

HYBRID DISCOURSE AND TEXTUAL PRACTICE: SINOLOGY AND NATURAL HISTORY IN THE NINETEENTH CENTURY

Fa-ti Fan

Max Planck Institute for the History of Science, Berlin

The institutionalization of sinology took place in Continental Europe in the first half of the nineteenth century, and later in Britain.¹ It was a latecomer to what has been called the discursive formation of Orientalism.² In China, Western sinologists had scholarly organizations, the most important of which was a branch of the powerhouse of British Orientalist scholarship — the Royal Asiatic Society. Like natural history, however, sinology cannot be understood in isolation. Many nineteenth-century Westerners in China had interest in both sinology and natural history, and they did not pack them in neatly separate intellectual compartments, but considered and pursued them as related enterprises. As we shall see later, the sinologist-naturalists shared with other Orientalists certain interests, ideas, and research techniques, and their Orientalist background informed their research into China's natural history.

The main goal of this essay, however, is not to emphasize the ideology of European imperialism in nineteenth-century scientific representation of China's natural world. Instead, it examines the ways in which Western research into Chinese writings about the natural world resulted in the formation of a hybrid discourse between sinology and natural history. I would like to describe and explain the historical circumstances and ways in which the Western naturalists approached, interpreted, and translated Chinese knowledge of the living world as contained in Chinese texts. I focus on the process instead of the result. I want to find out why they consulted Chinese works, what Chinese works they most frequently used and why, and how they construed and unfolded Chinese texts for the purpose of natural historical research.³

Because of its sinological content, the work of the sinologist-naturalists may appear distinctive. I will argue, however, that at a deeper level, their work was hardly a tiny island of eccentric scholarship in the grand river of Western natural history — isolated, localized, and remote from the mainstream. The use of textual evidence, philological data, and historical documents had always been part of the scholarship and practice of natural history. In certain branches of nineteenth-century natural history, this component was of critical importance to the research. In working with Chinese texts, the naturalists actually engaged in a scholarly practice congruent with the scope and tradition of natural history. The tradition of textual practice — as opposed to other forms of scientific practice, such as fieldwork and museum practices — has been neglected by historians of nineteenth-century natural history.⁴ This essay challenges the conventional view that the role of texts

diminished in natural history at some point in the early modern period and that the science metamorphosed into one that was based on direct observation and anatomical investigation.⁵ I would suggest that textual practice and the tradition of employing humanistic scholarly apparatuses remained fundamentally important in that branch of science as late as the nineteenth century.⁶

Much of our discussion will concern cross-cultural translation between different knowledge traditions and between different languages. Some scholars have asserted that there was a fundamental cultural incommensurability between China and the West that was rooted in mental categories, languages, or worldviews.⁷ Part of their intention was to critique the pitfall of judging Chinese culture from a Eurocentric point of view. Ironically, however, they ended up repeating the orientalist discourse by drawing a demarcation between China and “the West”. In this view, each culture becomes a fixed, rigid structure, and different cultures become seen as mutually exclusive.⁸ This viewpoint assumes and essentializes culture rather than explains it. Moreover, it ignores what historical actors actually did and turns them into powerless dolls imprisoned in the glass house of culture.⁹ The rigid dichotomy inherent in such a view makes any nuanced explanation of cultural encounters impossible. However complex the translation and comparison between Chinese and European knowledge about nature’s objects may appear to modern investigators, the historical actors practised it anyway, and it is exactly this phenomenon that needs to be explained within its historical context. By focusing on the textual practice and strategies of reading of the naturalists, I will examine the historical actors’ motivations, goals, criteria, and practices of translation. I am interested in what they thought and experienced and how they defined, negotiated, and crossed the boundaries between knowledge traditions.

