to Nihon bunka* (Tokyo: Perikansha, 1983), 129.
  81. This school is sometimes known as *kogaku*, or ancient studies. See Yamashita, *Compasses and Carpenter’s Squares*; Yoshikawa, *Jinsai Sorai Norinaga*.
  82. See Peter Nosco, *Remembering Paradise: Nativism and Nostalgia in Eighteenth-Century Japan* (Cambridge, MA: Harvard University Press, 1990); Harry Harootunian, *Things Seen and Unseen: Discourse and Ideology in Tokugawa Nativism* (Chicago: University of Chicago Press, 1988).
  83. Yabe Ichirō, “Dentōteki honzōka to yōgakukei honzōka,” in *Nihon kagakushi no shatei*, ed. Itō Shuntarō and Murakami Yōichirō (Tokyo: Baifūkan, 1989), 296–315.
  84. Quoted in Yabe, “Dentōteki honzōka to yōgakukei honzōka,” 304.

85. Quoted in Yabe, “Dentōteki honzōka to yōgakukei honzōka,” 304.  
 86. Ueno, *Hakubutsugakusha retsuden*, 10.

### PART III

1. Sugi Hitoshi, in *Kinsei no chiiki to zaison bunka: Gijutsu to shōbin to fūga no kōryū* (Tokyo: Yoshikawa Kōbunkan, 2001), concentrated on a local network of learned people in rural areas of the Kantō region and their interactions with both major national networks of scholars and local communities. Sugi argued that these local networks were structurally homologous to the larger ones in the major cities of Kyoto, Edo, and Osaka.
2. This was a common feature of the majority of private academies in Tokugawa Japan, in line with the *iemoto* tradition. I will describe group and circle organizations of *honzōgaku* scholars and amateurs in part IV.
3. Mayanagi, “Nihon no iyaku, hakubutsu chojutsu nenpyō”; Ōba, *Edo jidai ni okeru Karafune mochiwatarisho no kenkyū*.
4. For example, in Kimura, *Nihon shizenshi no seiritsu*; Yabe, *Edo no honzō*; Sugimoto, *Edo no hakubutsugakushatachi*; Ueno, *Nihon hakubutsugaku shi*.
5. Yonemoto, *Mapping Early Modern Japan*, 105–7. See also Walker, *The Lost Wolves of Japan*, 35–36; Cheng-hua Wang, “Art and Daily Life: Knowledge and Social Space in Late-Ming *Riyong Leishu*,” <http://www.ihp.sinica.edu.tw/~ihpcamp/pdf/92year/wang-cheng-hua-2.pdf>.

### CHAPTER 6

1. Biographical information on Yoshimune is taken from Tsuji Tatsuya, *Tokugawa Yoshimune* (Tokyo: Yoshikawa Kōbunkan, 1985).
2. Conrad Totman, *Early Modern Japan* (Berkeley: University of California Press, 1993), 281.
3. See Yoshida Nobuyuki, *Seijuku suru Edo* (Tokyo: Kōdansha, 2002), 18; Tsuji, *Tokugawa Yoshimune* for further details.
4. See Fukai Masaumi, *Edojō oniwaban* (Tokyo: Chūkō Shinsho, 1992).
5. For an example of how these oligopolies worked, see Ravina, *Land and Lordship in Early Modern Japan*.
6. See Umihara, *Kinsei no gakkō to kyōiku*.
7. The Kaihodō was a school that followed and reproduced Zhu Xi’s orthodox interpretations of Sugeno’s teachers Satō Naokata. Tsuji, *Tokugawa Yoshimune*, 165–80. See also Dore, *Education in Tokugawa Japan*; Najita, *Visions of Virtue in Tokugawa Japan*.
8. Totman, *Early Modern Japan*, 303. See also Rubinger, *Private Academies of Tokugawa Japan*, 109.
9. Totman, *Early Modern Japan*, 313. The famine of the Kyōhō era, after the destruc-

- tion of crops by locusts in Western Japan in 1732, involved forty-six domains, which “lost nearly 75% of their crop, some primarily to bad weather, others to insects. Authorities recorded 12,072 deaths from starvation, and 2,646,020 people reportedly suffered from hunger.” *Ibid.*, 237.
10. Yabe, *Edo no honzō*, 82; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 130; Sugimoto, *Edo no hakubutsugakushatachi*, 79; Kimura, *Edoki no nachurarisuto*, 11–17.
  11. Totman, *Early Modern Japan*, 313.
  12. Yoshida, *Seijuku suru Edo*, 17.
  13. Totman, *Early Modern Japan*, 314.
  14. The following survey of Yoshimune’s fiscal policies and their consequences for natural history is based on Kasaya Kazuhiko, “Arai Hakuseki to Tokugawa Yoshimune—Tokugawa jidai no seiji to honzō,” in *Mono no imeeji: Honzō to hakubutsugaku he no shōtai*, ed. Yamada Keiji (Tokyo: Asahi Shinbunsha, 1994), 319–35; Kasaya Kazuhiko, “Tokugawa Yoshimune no Kyōhō kaikaku to honzō,” in Yamada, *Higashi ajia no honzō to hakubutsugaku no sekai*, vol. 2, 3–42; Kasaya Kazuhiko, “The Tokugawa Bakufu’s Policies for the National Production of Medicines and Dodonæus’s *Cruyjdeboeck*,” in *Dodonæus in Japan: Translation and the Scientific Mind in the Tokugawa Period*, ed. W. F. Vande Walle (Leuven: Leuven University Press, 2001), 167–86.
  15. Perry Anderson, *Lineages of the Absolutist State* (London: Verso, 1985), 19.
  16. According to a population survey of 1726, Japan had 26,550,000 inhabitants consisting of 9.8 percent of samurai (*shi*); 76.4 percent of peasants (*nō*); 7.5 percent of *chōnin*; 1.9 percent of *boraimono*, or unclassifiable social categories like Buddhist monks, Shinto priests, physicians, and independent scholars; and 4.4 percent of outcastes (*eta* and *hinin*). It is worth reminding that the division of Tokugawa in a four-class system was ideological rather than legal: the only legal distinction, in fact, separated samurai from commoners. See Totman, *Early Modern Japan*, 250–52; Eijiro Honjo, *The Social and Economic History of Japan* (New York: Russell & Russell, 1965), 154.
  17. Kozo Yamamura, “Toward a Reexamination of the Economic History of Tokugawa Japan, 1600–1867,” *Journal of Economic History* 33, no. 3 (September 1973): 512.
  18. *Ibid.*
  19. *Ibid.*, 513.
  20. See Takano Yasuo, *Kinsei kome ichiba no keisei to tenkai* (Nagoya: Nagoya Daigaku Shuppankai, 2012), 26–132.
  21. Tokugawa Japan maintained a tightly supervised commodity and resource trade even after the secluding policies of the early shogun. The bakufu controlled overseas mercantile trade either directly through the Nagasaki *bugyō* or indirectly through the collaboration of the Shimazu, the Matsumae, and the Sō *daimyō*. Nagasaki oversaw trade with Ming and Qing China, the Netherlands, and the populations

- of Ezo through the mediation of the Matsumae Domain. The Shimazu of Satsuma were licensed to trade with the semiautonomous kingdom of the Ryūkyū islands, and the Sō of Tsushima mediated the import-export with Chosŏn Korea. While overall from the 1690s “foreign trade was conducted on a barter basis with any balances carried over to the following trading season,” luxury goods—especially medicinal substances like ginseng—were often paid in silver. See E. S. Crawcour and Kozo Yamamura, “The Tokugawa Monetary System: 1787–1868,” in *The Japanese Economy in the Tokugawa Era, 1600–1868*, ed. Michael Smitka (New York: Garland, 1998), 3.
22. See Murai Atsushi, *Kanjō bugyō Ogiwara Shigehide* (Tokyo: Shūheisha Shinsho, 2007).
  23. Kasaya, “Arai Hakuseki to Tokugawa Yoshimune,” 326.
  24. Kasaya, “The Tokugawa Bakufu’s Policies for the National Production of Medicines and Dodonæus’s *Cruijdeboek*,” 172.
  25. Imamura Tomo, *Ninjinshi*, vol. 4 (Kyoto: Shibunkaku Shuppan, 1971), 231. See also Kasaya, “The Tokugawa Bakufu’s Policies for the National Production of Medicines and Dodonæus’s *Cruijdeboek*,” 173–75.
  26. Emma C. Spary, *Utopia’s Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000), 7, 190–94.
  27. Shogunal concern with natural resources can be appreciated also by examining the development of a forestry and lumber industry beginning from the early eighteenth century. Strict control, at both central and domainal levels, over the cutting of trees, reforestation, and periodic censuses were some of the features of an elaborate system of woodland management developed by shogunal authority to cope with the consequences of a massive deforestation in the seventeenth century such as erosion, stream siltation, flooding, and so on. See Totman, *The Green Archipelago*; Conrad Totman, *The Lumber Industry in Early Modern Japan* (Honolulu: University of Hawaii Press, 1995).
  28. In order, *nankinhaze* (*Triadica sebifera*) is the Chinese tallow tree, the *tonkin nikukei* is a Chinese subspecies of Judas trees (*Cercidiphyllum japonicum*), the *tendai uyaku* is the Benjamin bush root (*Lindera strychnifolia*), and *sansbuyu* is the Japanese cornel fruit (*Corni fructus*).
  29. In order, *satōkibi* is sugarcane (*Saccharum officinarum*), *pan’ya* is the kapok tree (*Ceiba pentandra*), and *koganeyanagi* is the *Scutellaria baicalensis* Georgi.
  30. For a complete list, see Ōba Hideaki, ed., *Nihon shokubutsu kenkyū no rekishi: Koishikawa shokubutsuen 300 nen no ayumi* (Tokyo: Tokyo Daigaku Shuppankai, 1996), 34–39.
  31. *Ibid.*, 40.
  32. Ōba Hideaki has edited a historical study of the Koishikawa garden, of which he has been the curator for many years. *Ibid.*

33. *Ipomoea batatas* L.
34. Unlike Noro Genjō's 1732 *Kanshoki* (Sweet Potato Diaries), a diary of his experiments with the tuber.
35. Where he was joined in 1740 by Noro Genjō. For further information, see Kaneko Tsutomu, *Edo jinbutsu kagakushi* (Tokyo: Chūkō Shinsho, 2005), 66–74.
36. Precisely *Panax ginseng* C.A. Meyer.
37. As his Greek genus name, *Panax*, suggests.
38. See Kawashima Yūji, *Chōsen ninjin hishi* (Tokyo: Yasaka Shobō, 1993), 241–318.
39. Suzuki Akira, *Edo no iryō fūzoku jiten* (Tokyo: Tōkyōdō Shuppan), 179. More or less, the yearly stipend of an *ashigaru*, the lowest samurai rank.
40. Yabe, *Edo no honzō*, 84.
41. Suzuki, *Edo no iryō fūzoku jiten*, 179.
42. The commerce of live roots was forbidden by the Chosōn government. See Kawashima, *Chōsen ninjin hishi*, 57–74.
43. Yabe, *Edo no honzō*, 86; Kawashima, *Chōsen ninjin hishi*, 75–85.
44. Yabe, *Edo no honzō*, 86.
45. *Ibid.*
46. Inoue, *Kaibara Ekiken*.
47. In contemporary Europe, early modern states were also paying close attention to botanical knowledge. For more on the subject, see Ogilvie, *The Science of Describing*. Lisbet Koerner, in *Linnaeus: Nature and Nation* (Cambridge, MA: Harvard University Press, 1999), highlights how Linnaeus conceived his classifying methods out of preoccupations of economical nature. A simple and adaptable system was needed not only to classify the biological produce of one's state but to give sense and order to the massive amount of information about new species of plants and animals arriving from the remotest areas of the world. It was not by chance that the majority of Linnaeus's disciples were involved as botanists in maritime expeditions under the payroll of East Asian companies; see also Nishimura, *Rinne to sono shito-tachi*; Patricia Fara, *Sex, Botany, and Empire: The Story of Carl Linnaeus and Joseph Banks* (New York: Columbia University Press, 2003).
48. Yoshida, *Seijuku suru Edo*, 19.
49. *Ibid.*, 20.
50. For an introductory treatment of *oniwaban*, see Fukai, *Edojō oniwaban*. Useful introductory information on espionage in the early modern period may be found in Wilhelm Agrell and Bo Huldt, eds., *Clio Goes Spying: Eight Essays on the History of Intelligence* (Lunds, Sweden: Scandinavian University Books, 1983); Peter Burke, *A Social History of Knowledge: From Gutenberg to Diderot* (Malden, MA: Blackwell, 2000); Stephen Budiansky, *Her Majesty's Spymaster: Elizabeth I, Sir Francis Walsingham, and the Birth of Modern Espionage* (London: Viking, 2005).
51. See Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and*

- Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996).
52. Peter Burke, “The Bishop’s Questions and the Pope’s Religion”; Peter Burke, *Historical Anthropology of Early Modern Italy* (Cambridge: Cambridge University Press, 1987), 40–47.
  53. Gerald Strauss, “Success and Failure in the German Reformation,” *Past and Present* 67 (1975): 30–63; Burke, *A Social History of Knowledge*, 121–22. See also Gustav Henningsen and John Tedeschi, eds., *The Inquisition in Early Modern Europe: Studies on Sources and Methods* (DeKalb: Northern Illinois University Press, 1986). The interaction between church and state and the exchange of information between the two powers constitute an important page in the history of early modern Europe, involving figures so intriguing as to be immortalized in works of fiction, such as the cardinal-duc Armand de Richelieu (1585–1642); Giulio Raimondo Mazzarino (1602–62), known as Cardinal Mazarin in France; and Melchior Khlesl (1552–1630) in the Habsburg Empire.
  54. See Steven J. Harris, “Long-Distance Corporations, Big Sciences, and the Geography of Knowledge,” *Configurations* 6, no. 2 (Spring 1998), 269–304; Mordechai Feingold, ed., *Jesuit Science and the Republic of Letters* (Cambridge, MA: MIT Press, 2003).
  55. Donald Queller, “The Development of Ambassadorial *Relazioni*,” in *Renaissance Venice*, ed. J. R. Hale (Totowa, NJ: Rowman and Littlefield, 1973).
  56. Bayly, *Empire and Information*.
  57. Burke, *A Social History of Knowledge*, 125.
  58. *Ibid.*, 129.
  59. Tsuji, *Tokugawa Yoshimune*, 166.
  60. Thanks to a recommendation from another of Jun’an’s students, Arai Hakuseki.
  61. In this endeavor he took as his disciples his nephew Kada no Arimaro and Kamo no Mabuchi. See Nosco, *Remembering Paradise*; Susan Burns, *Before the Nation: Kokugaku and the Imagining of Community in Early Modern Japan* (Durham: Duke University Press, 2003).
  62. The purpose of Yoshimune’s educational policies was both didactic and ideological, as can be illustrated by the publication and distribution of didactical works. The most successful of these was *Rikuyu engi taii*, written by Muro Kyūsō in 1721 upon Yoshimune’s order. The text consisted of a commentary on the Qing period Chinese text *Liuyu yanyi* (Correct Explanation of the Six Precepts). Yoshimune ordered Ogyū Sorai to translate it and ordered this publication to be printed in a great quantity and be adopted as children textbook in domainal schools (*bankō*) and *terakoya* (temple schools). Tsuji, *Tokugawa Yoshimune*, 167–68. The six precepts are (1) to learn and practice filial piety, (2) to show respect for the superiors, (3) to contribute to the harmonious life of one’s community, (4) to educate one’s

- children and nephews, (5) to harmonize with the principle of nature (*seiri*), and (6) to restrain from behavior against the principle of nature.
63. Tsuji, *Tokugawa Yoshimune*, 176.
  64. *Ibid.*, 174.
  65. Kai (Yamanashi Prefecture), Shinano (Nagano Prefecture), Musashi (Tokyo and Saitama Prefecture), Sagami (Kanagawa Prefecture), Izu (Shizuoka Prefecture), Tōtōmi (Shizuoka Prefecture), and Mikawa (Aichi Prefecture). Tsuji, *Tokugawa Yoshimune*, 176–77.
  66. *Ibid.*, 178.
  67. See Yonemoto, *Mapping Early Modern Japan*; Berry, *Japan in Print*.
  68. Tsuji, *Tokugawa Yoshimune*, 169–70.
  69. It started with edicts prohibiting the preaching of Christianity (1612) and the import of religious books (1630). Prohibitions soon extended to all form of traveling abroad (1630 and 1635) unless formally dispatched by the shogunate. After the rebellion of a Christian community at Shimabara, in 1637, the shogunate prohibited entry to all Spanish and Portuguese vessels (1639), granting only to Dutch the permission of continuing their trading relationship from the small island of Deshima in the Nagasaki Bay (1641). See Toby, *State and Diplomacy in Early Modern Japan*.
  70. On the relations between Tokugawa authorities and Dutch merchants, see Clulow, *The Company of the Shogun*.
  71. Ueno, *Nihon hakubutsugaku shi*, 111.
  72. Ogilvie, *The Science of Describing*, 34.
  73. Rembert Dodoens, *Cruyjdeboeck*, 1554, accessed June 2007, <http://leesmaar.nl/cruyjdeboeck/index.htm>.
  74. Rembert Dodoens, *Cruydt-boeck*. 1644, accessed June 2007, <http://leesmaar.nl/cruydtboeck/index.htm>.
  75. Dioscorides (first century CE) was the author of *De materia medica*. Theophrastus (370–185 BCE) was the successor of Aristotle and authors of plants encyclopedias.
  76. Ogilvie, “The Many Books of Nature.”
  77. Quoted in Ogilvie, *The Science of Describing*, 51.
  78. S. Peter Dance, *The Art of Natural History: Animal Illustrations and Their Work* (Woodstock, NY: Overlook, 1978), 34.
  79. Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994).
  80. Dance, *The Art of Natural History*.
  81. As Arai Hakuseki testified in his *Taionki*, quoted in Shirahata Yōsaburō, “The Development of Japanese Botanical Interest and Dodoneus’ Role,” in Vande Walle, *Dodoneus in Japan*, 265.
  82. See chapter 8.
  83. Vande Walle, *Dodoneus in Japan*, 265. The same year, Kurisaki Dōyū and other

- three bakufu physicians visited the Nagasakiya, the Edo residence of Dutch emissaries, to pose the same questions to the VOC chief surgeon, Willem Wagemans.
84. As I have shown before, this educational background praised inductive research over the deductive reductionism of Zhu Xi's Neo-Confucianism. On Noro Genjō, see Ueno, *Hakubutsugakusha retsuden*, 26–31.
  85. Ueno, *Nihon hakubutsugaku shi*, 115; Shirahata, “The Development of Japanese Botanical Interest and Dodonaeus’ Role,” 267. Tōzaburō’s son, Kōgyū, would follow in his father’s steps as *ōtsūji* and befriended Carl Thunberg, Aoki Konyō, Genjō, Hiraga Gennai, Sugita Genpaku, and other renown scholars.
  86. For example, the voice *pāruto*, corresponding to a phonetical rendition of the Dutch “paard” (horse), was accompanied by the Japanese translation *uma*. Shirahata, “The Development of Japanese Botanical Interest and Dodonaeus’ Role.”
  87. About 5.7 meters.
  88. Translated in Shirahata, “The Development of Japanese Botanical Interest and Dodonaeus’ Role,” 268.
  89. Kajishima, *Shiryō Nihon dōbutsushi*, 573.
  90. Quoted in Shirahata, “The Development of Japanese Botanical Interest and Dodonaeus’ Role,” 268.
  91. *Ibid.*, 269.
  92. *Ibid.*
  93. *Ibid.*
  94. The *Rhinoceros unicornis* was a gift to obtain the pope’s concession of rights of exclusive possession of the newly discovered lands in the African continent by Vasco da Gama (1469–1524). See Silvio A. Bedini, *The Pope’s Elephant* (London: Carcanet, 1997).
  95. The German inscription above Dürer’s woodcut reads, “On the first of May in the year 1513 AD [*sic*], the powerful King of Portugal, Manuel of Lisbon, brought such a living animal from India, called the rhinoceros. This is an accurate representation. It is the color of a speckled tortoise, and is almost entirely covered with thick scales. It is the size of an elephant but has shorter legs and is almost invulnerable. It has a strong pointed horn on the tip of its nose, which it sharpens on stones. It is the mortal enemy of the elephant. The elephant is afraid of the rhinoceros, for, when they meet, the rhinoceros charges with its head between its front legs and rips open the elephant’s stomach, against which the elephant is unable to defend itself. The rhinoceros is so well-armed that the elephant cannot harm it. It is said that the rhinoceros is fast, impetuous and cunning.” Translation taken from T. H. Clarke, *The Rhinoceros from Dürer to Stubbs: 1515–1799* (London: Sotheby’s Publications, 1986).
  96. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 462. A complete translation of *Crujideboeck* was not commissioned until more than seventy years after

Genjō's *Wage*. Around 1792, the senior councilor Matsudaira Sadanobu recruited the former Nagasaki chief translator Ishii Tsuneemon for the task. Tsuneemon used a 1618 reprint of the first edition of Dodoens's encyclopedia for his translations, but he died sometime during the execution of the project. It would take another thirty years for the translation to be brought to completion by another former Nagasaki translator, Yoshida Kyūichi, who had studied *honzōgaku* under Ono Ranzan. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 489. *Ensei Dodoneusu sōmoku fu* (Dodoens's Herbal from the Far West) was completed in 1821 but never published. Sadanobu attempted in 1823 and 1828 to have it published, but fires destroyed the original wood blocks both times. A third attempt was interrupted by Sadanobu's death in 1829. Today, only a portion of the original manuscript survives. It consists of full-page reproductions of original illustrations taken from the 1618 Dutch edition, followed by the name of the plants in Latin and sometimes in other European languages (Dutch, French, or English), its translation into Japanese and Chinese, a morphological description of the plant, and its pharmacological uses.

97. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 490.
98. See Lynne Withey, *Voyages of Discovery: Captain Cook and the Exploration of the Pacific* (Berkeley: University of California Press, 1987); Patrick O'Brian, *Joseph Banks: A Life* (Chicago: University of Chicago Press, 1997).
99. The 1734 Dutch edition of the Latin original (1732).
100. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 466.
101. The great naturalist explorer who had accompanied Royal Navy captain James Cook in his travels around the world. For the influence of Linnaeus's system and the expanding British Empire through the exploration of Joseph Banks, see Fara, *Sex, Botany, and Empire*.
102. This was probably classified information: the shogunate claimed the monopoly of any information derived from interviews with Westerners.
103. Fara, *Sex, Botany, and Empire*, 21. Based on counting the number of male and female gonads in flowers (number of stamens and number of pistils).
104. *Ibid.*, 35. See also Koerner, *Linnaeus*.
105. Fara, *Sex, Botany, and Empire*, 134.
106. Linnaeus called them "apostles" to emphasize even more that theirs was a mission.
107. Fara, *Sex, Botany, and Empire*; Bayly, *Empire and Information*. In Japan it was not much different, even though Tokugawa Japan was not yet a nation-state in the modern sense, and often domainal interests outweighed national interest (Ravina, *Land and Lordship in Early Modern Japan*). Shogunal politics since Yoshimune employed similar "imperialistic" strategies to impose bakufu's hegemony over the Japanese provinces: as I show in the next chapter, the national surveys of natural products sponsored by the shogunate and organized by Niwa Shōhaku were similarly conceived and kept secret in the Momijiyama library.

108. Ritvo, *The Platypus and the Mermaid*, 44, 26.
109. Similarly, Copernicus's hesitancy to replace the Ptolemaic geocentric system of the universe was not only motivated by biblical fidelity but above all because it undermined the entire system of Aristotle's physics.

#### CHAPTER 7

1. Ihara Saikaku, *Seken munezan'yō*, in *Ihara Saikaku shū*, vol. 3, ed. Taniwaki Masachika, Jinbō Kazuya, and Teruoka Yasutaka (Tokyo: Shōgakukan, 1996), 337. I follow the English translation of Ben Befu in *Worldly Mental Calculation: An Annotated Translation of Seken munezan'yō* (Berkeley: University of California Press, 1976), 31.
2. John Stuart Mill, "On the Definition of Political Economy, and on the Method of Investigation Proper to It," originally published in October 1836 in the *London and Westminster Review*. Reprinted in *Essays on Some Unsettled Questions of Political Economy*, 2nd ed. (London: Longmans, Green, Reader & Dyer, 1874), essay 5, paragraphs 38 and 48.
3. Ihara Saikaku, *Seken munezan'yō*, 369. English translation in Befu, *Worldly Mental Calculation*, 52.
4. A xerographic reproduction of the survey papers can be found in Morinaga Toshitarō and Yasuda Ken, eds., *Kyōhō—Genbun shokoku sanbutsuchō shūsei*, 21 vols. (Tokyo: Kagaku Shoin, 1985).
5. Kondō Morishige (Seisai), *Kondō Seisai zenshū*, vol. 12 (Tokyo: Kokusho Kankōkai, 1905–6), 293.
6. Ueno, *Hakubutsugakusha retsuden*, 11.
7. Quoted in Yasuda, *Edo shokoku sanbutsuchō*, 25.
8. Ueno, *Hakubutsugakusha retsuden*, 19.
9. Ueno Masuzō has argued that the expeditions were probably an examination to judge his actual abilities in the field. *Ibid.*, 20. There are no historical sources revealing whether there was any contact between Yoshimune and Shōhaku before 1722, but it is reasonable to believe that Yoshimune may have at least indirectly heard about the young and talented physician-*honzōgakusha* practicing in one of the most vibrant castle towns of his domain, Matsusaka.
10. *Misgurnus anguillicaudatus*.
11. Quoted in Yasuda, *Edo shokoku sanbutsuchō*, 27–29.
12. *Ibid.*, 29.
13. *Ibid.*
14. *Ibid.*
15. *Ibid.*
16. *Ibid.*
17. Instructions on how to record various crops were very detailed. For example, in

- many domains the production of grains like rice followed different rhythms. Rice was usually recorded under three different rubrics: *wase*, *nakate*, and *okute*—that is, the first, second, and third harvest of the year, which had to be precisely dated. The problem was that different villages in the same domain might have followed different harvesting calendars or had different numbers of yields: in that case, the Sanbutsu Goyōdokoro collected the data in *wase*, *nakate*, and *okute*, specifying however in explicatory notes the crop yield in villages that did not follow the average harvesting calendar. Yasuda, *Edo shokoku sanbutsuchō*, 31.
18. In the case that the name did not appear in Shōhaku's guidelines, they followed Ekiken's nomenclature in *Yamato honzō*.
  19. Morinaga and Yasuda, *Kyōhō—Genbun shokoku sanbutsuchō shūsei*, vol. 1.
  20. Ibid. See also Yasuda, *Edo shokoku sanbutsuchō*, 32.
  21. Ibid.
  22. *Allium giganteum*.
  23. In order, *Lutra lutra* Whiteleyi, *Nipponia nippon*, and *Canis lupus hodophilax*.
  24. Yasuda Ken, "Niwa Shōhaku," in *Saishiki Edo hakubutsugaku shūsei*, ed. Shimonaka Hiroshi (Tokyo: Heibonsha, 1994), 64.
  25. Yasuda, "Niwa Shōhaku," 64.
  26. Now in the National Archives of Japan, Kokuritsu Komonjōkan, in Tokyo.
  27. See Wilfrid Blunt, *Linnaeus: The Compleat Naturalist* (Princeton, NJ: Princeton University Press, 2001), 38–70; Koerner, *Linnaeus*.
  28. See Blunt, *Linnaeus*, 185–97; Fara, *Sex, Botany, and Empire*; Nishimura, *Rinne to sono shitotachi*.
  29. Peter Raby, *Bright Paradise: Victorian Scientific Travellers* (Princeton, NJ: Princeton University Press, 1997), 45.
  30. For biographical information on Uemura Saheiji, see Matsushima Hiroshi, *Kinsei Ise ni okeru honzōgakusha no kenkyū* (Tokyo: Kōdansha, 1974), 194–262; Ueno, *Hakubutsugakusha retsuden*, 32–38. Saheiji's notebooks are reproduced in Uemura Masakatsu (Saheiji), *Kinsei rekishi shiryō shūsei*, dai II ki, dai VI kan: *Saiyakushi 1*, ed. Asamu Megumu and Yasuda Ken (Tokyo: Kagaku Shoin, 1994).
  31. Manuscript reproduced in Isono, *Egakareta dōbutsu shokubutsu*, 25.
  32. Ueno, *Hakubutsugakusha retsuden*, 33.
  33. A chronological list of his expedition can be found in Matsushima, *Kinsei Ise ni okeru honzōgakusha no kenkyū*, 205–16.

#### PART IV

1. Rubinger, *Popular Literacy in Early Modern Japan*; Susan B. Hanley, "A High Standard of Living in Nineteenth-Century Japan: Fact or Fantasy?," *Journal of Economic History* 43, no. 1 (March 1983): 183–92.
2. Ikegami, *The Taming of the Samurai: Honorific Individualism and the Making of*

- Modern Japan* (Cambridge, MA: Harvard University Press, 1995). On the civilizing process in Europe, see the classic Norbert Elias, *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*, ed. Eric Dunning, Johan Goudsblom, and Stephen Mennell (Oxford: Blackwell, 2000).
3. See Beonio-Brocchieri, *Religiosità e ideologia alle origini del Giappone moderno*; Bellah, *Tokugawa Religion*; Najita, *Vision of Virtue in Tokugawa Japan*.
  4. Donald H. Shively, "Popular Culture," in *The Cambridge History of Japan*, vol. 4, ed. John Whitney Hall (Cambridge: Cambridge University Press, 1991), 706–70; Harry D. Harootunian, "Late Tokugawa Culture and Thought," in *The Cambridge History of Japan*, vol. 5, ed. Marius B. Jansen (Cambridge: Cambridge University Press, 1989); Nishiyama Matsunosuke, *Edo Culture: Daily Life and Diversions in Urban Japan, 1600–1868*, trans. Gerald Groemer (Honolulu: University of Hawaii Press, 1997); Kitō Hiroshi, *Bunmei toshite no Edo shisutemu* (Tokyo: Kōdansha, 2002).
  5. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 148.
  6. Endō Shōji, *Honzōgaku to yōgaku: Ono Ranzan gakutō no kenkyū* (Tokyo: Shibunkaku Shuppan, 2003).
  7. Sugi, *Kinsei no chūiki to zaison bunka*.
  8. Haga Tōru, ed., *Hiraga Gennai ten* (Tokyo: Tokyo Shinbun, 2003); Okumura Shōji, *Hiraga Gennai wo aruku: Edo no kagaku wo tazunete* (Tokyo: Iwanami Shoten, 2003).
  9. Ōba Hideaki, *Shokubutsugaku to shokubutsuga* (Tokyo: Yasaka Shobō, 2003).
  10. Written by the Neo-Confucian scholar and Shōheikō instructor Shibano Ritsuzan, the *Kansei igaku no kin* (the Ban of Heterodoxy) edict was part of a program of reforms developed by the senior councilor Matsudaira Sadanobu and aimed at establishing the Hayashi School of Neo-Confucianism as the only orthodox form of learning (*seigaku*) in order to prevent the malicious proliferation of vicious heterodoxies (*igaku*). See Backus, "The Relationship of Confucianism to the Tokugawa Bakufu as Revealed in the Kansei Educational Reform"; Backus, "The Kansei Prohibition of Heterodoxy and Its Effects on Education"; Backus, "The Motivation of Confucian Orthodoxy in Tokugawa Japan"; see also Rai Kiichi, *Kinsei kōki shushigakuha no kenkyū* (Tokyo: Keisuisha, 1986); Wajima, *Nihon Sōgakushi no kenkyū*.
  11. Mayr, *The Growth of Biological Thought*.
  12. Leonard Huxley, *Life and Letters of Thomas Henry Huxley*, vol. 1 (New York: D. Appleton, 1901), 68.
  13. *Ibid.* In the 1890s, the zoologist Sir William Henry Flower (1831–99) complained that natural history was "about the worst paid and least appreciated of all professions." Sir William Henry Flower, *Essays on Museums and Other Subjects Connected with Natural History* (London: Macmillan, 1898), 64.

CHAPTER 8

1. *Zōshi* (1729) and *Zō no mitsugi* (1729) among the others.
2. Kajishima, *Shiryō Nihon dōbutsushi*, 573.
3. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 317–18.
4. See Nakano Yoshio, *Shiba Kōkan kō* (Tokyo: Shinchōsha, 1986), 57–61; Timon Screech, *The Lens within the Heart: The Western Scientific Gaze and Popular Imaginary in Later Edo Japan* (Honolulu: University of Hawaii Press, 2002), 39; Kajishima, *Shiryō Nihon dōbutsushi*, 573; Ian Miller, “Didactic Nature: Exhibiting Nation and Empire at the Ueno Zoological Gardens,” in *JAPANimals: History and Culture in Japan’s Animal Life*, ed. Gregory M. Pflugfelder and Brett L. Walker (Ann Arbor: University of Michigan Press, 2005), 280–83.
5. The history of early modern Europe witnessed similar parades of exotic animals donated to kings, princes, and popes, displayed to exalt their might, like the white elephant donated by the king of Portugal Emmanuel I to Pope Leo X in 1516—see Bedini, *The Pope’s Elephant*—or the lion donated to Pope Clement VII by the king of France. See Marina Belozerskaya, *The Medici Giraffe: And Other Tales of Exotic Animals and Power* (New York: Little, Brown, 2006), xiv. See also Smith and Findlen, *Merchants & Marvels*; Daniel Hahn, *The Tower Menagerie: The Amazing 600-Year History of the Royal Collection of Wild and Ferocious Beasts Kept at the Tower of London* (New York: Jeremy P. Tarcher/Penguin, 2003).
6. For further details, see Kimura, *Edoki no nachurarisuto*, 123–29.
7. For this section on fashions for plants and animals, I found the following particularly helpful: Kajishima, *Shiryō Nihon dōbutsushi*; Ueno Masuzō, *Nihon dōbutsugaku shi* (Tokyo: Yasaka Shobō, 1987); Yabe, *Edo no honzō*, 109–24; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 146–85.
8. *Tsubaki*, *Camellia japonica*.
9. Yabe, *Edo no honzō*, 111.
10. *Momiji* and *kaede*.
11. Yabe, *Edo no honzō*, 111.
12. *Karatachibana* (*Ardisia crispa*). For a complete list, see Arioka Toshiyuki, *Shiryō Nihon shokubutsu bunkashi* (Tokyo: Yasaka Shobō, 2005); Nomura Keisuke, *Edo no shizenshi: Bukō sanbutsushi wo yomu* (Tokyo: Dōbutsusha, 2002).
13. Sannojo’s son Itō Ihyōe Masatake expanded and reprinted it in 1733 with the title *Chōsei karin shō* (The Book of Long-Living Ornamental Plants). See Itō Ihyōe Sannojo, *Kadan ji kinshō*, ed. Katō Kaname (Tokyo: Heibonsha, 1976).
14. See Kaibara, *Kafu*, *Saifu*.
15. *Ibid.*, 14–15.
16. In order, *Igansai ranpin*, circulating in its manuscript form since 1713 and published later in 1772; *Igansai ōhin*, 1716 in manuscript, printed in 1757; *Igansai chikuhin*,

- completed in 1717 but never published; and *Igansai bathin*, published in 1760. See Ueno Masuzō, *Kusa wo te ni shita shōzōga* (Tokyo: Yasaka Shobō, 1986), 45–51.
17. Ono Ranzan and Shimada Mitsufusa, *Kai* (Kyoto: Bunshōkaku, 1759–65). On *Kai*, see Ueno, *Kusa wo te ni shita shōzōga*, 52–62. More information on gardening and *honzōgaku* in Shirahata Yōsaburō, “Honzōgaku to shokubutsu engei,” in Yamada, *Higashi Ajia no honzō to hakubutsugaku no sekai*, vol. 2, 143–69; Ueno, *Kusa wo te ni shita shōzōga*, 63–103.
  18. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 174.
  19. Between modern-day train stations of Komagome and Sugamo, in northwestern Tokyo. Somei was the quarter where the Itō Ihyōe family had their own shop.
  20. *Ipomoea nil*.
  21. Quoted in Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 176. Japanese gardening techniques were highly appreciated also by later visiting botanists like the Russian Carl Maximowicz and the French Paul Savatier. See Yabe, *Edo no honzō*, 119–24.
  22. Arioka, *Shiryō Nihon shokubutsu bunkashi*.
  23. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 179. High-ranking samurais’ love for falconry also prospered throughout the period, but it remained confined to the upper strata of Tokugawa society.
  24. *Ibid*.
  25. *Ibid*.
  26. In order, *tanchōzuru* (*Grus japonensis*), an endangered species of cranes now almost extinct in Japan; *oshidori* (*Aix galericulata*); *kinkei* (*Chrysolophus pictus*); and *hakkan* (*Lophura nycthemera*).
  27. Kajishima, *Shiryō Nihon dōbutsushi*.
  28. Isono Naohide and Uchida Yasuo, *Hakurai chōjū zushi* (Tokyo: Yasaka Shobō, 1992); Isono Naohide, “Umi wo koete kita chōjūtachi,” in Yamada, *Mono no imееji*, 65–91.
  29. In order, *bunchō* (*Lonchura oryzivora*); *benisuzume* (*Amandava amandava*); *kanmuribato* (*Goura cristata*); *kanariya* (*Serinus canaria*); *kujaku*, mostly *Pavus cristatus*; *onagabato* (*Macropygia unchall*); *kyūkanchō* (*Gracula religiosa*); *benijukei* (*Gracula religiosa*); and *horohorochō* (*Agelastes niger*); parrots (*ōmu*) and parakeets (*inko*) are not identifiable as modern species.
  30. In order, *hikuidori* (*Casuaris casuaris*); *dachō* (*Struthio camelus*); and *saichō*, fam. Bucerotidae. See Isono and Uchida, *Hakurai chōjū zushi* for a complete list.
  31. *Varanaus salvator*. See Kajishima, *Shiryō Nihon dōbutsushi*, 76–122 for a survey of animal imports in the Tokugawa period.
  32. See Harriet Ritvo, *The Animal Estate: The English and Other Creature in the Victorian Age* (Cambridge, MA: Harvard University Press, 1987); Lynn L. Merrill, *The*

*Romance of Victorian Natural History* (Oxford: Oxford University Press, 1989); Barber, *The Heyday of Natural History*.