Extant documents do not allow us fully to reconstruct the roles and intentions of the Chinese participating in the scientific enterprise. The Chinese, no doubt, took part in collecting, interpreting, and translating information in conducting research into Chinese books for natural historical research. Without native assistants, even the best sinologists in China found themselves skating on thin ice.¹⁰ I will indicate the roles of the Chinese whenever evidence warrants useful conjectures. Unfortunately, however, we probably will never be able to ascertain the details of their involvement in the enterprise and to examine how they negotiated linguistic and knowledge categories with their Western associates in translating Chinese works.¹¹

I

The connections between sinology and natural history did not begin in the nineteenth century. During the seventeenth and early eighteenth centuries, Jesuit missionaries, who had established themselves in China since the late sixteenth century, played a key role in transmitting information about China, including its literature on the natural world, to Europe.¹² Letters to their European headquarters, collected and compiled by brothers at home, together with works by the returnees, became

the authoritative accounts of China and set European scholars buzzing. What a bewildering task it must have been for the Europeans to navigate through the uncharted waters of Chinese subjects! Take the Chinese language. Matteo Ricci claimed from China that “no other language is as difficult for a foreigner to learn as the Chinese”.¹³ With rare luck, seventeenth- and eighteenth-century scholars in Europe might find visiting Chinese to help them crack the script.¹⁴ Almost all of them, however, had to work solely from the sundry ideographs recorded in Jesuit writings.¹⁵ So little was known about the language, so exotic and esoteric did it seem to Europeans that many theories were generated to explain its origins and nature. Some, like John Webb, believed that it was the first spoken language of mankind.¹⁶ Others, including Athanasius Kicher and later Joseph de Guignes and Lord Monboddo, were convinced that it derived from Egyptian hieroglyphs.¹⁷ In the international search for a universal language during the seventeenth and eighteenth centuries, John Wilkins and Gottfried Leibniz, among others, looked for inspirations in Chinese.¹⁸ Issues about Chinese popped up again and again in the Enlightenment debates about the origin of language. Yet, with little information to count on, European scholars ended up scratching their heads sometimes and performing intellectual acrobatics at other times.¹⁹

Similar confusion occurred in discussions on other Chinese subjects. The Jesuits, knowledgeable in all branches of science, wrote extensively on China’s natural history, and their writings provided European naturalists with enticing glimpses of the natural riches of the mysterious Middle Kingdom. The learned tomes of Martini, Kircher, Le Come, and other Jesuit fathers contained many intriguing descriptions of Chinese plants and animals.²⁰ The interest in China’s natural history and in Chinese literature converged in many ways. The Chinese had produced an enormous amount of literature that dealt with plants, animals, and minerals. The Jesuits made use of this information. As early as the mid-seventeenth century, Michael Boym, a Polish Jesuit to China, wrote works on Chinese drugs and medicine which were based partly on Chinese herbals.²¹ The results of his research were incorporated into Kircher’s influential *China illustrata* and gave rise to debates over the musk deer and the snakestones.²² Ginseng, rhubarb, camphor, and other curious animals and plants of supposedly Chinese origins continued to baffle generations of European scholars, not least because of often scanty and contradictory reports.²³ Even Linnaeus had to grope in the dark. Knowing little about tea, Linnaeus was eager to introduce and grow the plant in the soil of Sweden. His great scheme flopped badly.²⁴ The volumes of du Halde served generations of European naturalists as a storehouse of information about Chinese flora and fauna.²⁵ The work was translated into all major European languages. It contained excerpts from the great Chinese herbal *Bencao gangmu* and made it well-known in the West. The long-lasting importance of du Halde says as much of its comprehensiveness as of the Europeans’ lack of means to investigate the natural history of China.

II

Both sinology and Western research into China's natural history were taking new forms in the nineteenth century. Sinology was becoming institutionalized: a chair in Chinese language studies was created at the Collège de France in 1814;²⁶ other European countries followed suit in the subsequent decades. Most of the first academic sinologists in Europe had never been to China. The Chinese government had long imposed strict restrictions on foreigners' activities. During the 85 years before the opening of the treaty ports in 1842, all Western trade took place in Canton, a city on the southern coast of China.²⁷ Apart from the Russians, Catholic missionaries were the only Westerners who had obtained footholds in the interior of China, and even they were thrown into precarious existence from time to time.