33. See chapter 13.

#### CHAPTER 9

1. As the preponderance of low- to high-ranking samurai in nature studies also demonstrates. See Ueno, *Nihon hakubutsugaku shi*, 90–102 for a sociological classification of professional and amateur *honzōgaku* scholars. For a general overview of the involvement of high-ranking samurai and aristocrats in natural studies, see Kagaku Asahi, ed., *Tonosama seibutsugaku no keifu* (Tokyo: Asahi Sensho, 1991), 7–164.
2. His magnum opus consisted of annotations to *Honzō kōmoku*.
3. Tanaka Yūko, “Cultural Networks in Premodern Japan,” *Japan Echo* 34, no. 2 (April 2007). See also Tanaka Yūko, *Edo wa nettowāku* (Tokyo: Heibonsha, 1993).
4. Suwa Haruo, *Nihon no yūrei* (Tokyo: Iwanami Shoten, 1988); Timon Screech, *Sex and the Floating World: Erotic Images in Japan, 1700–1820* (London: Reaktion Books, 1999).
5. Suzuki Bokushi, *Snow Country Tales: Life in the Other Japan*, trans. Jeffrey Hunter and Rose Lesser (New York: Weatherhill, 1986).
6. See Suzuki, *Snow Country*.
7. Steven D. Carter, ed., *Literary Patronage in Late Medieval Japan* (Ann Arbor: University of Michigan Center for Japanese Studies, 1993); H. Mark Horton, “Renga Unbound: Performative Aspects of Japanese Linked Verse,” *Harvard Journal of Asian Studies* 53, no. 2 (December 1993): 443–512; Miyachi Masato, *Bakumatsu ishin ki no bunka to jōhō* (Tokyo: Meicho Kankōkai, 1994); Ichimura Yūichi, *Edo no jōhōryoku: Uebuka to chi no ryūtsū* (Tokyo: Kōdansha Sensho Mechie, 2004); Ikegami, *Bonds of Civility*; Tanaka, “Cultural Networks in Premodern Japan”; Ann Jannetta, *The Vaccinators: Smallpox, Medical Knowledge, and the “Opening” of Japan* (Stanford: Stanford University Press, 2007); Fukuoka, *The Premise of Fidelity*.
8. Ikegami, *Bonds of Civility*, 19.
9. *Ibid.*, 78.
10. *Ibid.*, 164. Ikegami’s “Habermasian” study of “the Tokugawa network revolution” explores the social and political repercussions of cultural associations and suggests that the social patterns structuring these “aesthetic networks” predicted a later emergence of a similarly structured public sphere. See Ikegami, *Bonds of Civility*, 10, 58–63, 380. See Anne Walthall’s review article in Walthall, “Networking for Pleasure and Profit,” *Monumenta Nipponica* 61, no. 1 (Spring 2006): 93–103. My view of *honzōgaku* societies suggests less an emerging public sphere than the evolution of “epistemological communities” in which people experimented with new forms of knowledge. See Michel Foucault, “On the Archaeology of the Sciences: Response

- to the Epistemology Circle,” in *Aesthetics, Method, and Epistemology*, ed. James D. Faubion (New York: New Press, 1998), 297–334.
11. Another space that saw the emergence of new forms of social interaction were pleasure quarters. See Cecilia Segawa Siegle, *Yoshiwara* (Honolulu: University of Hawaii Press, 1993).
  12. See Mizuta Norihisa, Noguchi Takashi, and Arisaka Michiko, eds., *Kanpon Kenkadō nikki* (Tokyo: Geika shoin, 2009).
  13. Matsuura Seizan, *Kasshi yawa*, 20 vols. (Tokyo: Heibonsha, 1979–81).
  14. Douglas Howland, *Translating the West: Language and Political Reason in Nineteenth-Century Japan* (Honolulu: University of Hawaii Press, 2002). This was without taking into consideration that even the European Republic of Letters was much less an “open society” and even less egalitarian (as some historians have ventured to claim) than the idealized descriptions of a commonwealth of men of letters given by Peiresc and other Renaissance scholars. See Anne Goldgar, *Impolite Learning: Conduct and Community in the Republic of Letters, 1680–1750* (New Haven: Yale University Press, 1995); Benedetta Craveri, *The Age of Conversation*, trans. Teresa Waugh (New York: New York Review Books, 2005); Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994).
  15. See, for example, the epistolary exchange between the two *honzōgaku* scholars Kuroda Suizan and Yamamoto Shinzaburō in Ueda Minoru, ed., *Bakumatsu honzōka kōshinroku: Kuroda Suizan-Yamamoto Shinzaburō monjo* (Osaka: Seibundō Shuppan, 1996).
  16. The so-called *iemoto* system (*iemoto seido*) was an organizational structure that characterized different kind of cultural and artisanal groups in Tokugawa Japan, and it is usually associated with cultural circles of tea experts (*chadō*). Eiko Ikegami explains that “the *iemoto* system ideally aimed at enhancing the authority of the grand master by creating a hierarchical order of professional teachers, semi-professionals, and amateur students. By increasing the authority of the grand master, the art school attempted to support the status of enclave publics in which students temporarily suspended the hierarchical status order of feudal society.” Ikegami, *Bonds of Civility*, 163.
  17. *Ibid.*, 164.
  18. Endō, *Honzōgaku to yōgaku*.
  19. Ueno, *Nihon hakubutsugaku shi*, 166.
  20. Quoted in *ibid.*
  21. Quoted in *ibid.*, 167.
  22. Nakamura Shin'ichirō, *Kimura Kenkadō no saron* (Tokyo: Shinchōsha, 2000), 308–13.
  23. The following information on Kenkadō's life is taken from Nakamura, *Kimura Kenkadō no saron*.

24. See also Tanemura Suehiro, “Kimura Kenkadō,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 128–29.
25. More information on Tsunenoshin can be found in Ueno, *Hakubutsugakusha retsuden*, 38–42.
26. Tanaka Yūko, “Edo bunka no patoroneeji,” in *Dentō geinō no tenkai*, ed. Kumakura Isao (Tokyo: Chūōkōronsha, 1993), 151–53.
27. Pierre Bourdieu, *Distinction: A Social Critique of the Judgement of Taste*, trans. Richard Nice (Cambridge, MA: Harvard University Press, 1984); Pierre Bourdieu, *The Field of Cultural Production: Essays on Art and Literature*, ed. Randal Johnson (New York: Columbia University Press, 1993).
28. Takigawa Giichi and Satō Takuya, eds., *Kimura Kenkadō shiryōshū: kōtei to kaisetsu* (Tokyo: Sōdosha, 1988).
29. *Kenkadō zasshi*, in Takigawa and Satō, *Kimura Kenkadō shiryōshū*, 100.
30. Kimura Kenkadō, *Kanpon Kenkadō nikki*, ed. Mizuta Norihisa, Noguchi Takashi, and Arisaka Michiko (Tokyo: Geika Shoin, 2009).
31. Tanemura, “Kimura Kenkadō,” 125.
32. For information about these groups, see Ueno, *Nihon hakubutsugaku shi*, 166–76; and Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 149–68. On Shōhyakusha, see Maki Fukuoka, *The Premise of Fidelity*.
33. On his involvement with natural history, see Sasaki Toshikazu, “Maeda Toshiyasu,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 341–51. Etchū is in modern-day Toyama Prefecture. The Edo mansion of the Maeda contained the Ikutokuen garden discussed in the preface.
34. The Fukuoka Domain could claim connections to the study of nature since the years when Kaibara Ekiken was serving its lords. On Baba Daisuke, see Sasaki Toshikazu, “Baba Daisuke,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 265–79. Nishinomaru was the area of the shogunal palace where the retired shogun resided.
35. Tanaka Makoto, “Kurimoto Tanshū,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 189–208; Ueno, *Hakubutsugakusha retsuden*, 81–85.
36. For a comparison with a similar cognitive approach and concern for description in early modern Europe, see Ogilvie, *The Science of Describing*. See also Svetlana Alpers, “Describe or Narrate? A Problem in Realistic Representation,” *New Literary History* 8, no. 1 (Autumn 1976): 15–41; Svetlana Alpers, “Interpretation without Representation, or, the Viewing of Las Meninas,” *Representations* 1 (February 1983): 30–42; Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983).
37. In order, an *ogoeze* (*Inimicus japonicus*) and an *akaei* (*Dasyatis akajei*). The stonefish was taken from the Shikien, the “Four Season Garden” of Sabase Yoshiyori. The stingray was a dried exemplar from the private collection of Kenbō, alias Shidara Sadatomo. See Isono, *Egakareta dōbutsu shokubutsu*, 49.

38. *Shōma* is the tuber *Cimicifugae Rhizoma*.
39. Kurimoto Tanshū, *Senchūfu* (Manuscript, 1811), accessed June 2007, [http://www.ndl.go.jp/nature/img\\_1/007/007-03-001.html](http://www.ndl.go.jp/nature/img_1/007/007-03-001.html).
40. *Yoroichō*, *Sasakia charonda*.
41. Isono, *Egakareta dōbutsu shokubutsu*, 87.
42. *Yamaarashi* are Sunda porcupines (*Hystrix javanica*) and sunfish *manbō* (*Mola mola*).
43. *Suiko* (*shuibu*) is the name of a Chinese mythological creature described in *Honzō kōmoku* and believed to be homologous to the Japanese *kappa* since Hayashi Razan's *Tashikihen* and Kaibara Ekiken's *Yamato honzō*. The existence of embalmed exemplars of *kappa*, *ningyō*, *tengu*, and other monstrous creatures, obviously an artful fabrication, was also common in early modern Europe. See Daston and Park, *Wonders and the Order of Nature*.
44. *Ibid.*, 176.
45. More information on the Shōhyakusha in Fukuoka, *The Premise of Fidelity*; Ueno, *Kusa wo te ni shita shōzōga*, 26–35.
46. More on Hōbun in Fukuoka, *The Premise of Fidelity*; Ueno, *Hakubutsugakusha retsuden*, 102–4; Sugiura Minpei, “Mizutani Hōbun,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 225–37.
47. Fukuoka, *The Premise of Fidelity*, 26–34.
48. In contrast with the generation of Western natural historians like John Ray (1627–1705) and Nehemiah Grew (1641–1712), for whom observation and inductive inferences were consciously opposed to the received knowledge of the classics of antiquity (especially explicit were their attacks on Pliny) and to their modern defenders (Aldrovandi and Gessner). For a defense of his observational method, see “The Preface” in Nehemiah Grew, *The Anatomy of Plants with an Idea of a Philosophical History of Plants, and Several Other Lectures, Read before the Royal Society* (London: W. Rowlinson, 1682). See also the lively descriptions of the conflict between the two paradigms in Gould, *The Hedgehog, the Fox, and the Magister's Pox*.
49. See chapter 12.
50. For a different interpretation, see Fukuoka, *The Premise of Fidelity*, 63–78.
51. *Ibid.*, 34–42.
52. *Fratercula cirrhata*; known in Japan also as *etopirika*.
53. *Fratercula corniculata*.
54. Higuchi Hideo, “Masuyama Sessai,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 161–72.
55. *Kenkadō zasshi*, in Takigawa and Satō, *Kimura Kenkadō shiryōshū*, 113.
56. See Sugimoto Tsutomu, *Edo no honyakukatachi* (Tokyo: Waseda Daigaku Shuppanbu, 1995).