As the century unfolded, more and more Westerners went to China and many resided there for years or even decades before returning to Europe. In the later part of the nineteenth century, academic sinologists in Europe were mostly recruited from this pool of talent and experience. Meanwhile, the widening of Sino-Western contact brought about new opportunities for Westerners to study the flora, fauna, and geology of China. A comparison between two standard works about Chinese flora across the century — Loureiro's *Flora cochinchinensis* (1788) and Forbes and Hemsley's *Index florae sinensis* (1886–1905) — testifies to the remarkable achievement. The British, who had hitherto contributed practically nothing to Western sinology and knowledge of China's natural history, played a major role in the process of this transformation.²⁸

Despite their ascendancy in the China trade since the eighteenth century, the British lagged embarrassingly behind France in the investigation of China's natural history.²⁹ Before the nineteenth century, only a few Britons acquired any acquaintance with the Chinese language. The situation improved slightly during the first decades of the nineteenth century when several individuals, notably George T. Staunton and Robert Morrison, made headway into sinology and earned grudging recognition from their Continental colleagues. Most of these pioneering British sinologists were associated with the Canton Factory of the East India Company, and some of them were interested in natural history. They and some others in Canton were duly incorporated into the global network of British scientific organizations, chiefly the Horticultural Society and Kew Gardens, to which they sent specimens and scientific data.³⁰

Confined to a corner of Canton, British naturalists in China were at the same time enchanted by the reputed natural riches beyond their reach and frustrated by the impossibility of gratifying their curiosity. “[The] works of nature in China are shut out from our gaze”, sighed a Western resident in Canton.³¹ Without direct access to China's nature, the naturalists sought to maximize whatever they could lay their hands on; they hoped to open a window: “we can look into the books of the Chinese.... Their medical and botanical treatises are numerous and voluminous indeed, and we might reasonably promise ourselves a reward in reading them.”³²

However, it was only in the second half of the nineteenth century that many

Westerners were able to look through the window. The number of Westerners who knew Chinese increased spectacularly during the period together with the expansion of the diplomatic and missionary organizations. Defeats on battlefields forced China to open treaty ports to Western powers for trade. New opportunities brought in hundreds of merchants, diplomats, and missionaries from Europe and the United States. Few merchants bothered to learn Chinese; they depended heavily on the linguistic assistance of Chinese compradors and clerks.³³ Diplomats and missionaries, on the other hand, needed some proficiency in the language to carry out their duties. The British Consular Service in China and the Imperial Maritime Customs of China, the two most important diplomatic institutions in the country at that time, required their employees to learn the Chinese language.³⁴ Indeed their employees' chances of promotion were determined to a great extent by their linguistic skills.³⁵ Like diplomats, missionaries in China needed knowledge of Chinese to advance their cause. Not only did they regularly have to use Chinese in their services, but they were also eager to penetrate the heathen mind and to grasp Chinese thought. Under these demands, it is little wonder that many missionaries became diligent sinologists.³⁶

These non-scientific organizations turned out to produce corps of researchers on natural history and provided networks for scientific information. Junior members of the British Consular Service and the Chinese Customs — young, energetic, aspiring, and educated — could make ideal naturalists. They were excited by the vision of infinite opportunities in a vast empire whose flora and fauna were scarcely known to Westerners.³⁷

III

After the 1850s Shanghai replaced Canton as the principal international port of China and had a thriving Western community.³⁸ As the population of Western residents in China grew, their cultural and intellectual life flourished. The Shanghai Literary and Scientific Society was founded in 1857 and would become the North China Branch of the Royal Asiatic Society (NCBRAS) in the next year.³⁹ It was the centre of sinological research in China, holding regular meetings and possessing a large research library. Natural history ranked high among the intellectual pursuits promoted by NCBRAS. In his Presidential Address, E. C. Bridgman, first President of the Society, urged its members to pursue natural history and introduce the natural world of China to the West, a view shared by many.⁴⁰

The Society's journal, the most prestigious Western journal in China, was scholarly and influential. There were a few other learned journals that set themselves apart from the myriad Western periodicals in China. The major Protestant missionary journal *Chinese repository* began in 1832. It published articles on a wide range of subjects — religious, historical, philological, ethnographic, and scientific. This important journal, however, folded in 1851. The *Chinese recorder* filled the gap in 1867. *Notes and queries on China & Japan* was also launched in 1867 and would evolve into *China review*, a respected journal on Chinese studies. These

were among the regular venues for Western scholars in China to express thoughts, discuss research, and exchange discoveries. The *Journal* of the NCBRAS, for example, published research articles of over one hundred pages as well as short reviews. *Notes and queries*, as its title indicates, served mainly as a bulletin for serious queries and replies dealing with Chinese and Japanese subjects, but it also carried learned papers.⁴¹

The influence of these journals and organizations was not limited to the Shanghai area. The membership of the NCBRAS, which reached 150 in the late 1860s and grew to approximately 250 in the 1880s, spread widely to other treaty ports and beyond. As for the journals, *Notes and queries* hailed from Canton and Hong Kong; the *Chinese recorder* was from Fuzhou, also in South China. The journals found readers even in Europe. The expansion of Western communities in China and the proliferation of channels for scholarly discussion in the 1860s and '70s helped to form a discursive forum guided by the aim of sinological research.