57. Fukuoka, *The Premise of Fidelity*, 61–62.
58. Today known as *Fistularia petimba*.
59. *Azarashi* (*Erignathus barbatus*).
60. Isono, *Egakareta dōbutsu shokubutsu*, 88; Kajishima, *Shiryō Nihon dōbutsushi*, 480–81.
61. Maeda Toshiyasu, *Honzō tsūkan*, 94 vols., ed. Masamune Atsuo (Tokyo: Nihon Koten Zenshū Kankōkai, 1937–40). See also Sasaki, “Maeda Toshiyasu,” 345.
62. Maeda Toshiyasu, *Honzō tsūkan shōzu*, ed. Yamashita Moritane (Tokyo: Kokuritsu Kōbunshokan Naikaku Bunko, 2000), 1.
63. Aramata Hiroshi, “Matsudaira Yorikata,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 73–88. Sanuki is now Kagawa Prefecture.
64. Konishi Masayasu, “Hosokawa Shigekata,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 89–105. Higo is in today’s Kumamoto Prefecture.
65. Mutsu was the name of the province in the northeastern portion of the Honshū island.
66. Higuchi, “Masuyama Sessai.”
67. See chapter 13. Ueno Masuzō, *Satsuma hakubutsugaku shi* (Tokyo: Shimazu Shuppankai, 1982); Murano Moriji, “Shimazu Shigehide,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 134–44; Ueno, *Hakubutsugakusha retsuden*, 62–73. Satsuma is in Kagoshima Prefecture.
68. Naitō Takashi, “Satake Shozan,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 145–60.
69. He was also the lord of the Katata Domain in Ōmi Province (in today’s Shiga Prefecture) first and later transferred the Sano Domain in Shimotsuke Province (today’s Tochigi Prefecture). See Suzuki Michio, “Hotta Masaatsu,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 173–88.
70. In 1867, Takayuki was also involved in the antishogunate coalition that overthrew the Tokugawa army in 1868.
71. *Honzōgaku* finds its contemporary counterpart in Emperor Hirohito’s chemistry experiments and his son Akihito’s passion for the natural sciences. See Kagaku Asahi, *Tonosama seibutsugaku no keifu* for a general survey of the “*Tono-sama hakubutsugaku*.” See also Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 149–56.
72. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 150.
73. Aramata, “Matsudaira Yorikata,” 80–85.
74. *Ibid.*, 84.
75. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 150. See chapter 11.

## CHAPTER 10

1. *Ammotragus lervia*.
2. *Jakōneko*, an unidentifiable species of the Viverridae family.

3. Almost five square meters.
4. See Isono and Uchida, *Hakurai chōjū zushi* for a reproduction of a catalog advertising tropical birds for sale. See also Isono Naohide, “Chinkin ijū kigyō no kokiroku,” *Hiyoshi Review of Natural Science* 37 (2005): 33–59.
5. See Screech, *The Lens within the Heart*.
6. Ono Ranzan, *Honzō kōmoku keimō: honbun, kenkyū, sakuin*, ed. Sugimoto Tsutomu (Tokyo: Waseda Daigaku Shuppanbu, 1974).
7. On Hiraga Gennai, see Okumura, *Hiraga Gennai wo aruku*; Inagaki Takeshi, *Hiraga Gennai: Edo no yume* (Tokyo: Shinchōsha, 1989); Ueno, *Hakubutsugakusha retsuden*, 47–55; Haga Tōru, *Hiraga Gennai* (Tokyo: Asahi Shinbunsha, 2004); Haga Tōru, *Hiraga Gennai ten*; Jōfuku Isamu, *Hiraga Gennai* (Tokyo: Yoshikawa Kōbunkan, 1971).
8. Inagaki, *Hiraga Gennai*; Okumura, *Hiraga Gennai wo aruku*.
9. Quoted in Sugimoto Tsutomu, *Chi no bōkenshatachi: “Rangaku kotohajime” wo yomu* (Tokyo: Yasaka Shobō, 1994).
10. Jōfuku, *Hiraga Gennai*, 5; Okumura, *Hiraga Gennai wo aruku*, 4.
11. Jōfuku, *Hiraga Gennai*, 21–24; Okumura, *Hiraga Gennai wo aruku*, 147–66.
12. On Gennai’s experiments with asbestos, see Hiraga Gennai, *Hiraga Gennai zenshū*, ed. Irita Seizō (Tokyo: Hiraga Gennai Sensei Kenshōkai, 1932–34), 1:199–217; Jōfuku, *Hiraga Gennai*, 67–68; Okumura, *Hiraga Gennai wo aruku*, 189–96. On the *erekiteru*, see Jōfuku, *Hiraga Gennai*, 138–41; Okumura, *Hiraga Gennai wo aruku*, 167–88.
13. Screech, *The Lens within the Heart*, 44–47.
14. Translated in *ibid.*, 45.
15. Haga, *Hiraga Gennai ten*, 45.
16. Okumura, *Hiraga Gennai wo aruku*, 4.
17. Jōfuku, *Hiraga Gennai*, 15–20.
18. *Hiraga Gennai zenshū*, vol. 1, 193.
19. See Haga, *Hiraga Gennai ten*, 42–45 for a complete schema of Gennai’s network. See *Hiraga Gennai zenshū*, vol. 1, 599–653 for his epistolary exchanges with *honzō-gaku* scholars.
20. Okumura, *Hiraga Gennai wo aruku*, 4.
21. Ueno, *Hakubutsugakusha retsuden*, 51; Okumura, *Hiraga Gennai wo aruku*, 14.
22. In particular, Okamoto Rihei published his *gesaku* works: *Nenashi gusa* (Rootless grass, 1763, in *Hiraga Gennai zenshū*, vol. 1, 221–340), *Fūryū Shidōken den* (The Amazing Story of Shidōken, also in 1763, in *Hiraga Gennai zenshū*, vol. 1, 481–558); Suwaraya Ichibei published his “scientific” and technological treatises; Uemura Zenroku and Yamazaki Kinbei published his *jōruri* plays.
23. Santō Kyōden would be the first popular writer to bargain for a fixed copyright income. Okumura, *Hiraga Gennai wo aruku*, 12.

24. As Gennai narrated it in the Preface (*hanrei*) of his *Butsurui hinshitsu* (A Selection of Species), in *Hiraga Gennai zenshū*, vol. 1, 9.
25. Ueno, *Hakubutsugakusha retsuden*, 52–53.
26. More on Tsunenoshin in *ibid.*, 38–42.
27. *Ibid.*, 53. Ueno ventured the hypothesis that Gennai might have considered joining Tsunenoshin's school but changed his mind after Tsunenoshin died the thirteenth day of the twelfth month of the same year.
28. Kajishima, *Shiryō Nihon dōbutsushi*, 99–100.
29. Quoted in *ibid.*, 100.
30. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 130.
31. The Japanese variant of the ginseng plant, originating from Ransui's experiment, is acknowledged in today's taxonomical system as an independent species, *Panax japonicus*. See Kawashima, *Chōsen ninjin hishi*. See also Ueno, *Hakubutsugakusha retsuden*, 43.
32. See, for example, Ueno, *Hakubutsugakusha retsuden*, 43; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 130–32.
33. Preceded by an official mentioning of his intellectual distinction (*senbatsu*) in 1758.
34. Okumura, *Hiraga Gennai wo aruku*, 42. The fourth exhibition was held in the Ichigaya ward and organized by another of Ransui's students, Matsuda Chōgen. Gennai had been called back to Takamatsu at the time and took the occasion to beg his lord to accept his resignations.
35. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 1, 136–38.
36. *Ibid.*, 140. For a comparative view of London exhibitions between 1600 and 1862, see Richard D. Altick, *The Shows of London: A Panoramic History of Exhibitions* (Cambridge, MA: Harvard University Press, 1978).
37. February 6, 1762.
38. On Rembert Dodoens and the history of his herbal *Cruydeboek* (first ed. 1554) in Japan, see chapter 6. See also W. F. Vande Walle, *Dodoneus in Japan*.
39. In order, Edo, Kyoto, Osaka, Nagasaki, Nara, Yamato, Ōmi, Settsu, Kawachi, Harima, Mino, Owari, Sanuki, Etchū, Shinano, Tōtōmi, Suruga, Izu, Kamakura, Shimōsa, Shimozuke, and Musashi.
40. Moriya Katsuhisa, "Urban Networks and Information Networks," in *Tokugawa Japan*, ed. Nakane Chie and Ōishi Shinzaburō (Tokyo: University of Tokyo Press, 1990), 97–123; Vaporis, *Breaking Barriers*; Vaporis, "To Edo and Back: Alternate Attendance and Japanese Culture in the Early Modern Period," *Journal of Japanese Studies* 23, no. 1 (Winter 1997): 25–67; Ichimura, *Edo no jōhōryoku*.
41. Kajishima, *Shiryō Nihon dōbutsushi*, 100. See also Kosoto Hiroshi, *Kanpō no reki-shi: Chūgoku-Nihon no dentō igaku* (Tokyo: Taishūkan Shoten, 1998); Umihara Ryō, *Kinsei iryō no shakaishi: Chishiki, gijutsu, jōhō* (Tokyo: Yoshikawa Kōbunkan, 2007).

42. See chapter 13.
43. Endō, *Honzōgaku to yōgaku*.
44. *Hiraga Gennai zenshū*, vol. 1, 595. See also the index of species treated in *Butsurui hinshitsu* in *Hiraga Gennai zenshū*, vol. 1, 1–13.
45. *Hiraga Gennai zenshū*, vol. 1, 1–184.
46. Isono, *Nihon hakubutsushi nenpyō*, 761–70. See also Fukuoka, *The Premise of Fidelity*, 84.
47. Itō Keisuke, “Owari hakubutsugaku Shōhyakusha soshienkaku narabi shosentetsu rireki zakki,” in *Igaku yōgaku honzōgaku no kenkyū*, ed. Yoshikawa Yoshiaki (Tokyo: Yasaka Shobō, 1993), 30–33.
48. Fukuoka, *The Premise of Fidelity*, 82.
49. *Ibid.*, 103.
50. Lord of the Sagara Domain in Tōtōmi Province, personal councilor of shogun Tokugawa Ieshige, and later senior councilor (*rōjū*) under Tokugawa Ieharu.
51. See Ochiai Kō, “The Shift to Domestic Sugar and the Ideology of ‘National Interest,’” in *Economic Thought in Early Modern Japan: Monies, Markets, and Finance in East Asia, 1600–1900*, ed. Bettina Gramlich-Oka and Gregory Smits (Leiden: Brill, 2010), 89–110.