This development co-evolved with the formation of an identity corresponding to their expertise and geographical position. Sinologists in China saw themselves as experts with unique access to their research subject. Major contributors to the China journals enjoyed scholarly reputations not only among Westerners in China, but also in the international circles of sinology. Some of them, like the missionary James Legge, were among the foremost sinologists of the West.⁴² Compared with their colleagues in Europe, they had the advantage of having direct contact with the Chinese. They could “investigate, at the fountain head, all that bears upon the physical, intellectual, and moral condition, of this countless population”.⁴³ Moreover, it was infinitely easier for them to obtain help from native scholars. Not only did they have Chinese tutors teach them the language and Chinese writers do office work, but they could even obtain native mandarin-scholars’ help through friendship or semi-official relationships. When W. F. Mayers, eminent sinologist and Vice-Consul at Canton, conducted research on maize in China, he received assistance from local Chinese mandarins. And the Chinese Intendant of the Grain Revenue for the Province of Guangdong prepared for him a paper based on Chinese sources.⁴⁴

Many of the sinologists took up natural history either as a pastime or as a serious pursuit. Few of them attained a European reputation as distinguished natural historians, but they were lords of their chosen fields. In addition to necessary training in Western natural history, a competent investigator needed to possess a certain familiarity with Chinese literary traditions, knowledge of Chinese historical geography, and the ability to decipher the nomenclature and descriptions in Chinese works on natural history. As sinologists, as individuals who possessed first-hand knowledge of the enigmatic country, China, the naturalists took pride in their expertise. They wished to leave imprints not only in their writings, but also in their nomenclature.⁴⁵ Robert Swinhoe poked fun at “the great naturalists at home” for their indiscriminate application of the name *Sinensis* to “everything that came to them from China”. The specimens, he wrote, might have come “from some isolated

spot in this vast empire, or from some distant part of Thibet or Manchuria".⁴⁶ Swinhoe himself could be very specific. He named a rat after the Chinese pirate-king Koxinga, who expelled the Dutch from Taiwan and colonized the island, because the rat had emigrated from mainland China and dominated the indigenous species of rats in Taiwan.⁴⁷ He once proposed to name a bird discovered on the island of Hainan after the eleventh-century literary figure Su Dongpo, who spent many years on the remote island. The Cambridge ornithologist Alfred Newton did not appreciate this sinological touch and ultimately persuaded Swinhoe to give it up.⁴⁸ Less whimsical than Swinhoe, Emil Bretschneider recommended that plants be named after their indigenous names to preserve their origins. He cited the examples of Litchi, Moutan, Yulan, etc. with approval, and deplored the tendency to name plants after "savants or other persons (who frequently had nothing to do with the plant dedicated to them)..."⁴⁹

The establishment of an intellectual identity and a forum for exchanging information and expressing opinions also allowed the formation of a hybrid discourse, one that combined the vocabulary, concepts, and purposes of sinology and natural history. Although the China journals were not primarily scientific periodicals, Western naturalists in China found them a convenient place to publish their discoveries. The most accomplished, no doubt, preferred to have their technical papers appear in specialist journals in Europe. The botanist Henry Hance and the zoologist Robert Swinhoe, for example, each published scores of articles in leading scientific journals in Europe, including the *Journal of botany* and the *Journal of the Linnean Society*. Most of the papers were reports in systematic botany and zoology.