#### CHAPTER 11

1. Fukuoka, *The Premise of Fidelity*, 90–94. See also Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2008); Fara, *Sex, Botany, & Empire*; Ogilvie, *The Science of Describing*.
2. Ogilvie, *The Science of Describing*, 203. See also Ōba, *Shokubutsugaku to shokubutsuga*; Aramata Hiroshi, *Zukan no hakubutsushi* (Tokyo: Riburopōto, 1988); Wilfrid Blunt, *The Art of Botanical Illustration: An Illustrated History* (New York: Dover, 1994); S. Peter Dance, *The Art of Natural History* (New York: Arch Cape, 1978).
3. Fabio Colonna, *Ecphrasis I*, 17, quoted in Ogilvie, *The Science of Describing*, 198.
4. See David Freedberg, *The Eye of the Lynx: Galileo, His Friends, and the Beginnings of Modern Natural History* (Chicago: University of Chicago Press, 2003); David Attenborough, Susan Owens, Martin Clayton, and Rea Alexandratos, *Amazing Rare Things: The Art of Natural History in the Age of Discovery* (New Haven: Yale University Press, 2007).
5. See Dance, *The Art of Natural History*; Paul Lawrence Farber, *Finding Order in Nature: The Naturalist Tradition from Linnaeus to E. O. Wilson* (Baltimore: Johns Hopkins University Press, 2000).
6. Like in the case of *trompe-l'oeil* miniatures. See Thomas DaCosta Kaufmann and Virginia Roehrig Kaufmann, “The Sanctification of Nature: Observations on the Origins of Trompe l’Oeil in Netherlandish Book Painting of the Fifteenth and Six-

- teenth Centuries,” in *The Mastery of Nature: Aspects of Art, Science, and Humanism in the Renaissance*, ed. Thomas Da Costa Kaufmann (Princeton, NJ: Princeton University Press, 1993). See also Martin Kemp, *Visualizations: The Nature Book of Art and Science* (Berkeley: University of California Press, 2001); Alpers, *The Art of Describing*. For a comparative view with China, see also Francesca Bray, Vera Dorofeeva-Lichtmann, and Georges Métaillié, ed., *Graphics and Text in the Production of Technical Knowledge in China: The Warp and the Weft* (Leiden: Brill, 2007).
7. See in particular Stephen Gaukroger, *The Emergence of a Scientific Culture: Science and the Shaping of Modernity, 1210–1685* (Oxford: Oxford University Press, 2006).
  8. The notion of a “quiet revolution in knowledge” is taken from Berry, *Japan in Print*, and refers to the explosion of information on places, people, customs, events, marvels, flora and fauna, and so on in the forms of printed books, wood-block prints, paintings, manuscripts, and broadsheets.
  9. See Berry, *Japan in Print*; Vaporis, *Breaking Barriers*; Vaporis, *Tour of Duty*. See also Laura Nenzi, *Excursions in Identity: Travel and the Intersection of Place, Gender, and Status in Edo Japan* (Honolulu: University of Hawaii Press, 2008).
  10. Melinda Takeuchi, *Taiga’s True Views: The Language of Landscape Painting in Eighteenth-Century Japan* (Stanford: Stanford University Press, 1992).
  11. Yonemoto, *Mapping Early Modern Japan*.
  12. Kōno Motoaki, “Edojidai ‘shasei’ kō,” in *Nihon kaigashū no kenkyū* (Tokyo: Yoshikawa Kōbunkan, 1989).
  13. See chapter 9.
  14. Conrad Gessner, *Historia animalium*, 4 vols. (Zürich: Christoph Froshauer, 1551–58).
  15. See Nappi, *The Monkey and the Inkpot*, 50ss.
  16. Isono, *Egakareta dōbutsu shokubutsu*, 18.
  17. See chapter 4.
  18. See chapter 7.
  19. The four scrolls, still incomplete, were acquired in the modern era by the botanist Shirai Mitsutarō, who donated them to the National Diet Library where they are currently stored.
  20. Isono Naohide, “Kanō Shigekata ga *Sōmoku shasei*,” *Keiō Gijuku Daigaku hiyoshi kiyō—Shizenkagaku* 36 (2004): 2.
  21. The gillyflower (*Matthiola incana*) was known by the name of *barakos* in ancient Greece as a medicinal plant and both Theophrastus and Dioscorides treated it in details. In the Renaissance the *violacciocca*, as the *Matthiola incana* was known in Italy, was widely planted in many private botanical gardens. See Margherita Azzi Visentini, *Il giardino botanico di Padova e il giardino del Rinascimento* (Milano: Edizioni il Polifilo, 1984). See also Giuseppe Olmi, *L’inventario del mondo: Catalogazione della natura e luoghi del sapere nella prima età moderna* (Bologna: Il Mulino, 1992) on botanical gardens in Renaissance Italy.

22. The earliest datable source mentioning the *araseitō* is a manual in three volumes by the garden artist Mizuno Motokatsu, *Kadan kōmoku*, published in 1681.
23. See chapter 9.
24. Kimura, *Edoki no Nachurarisuto*, 222–25; Ueno, *Hakubutsugakusha retsuden*, 107–15; Yabe Ichirō, “Iwasaki Kan’en,” in Shimonaka, *Saishiki Edo hakubutsugaku shūsei*, 280–92; and Ōba, *Shokubutsugaku to shokubutsuga*, 220–30.
25. Kimura, *Edoki no Nachurarisuto*, 222.
26. As Maki Fukuoka put it, true-to-nature illustrations were effective “in attesting to the existence of a particular specimen and the direct observational experience of the specimen.” Fukuoka, *The Premise of Fidelity*, 106.
27. Foucault, *The Order of Things*, 134.
28. Kōno, “Edojidai ‘shasei’ kō,” 388–427.
29. Satō Dōshin, *Meiji kokka to kindai bijutsu* (Tokyo: Yoshikawa Kōbunkan), 218–22; see also Fukuoka’s reading of Satō in *The Premise of Fidelity*, 47–48. On a more theoretically sophisticated definition of “perceptual realism,” see Margaret Archer, Roy Bhaskar, Andrew Collier, Tony Lawson, and Alan Norrie, ed., *Critical Realism: Essential Readings* (London: Routledge, 1998).
30. See Koyasu, *Itō Jinsai: Jinrinteki sekai no shisō*, 28–59; Kanno Kakumyō, *Motoori Norinaga: Kotoba to miyabi* (Tokyo: Perikansha, 1991), 12.
31. *Gomō jiggi*, XX, 4, English translation by John A. Tucker in *Itō Jinsai’s Gomō jiggi*, 188.
32. Ekiken, *Yamato honzō*, “hanrei,” 2.
33. Endō, *Honzōgaku to yōgaku*, especially 73–155.
34. Fukuoka, *The Premise of Fidelity*, 7–8.
35. *Ibid.*, 105–54.
36. *Ibid.*, 106.
37. See Federico Marcon, “Review of *The Premise of Fidelity*,” *Journal of Asian Studies* 73, no. 1 (2014): 249–51.
38. For Jakusui, it was a matter of assigning the correct name—which in his case meant the entry name in *Honzō kōmoku*—to those species that, known in Japan under different names, displayed characteristics and properties reducible to the species name described in the Chinese encyclopedia. For Ekiken and Ranzan, it meant to format knowledge of plants and animals autochthonous to Japan—with their peculiar characteristics and names—in a way consonant to *Honzō kōmoku*’s system.
39. Daston and Galison, *Objectivity* (New York: Zone Books, 2007), 55–113.
40. *Ibid.*, 104.
41. See chapter 2 for an analysis of the concept of “species” in *honzōgaku*.
42. *Ibid.*, 40.
43. Eco, *Kant and the Platypus*, ch. 3.

44. The pun is taken from the opening of “The Fetishism of the Commodity and Its Secret,” in Karl Marx’s *Capital Volume I* (London: Penguin Classics, 1990), 163.
45. Nature, in her prodigious polysemy, sustains a number—not unlimited—of differing interpretations, whereby we could paraphrase Shigehisa Kuriyama’s phrase and talk about the expressiveness of nature. The ability to discriminate among the various views cannot be directly and immediately obtained from her material form, but it is directly related to the sophistication of the labor of manipulation, isolation, description, conceptualization, and so on performed upon nature, which in turn depends on the intersubjective consensus of a community of scholars.
46. Marx, *Capital Volume I*, 164–65.

#### PART V

1. *Exaptation* is a term I adopted from evolutionary biology. It was used by Stephen Jay Gould in 1982 to refer to a shift in the function of a trait or feature that was not produced by natural selection for its current use. Perhaps the feature was produced by natural selection for a function other than the one it currently performs and was then co-opted for its current function. For example, feathers might have originally arisen in the context of selection for insulation, and only later were they co-opted for flight. In this case, the general form of feathers is an adaptation for insulation and an exaptation for flight.

#### CHAPTER 12

1. On Kuroda Suizan, see Zenitani Buhei, *Kuroda Suizan den: Mō hitori no Kumagusu* (Osaka: Tōhō Shuppan, 1998); Sugimoto, *Edo no hakubutsugakushatachi*, 263–369; Ueno, *Hakubutsugakusha retsuden*, 117–30.
2. Harutomi also nominated Suizan to be his personal physician.
3. For a collection of letters that Suizan exchanged with Tatsunosuke and Shinzaburō, see Ueda Minoru, ed., *Bakumatsu honzōka kōshinroku: Kuroda Suizan — Yamamoto Shinzaburō monjo* (Osaka: Seibundō Shuppan, 1996).
4. Ueno, *Hakubutsugakusha retsuden*, 118.
5. *Ibid.*
6. Republished in 1822 in a revised and expanded edition by his adoptive son Genshin.
7. Konta Yōzō, *Edo no kashiyon’yanan: Kinsei bunkashi no sokumen* (Tokyo: Heibonsha, 2009).
8. Kornicki, *The Book in Japan*; Nagatomo Chiyoji, *Edo jidai no tosho ryūtsū* (Tokyo: Shibunkaku Shuppan, 2002). On the impact of the print in European intellectual history, see Elizabeth Eisenstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe* (Cambridge: Cambridge University Press, 1979); Adrian Johns, *The Nature of the Book: Print*

- and Knowledge in the Making* (Chicago: University of Chicago Press, 1998). On the endurance of manuscripts in early modern Europe, see Harold Love, *The Culture and Commerce of Texts: Scribal Publication in Seventeenth-Century England* (Amherst: University of Massachusetts Press, 1998). For China, see Susan Cherniack, "Book Culture and Textual Transmission in Sung China," *Harvard Journal of Asiatic Studies* 54, no. 1 (June 1994): 5–125.
9. See Terao, "Shizen" *gainen no keiseishi*, 233–37. The dictionary was based upon the Dutch-French dictionary written by François Halma, *Woordenboek der Nederdeitsche en Fransche Taalen* (Amsterdam: Rudolf en Gerard Wetstein, 1717). The early editions of Halma's dictionary were published four times in Utrecht and Amsterdam: in 1710 for Pieter Mortier, in 1717, in 1719 for J. van Poolsum in Utrecht, and in 1729 for R. & G. Wetstein & Smit in Amsterdam and also van Poolsum in Utrecht. See Elly van Brakel, "'Van een gantsch Nieuwe Wyze . . .' Over *De Schat der Nederfuitsche Wortel-woorden* (Corleva 1741)," *Trefwoord, tijdschrift voor lexicografie*, no. 15 (2010), 1–16, at [http://www.fryske-akademy.nl/fileadmin/Afbeeldingen/Hoofdpagina/pdf\\_files/pdf-corleva.pdf](http://www.fryske-akademy.nl/fileadmin/Afbeeldingen/Hoofdpagina/pdf_files/pdf-corleva.pdf).
  10. He also edited a revised version of Sugita Genpaku's *Kaitai shinsho* in 1829.
  11. For a complete list of his translation, Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 481–82.
  12. Ian J. Miller, *The Nature of the Beast: Empire and Exhibition at the Tokyo Imperial Zoo* (Berkeley: University of California Press, 2013), 25–30.
  13. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 486.
  14. See chapter 3.
  15. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 507.
  16. Quoted in Ueno, *Hakubutsugakusha retsuden*, 132.
  17. See Udagawa Yōan, *Shokugaku keigen, Shokubutsugaku*, ed. Ueno Masuzō and Yabe Ichirō (Tokyo: Kōwa Shuppan, 1980), 11–170. The Chinese mathematician Li Shanlan published with the aid of Alexander Williamson a Chinese translation of John Lindley's *Elements of Botany*, titled *Zhiwuxue* (1858). The introduction of Li's translation in Japan is not precisely dated, but it is conventionally considered the definitive adoption of *shokubutsugaku* as the modern term for botany. The text was printed in Japan in 1867 with the title of *Honkoku shokubutsugaku* (Botany in Translation). See Ri Zenran (Li Shanlan), *Shokubutsugaku (Zhiwuxue)*, in Ueno and Yabe, *Shokugaku keigen, Shokubutsugaku*, 175–382.
  18. Kuhn, *The Structure of Scientific Revolution*.
  19. Biagioli, *Galileo, Courtier*, 234.
  20. Yōan had the title of *hon'yakukan* and received a stipend from the shogunate as official translator of diplomatic correspondence.
  21. Sugimoto, *Edo no hon'yakukatachi*, 80–90.