Technical articles of the same kind did occasionally appear in the China journals. Yet, with some exceptions, notably Hance and the Jesuit chonologist Pierre Heude, most Western naturalists in China did not distinguish themselves in systematics.⁵⁰ A number of them, such as Swinhoe and the Lazarist Armand David impressed their European colleagues as field naturalists.⁵¹ Most were competent collectors who brought their sinological interest to bear on natural history. Their endeavours could be about economic botany, *materia medica*, or (to use an anachronic term) ethnoscience — the study of Chinese knowledge of the natural world. Their publications were in the form of travel writing, book reviews, or enumerations of the animals and plants of a particular area. Since their writings included sinological research — philological inquiries, discussion on Chinese history and culture, analysis of certain texts, and so on — most natural historians of Europe would find this part of their work esoteric, but could not ignore its often valuable conclusions. The sinologist-naturalists carved out a scholarly territory in which the discourses of sinology and natural history blended. Or put differently, in the discussion forum, they conversed in a "creole" that would defeat most naturalists in Europe.⁵²

Overemphasizing boundary drawing, however, can obscure the fact that many sinologist-naturalists were actually well connected to the scientific communities in Europe. The enterprise of natural history still relied much on the network of

correspondence so essential to the working of the nineteenth-century scientific community. Swinhoe, Hance, the botanical collector Augustine Henry, Emil Bretschneider, who was Physician to the Russian Legation in Beijing, and many other contributors to the China journals kept regular correspondence with scientific organizations in Europe. Those in Europe had much to draw on from their far-away colleagues' unique access to the natural history of China and their sinologically informed research. Western naturalists in China, on the other hand, gained from this connection prestige, influence, and indirect access to the well-stocked museums and herbaria in Europe.⁵³

IV

Like their colleagues in Europe, Western naturalists in China tended to specialize in one or two branches of natural history while maintaining interest in others. The sinologist-naturalists often preferred scientific research with a humanist bent. They roamed in the border areas between natural history and civil history, between the natural sciences, such as zoology and botany, and the human sciences, such as philology and ethnography. Careful consideration of the sinologist-naturalists' reasons for consulting Chinese works will help us to restore the truncated picture and reconfigure the map of knowledge in nineteenth-century natural history. The various reasons might be grouped into two rough categories: one primarily concerning the study of Chinese culture; the other, investigations of China's natural history.

As sinologists, the naturalists had noticed that the Chinese possessed an enormous amount of literature about plants, animals, and other natural objects. Their herbals, agricultural and horticultural literature, encyclopedias, travel writing, and local histories all contained much information about the natural environment.⁵⁴ These writings featured significantly in traditional Chinese literature. The sinologist-naturalists recognized the value of this literature in understanding Chinese culture and occasionally deliberately approached the literature from the standpoint of a sinologist. For example, Theophilus Sampson, a frequent contributor to *Notes and queries*, made clear in a paper that its subject was "figs ... from a Chinese and popular point of view, and not figs in a botanical sense".⁵⁵ To assess Chinese achievements in natural history, Thomas Watters, a member of the British Consular Service, "devoted a considerable amount of time" to studying pigeons in Chinese literature; he also investigated the fox in Chinese myths.⁵⁶ In these cases, the naturalist-sinologists studied the native (i.e. the Chinese) knowledge of their natural environment, and examined animals and plants in Chinese culture and society. The primary goal of this kind of research was not so much to investigate China's natural history as to understand Chinese civilization.

Exploring Chinese culture through natural historical literature constituted only a small part of the naturalists' enterprise. A more immediate reason for digging into Chinese works on natural history came from their desire to unearth data that might assist investigations of the natural history of China. The British faced tremendous

obstacles to any systematic exploration of China because of China's strict policy towards foreign activities in the interior. Travel inland would become relatively easy as the nineteenth century drew to its close, but information brought back from occasional adventures into areas distant from Western communities could hardly add up to a satisfactory picture of the natural riches of so enormous an empire. Under these circumstances, British naturalists in China understandably wished to take full advantage of such a unique and potentially valuable source of information as Chinese literature.

Among the things that they hoped to discover in Chinese literature was information about Chinese *materia medica*.⁵⁷ Many Westerners in China turned their attention to Chinese works on natural history because of their curiosity about Chinese drugs and herbal remedies. They were convinced that there must be some items of efficacy in the bizarre mass of Chinese medicinal substances. Identifying the dried and processed roots, stems, and leaves was no easy task, for even an experienced taxonomist needed well-preserved flowers, fruits, and leaves to determine a plant's identity. In China, drugs came from all corners of the empire, especially from the mountainous regions in the interior, where few European naturalists had ever visited and whose floras were little known. To trace an original plant from mutilated, deformed parts necessarily involved much guesswork. And the naturalists combed through the Chinese lore for clues.