22. Udagawa Yōan, *Seimi kaisō: Fukkoku to gendaigo yaku, chū*, ed. Tanaka Minoru (Tokyo: Kōdansha, 1975).
23. Quoted in Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 509.
24. See Roy Porter, *Flesh in the Age of Reason* (New York: W. W. Norton, 2004), 123–26. For biographical information on Hanaoka Seishū, see Sugimoto and Swain, *Science & Culture in Traditional Japan*, 387–90; Kaneko Tsutomu, *Jipangu Edo: Kagakushi sanpō* (Tokyo: Kawade Shobō Shinsha, 2002), 92–97; Hattori, *Edo jidai igakushi no kenkyū*, 448–49. See also Ellen Gardner Nakamura, *Practical Pursuits: Takano Chōei, Takahashi Keisaku, and Western Medicine in Nineteenth-Century Japan* (Cambridge, MA: Harvard University Press, 2005). For a contemporary medical perspective, see Masaru Izuo, “Seishu Hanaoka and His Success in Breast Cancer Surgery under General Anesthesia, Two Hundred Years Ago,” *Breast Cancer* 11, no. 4 (2004): 319–24.
25. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 496.
26. For a map showing the geographical distribution of Siebold’s students, see Rubinger, *Private Academies of Tokugawa Japan*, 115.
27. *Ibid.*, 117.
28. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 497.
29. Miyazaki Michio, *Shiiboruto to sakoku-kaikoku Nihon* (Tokyo: Shibunkaku Shuppan, 1997).
30. Ōba, *Edo no shokubutsugaku*, 160–63.
31. The story of his relationship with Takahashi Kageyasu is the most widely known. Kageyasu was, in Donald Keene’s words, “a peculiarly tragic figure”; Donald Keene, *The Japanese Discovery of Europe, 1720–1830* (Stanford: Stanford University Press, 1969), 147. A high-ranking scholar in the shogunal administration and court astronomer (*shomotsu bugyō* and *tenmongata*), Kageyasu passed to Siebold a series of classified maps of the northeastern regions of the Honshū island, of Ezo (modern-day Hokkaidō), and of Sakhalin in exchange for books. The incident (the so-called Siebold affair, *Shiiboruto jiken*) would eventually determine Siebold’s expulsion from Japan in the tenth month of 1829.
32. See Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 499.
33. Before, surgeons were routinely replaced every one or two years.
34. Koerner, *Linnaeus*.
35. The following brief biography of Itō Keisuke is based on Sugimoto Isao, *Itō Keisuke* (Tokyo: Yoshikawa Kōbunkan, 1960). See also Fukuoka, *The Premise of Fidelity*; Miller, *The Nature of the Beast*.
36. Sugimoto, *Itō Keisuke*, 19–68.
37. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 500.
38. *Ibid.*, 502.

39. Itō Keisuke, *Taisei honzō meiso*, in *Nagoya sōsho sanpen*, ed. Nagoyashi Hōsa Bunko (Nagoya: Nagoya Kyōiku Iinkai, 1982), 312. English translation, slightly modified, in Fukuoka, *The Premise of Fidelity*, 66. The passage does not appear in the 1828 original manuscript—which can be browsed online at <http://dl.ndl.go.jp/info:ndljp/pid/1286741/6>—but was added as an introduction in Chinese to the 1829 printed version of the text, which can be found at <http://dl.ndl.go.jp/info:ndljp/pid/2537377>.
40. Fukuoka, *The Premise of Fidelity*, 67.
41. Slides 114–17 at <http://dl.ndl.go.jp/info:ndljp/pid/2537377>.
42. Kimura Yōjirō, “Nihon ni okeru Rinne no shiyūzui bunrui taikai no dōnyū,” *Shokubutsu kenkyū zasshi* 59, no. 3 (1984): 78–90; Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 505.
43. Published in London in two volumes between 1779 and 1789. See Kimura, “Nihon ni okeru Rinne no shiyūzui bunrui taikai no dōnyū”; Miyazaki, *Shiiboruto to sakoku-kaikoku Nihon*; and Arlette Kouwenhoven and Matthi Forrer, *Siebold and Japan: His Life and Work* (Leiden: Hotei Publishing, 2000). Johann Mueller was a Swiss botanist who emigrated in England where he changed his name into John Miller.
44. Modern Japanese natural science, in fact, translates the categories of Western taxonomy utilizing *Honzō kōmoku*'s original categories, with only kingdom maintaining Yōan's rendition: kingdom (*regnum*) is *kai*, phylum is *mon* (a category introduced after Linnaeus), class is *kō*, order is *moku*, genus is *zoku*, and species is *shu*.
45. In the original *ruizoku*, but with the attached *furigana* reading “*gesuragato*”—that is, *geslacht*, the Dutch translation of genus.
46. Itō, *Taisei honzō meiso*, slide 12, <http://dl.ndl.go.jp/info:ndljp/pid/2537377>.
47. Sugimoto, *Itō Keisuke*, 225.
48. The University of Tokyo was renamed Teikoku Daigaku (Imperial University) in 1886, and it became Tokyo Imperial University (Tōkyō Teikoku Daigaku) in 1897. In 1947 it assumed its original name of the University of Tokyo (Tōkyō Daigaku).
49. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 503; Ueno, *Hakubutsugaku-sha retsuden*, 134–37.
50. Biagioli, *Galileo Courtier*, 232–42.
51. See next chapter on the case of the Satsuma Domain.
52. Itō Keisuke was in particular referring to smallpox epidemics, which ravaged Japan especially in the mid-nineteenth century. As Ann Bowman Jannetta demonstrated in *Epidemics and Mortality in Early Modern Japan* (Princeton, NJ: Princeton University Press, 1987), with the increase of contacts with Westerners in the late Tokugawa period, the frequency of epidemics augmented (especially of measles, smallpox, and cholera, all diseases that were not endogenous of Japan but were always imported from the outside through the open door of Nagasaki).

53. See Fukuoka, *The Premise of Fidelity*, 107–29.
54. Among these, the most well known was Inuma Yokusai. Ueno, *Hakubutsugakusha retsuden*, 104–6.
55. Shapin, *The Scientific Revolution*. As Shapin argued, “There was no such thing as the Scientific Revolution, and this is a book about it. . . . There was, rather, a diverse array of cultural practices aimed at understanding explaining, and controlling the natural world”; Shapin, *The Scientific Revolution*, 1.
56. Koerner, *Linnaeus*.

#### CHAPTER 13

1. Horkheimer and Adorno, *Dialectic of Enlightenment*, 233.
2. The original Latin is: “Recuperet modo genus humanum jus suum in naturam quod ei ex dotatione divina competit.” Francis Bacon, *Novum organum scientiarum*, in *The Works of Francis Bacon*, vol. 8 (London: C. & J. Rivington, 1826), 77.
3. Included in Linnaeus, “Två svenska akademiprogram” (1750), quoted from Koerner, *Linnaeus*, 104.
4. Peter Dear, “What Is the History of Science the History Of? Early Modern Roots of the Ideology of Modern Science,” *Isis* 96, no. 3 (September 2005): 390–406.
5. Latour, *We Have Never Been Modern*; Latour, *Politics of Nature*.
6. Neil Smith, *Uneven Development: Nature, Capital, and the Production of Space*, 3rd ed. (Athens: University of Georgia Press, 2008), 10.
7. Vogel, *Against Nature*, 78–79.
8. Smith, *Uneven Development*, 11–12.
9. Tessa Morris-Suzuki, *Re-inventing Japan: Time, Space, Nation* (Armonk, NY: M. E. Sharpe, 1988), 35–59; Saigusa Hiroto, “Nihon no chisei to gjijutsu,” in *Saigusa Hiroto chosakushū*, vol. 10 (Tokyo: Chūōkōronsha, 1973), 371–74.
10. John H. Sagers, *Origins of Japanese Wealth and Power: Reconciling Confucianism and Capitalism, 1830–1885* (New York: Palgrave Macmillan, 2006), 5.
11. Kanbashi Norimasa, *Shimazu Shigehide* (Tokyo: Yoshikawa Kōbunkan, 1980), 171–75.
12. Sagers, *Origins of Japanese Wealth and Power*, 6, 53–72.
13. See, for example, Ishii Takashi, *Gakusetsu hikan: Meiji ishin ron* (Tokyo: Ishikawa Kōbunkan, 1968).
14. Harold Bolitho, “The Tempō Crisis,” in *The Cambridge History of Japan*, vol. 5, *The Nineteenth Century*, ed. Marius Jansen and John Whitney Hall (Cambridge: Cambridge University Press, 1989), 116–67.
15. Susan B. Hanley and Kozo Yamamura, *Economic and Demographic Change in Pre-industrial Japan, 1600–1868* (Princeton, NJ: Princeton University Press, 1971), 147.
16. Ōguchi Yūjirō, “Tenpōki no seikaku,” in *Iwanami kōza Nihon rekishi*, vol. 12, *Kinsei* 4, ed. Asao Naojiro and Naoki Kōjirō (Tokyo: Iwanami Shoten, 1976).

17. Bolitho, "The Tempō Crisis," 22.
18. On regional nationalism and the concept of *kokuueki*, see Ochiai, "The Shift to Domestic Sugar and the Ideology of 'National Interest,'" 89–110.
19. Sagers, *Origins of Japanese Wealth and Power*, 6.
20. On Shigehide, see Ueno, *Hakubutsugakusha retsuden*, 62–72; Kanbashi, *Shimazu Shigehide*.
21. Sagers, *Origins of Japanese Wealth and Power*, 5.
22. On Satsuma in late Tokugawa Japan, see Robert K. Sakai, "Feudal Society and Modern Leadership in Satsuma-han," *Journal of Asian Studies* 16, no. 3 (May 1957): 365–76; Robert K. Sakai, "The Satsuma-Ryukyu Trade and the Tokugawa Seclusion Policy," *Journal of Asian Studies* 23, no. 3 (May 1964): 391–403; Hidemura Senzō, ed., *Satsuma han no kōzō to tenkai* (Tokyo: Ochanomizu Shobō, 1970).
23. Matsui Masatō, *Satsuma hanshū Shimazu Shigehide: Kindai Nihon keisei no kiso katei* (Tokyo: Honpō shoseki, 1985), 127–31.
24. Sagers, *Origins of Japanese Wealth and Power*, 42.
25. Albert M. Craig, *Chōshū in the Meiji Restoration* (Cambridge, MA: Harvard University Press, 1961), 71.
26. Joseph Needham, Christian Daniels, and Nicholas K. Menzies, *Science and Civilization in China*, vol. 6, bk. 3, *Biology and Biological Technology. Agro-Industries and Forestry* (Cambridge: Cambridge University Press, 1996), 450.
27. Miyazaki Yasusada, *Nōgyō zensho* (Tokyo: Iwanami Shoten, 1936), 391–92.
28. Matsui, *Satsuma hanshū Shimazu Shigehide*, 134–36.
29. Bolitho, "The Tempō Crisis," 6.
30. Mark Ravina, *Land and Lordship in Early Modern Japan*.
31. Luke Roberts, *Mercantilism in a Japanese Domain* (Cambridge: Cambridge University Press, 1998).
32. Fujita Teiichirō, *Kokuueki shisō no keifu to tenkai* (Osaka: Seibundō Shuppan, 1998).
33. And *karō*, head of retainers, after 1838.
34. Craig, *Chōshū in the Meiji Restoration*, 70.
35. Satō Nobuhiro, *Keizai yōryaku*, in *Nihon shisō taikei*, vol. 45, *Andō Shōeki, Satō Nobuhiro*, ed. Bitō Masahide and Shimazaki Takao (Tokyo: Iwanami Shoten, 1977), 522. English translation from Tessa Morris-Suzuki, *A History of Japanese Economic Thought* (London: Routledge, 1989), 35.
36. Satō Nobuhiro, *Suitō hiroku*, in *Satō Nobuhiro kagaku zenshū*, vol. 3, ed. Takimoto Shōichi (Tokyo: Iwanami Shoten, 1927), 412.
37. Morris-Suzuki, *A History of Japanese Economic Thought*, 36.
38. Satō, *Suitō hiroku*, 503. For further details, see Morris-Suzuki, *A History of Japanese Economic Thought*, 36.

39. Satō Nobuhiro, *Satsuma keii ki*, in *Satō Nobuhiro kagaku zenshū*, vol. 3, 671. For a different translation, see Sagers, *Origins of Japanese Wealth and Power*, 49.
40. Kanbashi Norimasa, *Zusho Hirosato* (Tokyo: Yoshikawa Kōbunkan, 1987), 99–119.
41. Kanbashi, *Zusho Hirosato*, 144–70.
42. *Ibid.*, 197–209. See also Kanbashi Norimasa, *Satsumajin to Yōroppa* (Kagoshima: Chosakusha, 1985), 75–89.
43. See Kanbashi, *Shimazu Shigehide*, 73–81.
44. This is a trope that can be traced as far back as the writings of seventeenth-century Confucian scholar Yamaga Sokō and that was continuously appropriated in the course of the Tokugawa period by scholars as diverse as Kaibara Ekiken, Motoori Norinaga, Hiraga Gennai, Andō Shōeki, and Aizawa Seishisai. In the twentieth century, it would become part of the nationalist rhetoric of *Kokutai no hongi* (The Essential Principles of the Nation), an ideological manifesto that sustained the imperialist expansion of Japan in the 1930s and early 1940s. See Thomas, “The Cage of Nature,” 21–22.
45. Satō Nobuhiro, *Kondō bisaku*, in *Nihon shisō taikai*, vol. 45, 426. Translated by Tessa Morris-Suzuki in *A History of Japanese Economic Thought*, 37–38.
46. Satō Nobuhiro, *Satsuma keii ki*, 679.
47. See chapter 7.
48. *Bref och skrivelser* (I:7, 27), quoted in Koerner, *Linnaeus*, 104.
49. Kanbashi, *Shimazu Shigehide*, 98–101.
50. Nanzan is one of Shigehide’s noms de plume.
51. Philipp Franz von Siebold, *Edo sanpu kikō*, trans. Saitō Makoto (Tokyo: Heibonsha, 1967), 186.
52. Ueno, *Hakubutsugakusha retsuden*, 69; see also Ueno Masuzō, “Shiiboruto no Edo sanpu ryokō no dōbutsugakushiteki igi,” in *Jimbun* 6 (Kyoto: Kyōdai Kyōyō Bukan, 1959), 309–25.
53. Shimazu Shigehide, *Gyōbō setsuroku* (Tokyo: Kokushi Kenkyūkai, 1917), 40.
54. Ueno, *Hakubutsugakusha retsuden*, 68.
55. Sō Senshun and Shirao Kunihashira, eds., *Seikei zusetzu* (Kagoshima: Satsumafugaku, 1804), especially vols. (*kan*) 1–12.
56. Shimazu, *Gyōbō setsuroku*, 22.
57. The history of *Seikei zusetzu*, now a “prefectural treasure” of Kagoshima, is in itself quite interesting, as the original wood blocks were repeatedly destroyed by fire and had to be recast. See Kanbashi, *Shimazu Shigehide*, 121.
58. Sō and Shirao, *Seikei zusetzu*, vol. 1, “Outline” (*Teiyō*), 1-left and 2-right. See the photographic reproduction at [http://archive.wul.waseda.ac.jp/kosho/nio1/nio1\\_02442/nio1\\_02442\\_0001/nio1\\_02442\\_0001.html](http://archive.wul.waseda.ac.jp/kosho/nio1/nio1_02442/nio1_02442_0001/nio1_02442_0001.html).
59. *Ibid.*, page 2-left.

60. Ibid., page 3-right.
61. *Seikei zusetsu*, vol. 1, “Agricultural Matters”, 1-left.
62. Ibid., 3-right.
63. Satō, *Kondō hisaku*, 426. Musubi no kami, *sanrei* in Nobuhiro’s text, refers to Kami-Musubi-no-kami and Takami-Musubi-no-kami as two of the first three gods in the mythological chapters of the *Kojiki*.
64. Ibid.
65. “Natura jugum recipit ab imperium hominis.” Aphorism 1 in Francis Bacon, *Parasceve ad historiam naturalem et experimentalem*, in *The Works of Francis Bacon*, vol. 2, ed. James Spedding, Robert Leslie Ellis, and Douglas Denon Heath (Boston: Houghton, Mifflin, n.d.), 47.
66. Senior Councilor Tadakuni’s attempt to stabilize the economy by appealing to frugality and moderation through new sumptuary laws were particularly unsuccessful. See E. Sydney Crawcour, “Economic Change in the Nineteenth Century,” in *The Cambridge History of Japan*, vol. 5, *The Nineteenth Century*, ed. Marius Jansen and John Whitney Hall (Cambridge: Cambridge University Press, 1989), 587–600.
67. Satō, *Keizai yōryaku*, 522. A different translation can be found in Morris-Suzuki, *A History of Japanese Economic Thought*, 35. It is worth pointing out that many of the terms Nobuhiro used in this line—*keizai*, *keiei*, *kaibatsu*, and so on—have since become part of the jargon of modern Japanese political economy.
68. Satō, *Keizai yōryaku*, 522.
69. Ibid.
70. Ibid.
71. See Saigusa, “Nihon no chisei to gijutsu,” 371–74; Morris-Suzuki, *Reinventing Japan*, 41.
72. Ekiken, however, never dissociated the “investigation of things” from its application in agricultural production. See chapter 5.
73. See Hijioka Yasunori, “Minakawa Kien no kaibutsugaku,” *Chūgoku kenkyū shūkan* 18 (Winter 1996); Hamada Shigeru, “Minakawa Kien no kaibutsugaku no hōhō ni tsuite,” *Kokubungaku kenkyū nōto* 27 (1993); Hamada, Shigeru, “Kaibutsugaku no hassō ni tsuite: *Kinchū sanjūroku soku wo chūshin ni*,” *Kokubun ronsō* 20 (1993). Simply put, Kien’s argument was that in ancient China, people were in a condition of sympathetic attunement with the universal life force *ki* and were therefore able to express with their voices the essence of things they came into contact with and named them accordingly. For Kien names and things shared the same substance, being moved by the same spontaneous activity (*shizen no gi*). The development of the writing system had the pernicious effect of clouding this empathic understanding of things by separating objects and their names through the meaning embedded in the written characters. The similarity of Kien’s argument with Motoori Norinaga’s philosophy of language is striking.

74. Joseph Needham, Ho Ping-Yü, Lu Gwei-djen, and Wang Ling, *Science and Civilisation in China*, vol. 5, bk. 7, *Military Technology: The Gunpowder Epic* (Cambridge: Cambridge University Press, 1987), 102.
75. Song Yingxing, *T'ien-Kung K'ai-Wu: Chinese Technology in the Seventeenth Century* (University Park: Pennsylvania State University Press, 1966), xiv. See also Dagmar Schäfer, *The Crafting of the 10,000 Things: Knowledge and Technology in Seventeenth-Century China* (Chicago: University of Chicago Press, 2011), 20–21.
76. Kikuchi Toshiyoshi, *Zufu Edo jidai no gijutsu*, vol. 1 (Tokyo: Kōwa Shuppan, 1988), 85. See also Morris-Suzuki, *Reimagining Japan*, 43–44.
77. The same characters, read as *keidai*, refer to the enclosed precinct of a shrine or a temple; it is worth noting the sacred connotations given to the country enclosed by borders.
78. Satō, *Keizai yōryaku*, 535.
79. Despite the fact that some physiocrats, especially François Quesnay, developed their theories inspired by ideas of Chinese Confucian agrarianism circulating in seventeenth- and eighteenth-century Europe, individual entrepreneurship and private property remained for them axiomatic assumptions. See Arnold H. Rowbotham, “The Impact of Confucianism on Seventeenth Century Europe,” *Far Eastern Quarterly* 4 (1945): 224–42; Lewis A. Maverick, *China, a Model for Europe* (San Antonio, TX: Paul Anderson, 1946).
80. Satō, *Keizai yōryaku*, 535.
81. Satō, *Keizai yōryaku*, 536.
82. *Ibid.*
83. Karl Marx, *Capital*, 637–38. Although Marx did not develop a thorough conceptualization of “nature” and the environment, his thought has nonetheless influenced a number of environmental thinkers. See Alfred Schmidt, *The Concept of Nature in Marx* (London: Verso, 1971); Foster, *Marx's Ecology*.
84. As Robert Stolz has recently argued, the notion of nature’s unlimited capacity to produce laid the foundation of the agricultural and industrial expansion of Japan in the Meiji period, often with disastrous consequences for the natural environment and the health of its people. Robert Stolz, *Bad Water: Nature, Pollution, and Politics in Japan, 1870–1950* (Durham: Duke University Press, 2014).
85. Satō, *Keizai yōryaku*, 536.
86. *Keizai yōryaku* and *Sonka zateki ron* are the two texts in which Nobuhiro developed the concept of *fukoku*. The third chapter of *Keizai yōryaku* is titled precisely “*Fukoku*,” and it begins by stating, “Those who wants to make the country prosperous must first of all rectify the circulation of wealth and making sure there is no disturbance in its working.” Satō, *Keizai yōryaku*, 549. That is, the ruler must intervene by maintaining the flow of money and commodities in redistribution as well as in domestic and international trade.

87. Satō, *Keizai yōryaku*, 537.
88. This included season, position of the stars, temperature, and so on.
89. Satō, *Keizai yōryaku*, 537.
90. *Ibid.*
91. *Ibid.*, 536.
92. *Ibid.*, 547.
93. *Ibid.*, 548.
94. Edo Tekirei, *Chiyō no sugata* (Tokyo: Seinen Shobō, 1939).
95. Herbert Marcuse, *Five Lectures* (Boston: Beacon, 1970), 1.
96. Max Weber, “Science as a Vocation,” in *From Max Weber*, ed. H. H. Gerth and C. Wright Mills (Oxford: Oxford University Press, 1946), 155.
97. Two elements that Horkheimer and Adorno ascribed, following Weber and Marx, to the modernization process. See Alison Stone, “Adorno and the Disenchantment of Nature,” *Philosophy and Social Criticism* 32, no. 2 (2006): 231–53.
98. Although it should be noted that in the Meiji period, it coexisted with the opposite view whereby Japan was a country peculiarly poor of natural resources, an argument that would be mobilized to sustain Japan’s imperial expansion. See Satō, “*Motazaru kuni*” *no shigenron*.
99. Thomas, *Reconfiguring Modernity*.

#### EPILOGUE

1. Yanagita Kunio, “Tsuka to mori no hanashi,” in *Yanagita Kunio zenshū*, vol. 15 (Tokyo: Chikuma Bunko, 1990). English translation in Hamashita Masahiro, “Forests as Seen by Yanagita Kunio: His Contribution to a Contemporary Ecological Idea,” *Diogenes* 207 (2005): 14.
2. Yanagita Kunio, *The Legends of Tono*, trans. Ronald A. Morse (Lanham: Lexington Books, 2008).
3. Thomas, *Reconfiguring Modernity*; Harootunian, *Overcome by Modernity*. See also Gerald A. Figal, *Civilization and Monsters: Spirits of Modernity in Meiji Japan* (Durham: Duke University Press, 1999).
4. Conrad Totman, *A History of Japan* (Malden, MA: Blackwell, 2000).
5. Harootunian, *Overcome by Modernity*, 18.
6. James R. Bartholomew, *The Formation of Science in Japan: Building a Research Tradition* (New Haven: Yale University Press, 1989), 9.
7. See Carol Gluck, “The Invention of Edo,” in *Mirror of Modernity: Invented Traditions of Modern Japan*, ed. Stephen Vlastos (Berkeley: University of California Press, 1998), 262–84; Carol Gluck, *Japan’s Modern Myths: Ideology in the Late Meiji Period* (Princeton, NJ: Princeton University Press, 1985).
8. In Japanese, *kohonzō fukko*. Ueno, *Hakubutsugakusha retsuden*, 138–44.
9. *Ibid.*, 145–48.

10. Ibid., 148–51. Ono Mototaka was a member of the shogunal Institute of Medicine (*Igakukan*).
11. Ibid., 169–76.
12. Ibid., 180–89.
13. Ibid., 190–96.
14. Ibid., 197.
15. Nishimura, *Bunmei no naka no hakubutsugaku*, vol. 2, 520–27, 544–56.
16. Miller, *The Nature of the Beast*.
17. Shirai Mitsutarō, *Jumoku wamyō kō* (Tokyo: Uchida Rōkakuho, 1933).
18. Andrew E. Barshay, *The Social Sciences in Modern Japan: The Marxian and Modernist Traditions* (Los Angeles: University of California Press, 2004), 241.
19. An antiquarian, writes Nietzsche, “possesses an extremely restricted field of vision. . . . There is a lack of that discrimination of value and that sense of proportion which would distinguish between the things of the past in a way that would do true justice to them; their measure and proportion is always that accorded them by the backward glance of the antiquarian nation or individual.” Friedrich Nietzsche, “On the Uses and Disadvantages of History for Life,” in *Untimely Meditations*, ed. Daniel Breazeale (Cambridge: Cambridge University Press, 1997), 74.