Daniel Hanbury, a distinguished pharmacologist in London, analysed the drugs sent to him by his brother Thomas from Shanghai. Despite his recognized professional expertise, he sought help from British doctors and naturalists in China and even made efforts to learn Chinese so that he could work at fragments from the major Chinese herbal, *Bencao gangmu*.⁵⁸ In China, Frederick Porter Smith, a missionary doctor in Hankow, central China, compiled a treatise on Chinese *materia medica*, culling material from Chinese herbals as well as Western works.⁵⁹ He embarked on this project mainly because he thought a better understanding of Chinese drugs might be of use to Western and native missionary doctors in China. Information about Chinese medicines was deemed so important that Robert Hart, Inspector General of the Chinese Customs, ordered the officers at different ports to send in reports on the drugs traded there.⁶⁰ The celebrated botanical collector Augustine Henry, a surgeon of the Chinese Customs, plunged himself into botany partly as a recreation, but he was also powered by an interest in identifying Chinese medicinal plants and drugs.⁶¹ He worked hard at Chinese books on plants and published several articles on the subject. Those who did not know Chinese found other ways to unlock the Chinese lore of *materia medica*. Charles Ford, Superintendent of the Hong Kong Botanic Gardens, developed an interest in Chinese drugs and collaborated with Ho Kai, a Chinese barrister with a medical degree from Edinburgh, on a project elucidating Chinese *materia medica*.⁶²

Last but not least among the reasons why the naturalists sought information in Chinese works was their interest in geographical botany and the history of cultivated plants. The problem of geographical distribution of plants and animals had long

been a major issue in natural history and had inspired different approaches and theories to explain the pattern, process, and underlying causes of the distribution of floras and faunas.⁶³ The issue became even more important after the first decades of the nineteenth century, in part because of the influence of Humboldtian botanical geography. New and often controversial theories of migration, earth history, and Darwin's theory of evolution were also brought to bear on the challenging problem. Few sinologist-naturalists were equipped to enter this contested field, although many of them were aware of the discussion.⁶⁴ However, they shared the great Swiss botanist Alphonse de Candolle's interest in bringing human history into the study of botanical geography.⁶⁵ Candolle had included human agency in his list of means by which plants had been transmitted. If one wanted to find out how the current distribution of plants had come into being, human history had to be part of the explanation. And because of their relevance to economic botany, agriculture, and the history of civilizations, cultivated plants deserved special attention. He had also suggested that Chinese texts might contain useful clues to some of the questions regarding the history of cultivated plants.⁶⁶

Emil Bretschneider wrote influential monographs to prove that Chinese works held keys to many questions regarding geographic botany and the history of cultivated plants. He argued that such works could be used to trace the origins of many cultivated plants and even to determine the routes of transmission.⁶⁷ For example, they provided information for deciding if certain plants in China had been introduced from America or had been in the empire since time immemorial. Another example must suffice. Historical records had it that Zhang Qian (*fl.* 120 B.C.) brought back melons, grapes, and other curious fruits from his diplomatic mission to central Asia. While scholars disagreed about the particulars of the story, they took it seriously and tested it against evidence collected from sources in other languages.⁶⁸ The sinologist-naturalists' intellectual background helped to explain why they were attracted to the particular areas of research. Their interest in Chinese civilization, their taste for literary studies, and their knowledge of sinology/philology steered them towards research involving these concerns. Bretschneider found systematic botany (i.e. classifying plants) "dried" and "monotonous", not the least because it left out "the relation of the plants to man".⁶⁹ He spoke for many of his colleagues in China. Like natural history, historical geography and philology were popular subjects among Western scholars in China. The pages of the China journals were full of reports, queries, and heated debates on the subjects, which often dealt with the historical contact between China and other parts of the world, particularly India and central Asia. The cultural exchange among China, India, and central Asia had been consequential and left its traits in languages, religions, material culture, domesticated animals, and cultivated plants. Sinologists in China applied Orientalist scholarship, such as comparative philology, which had been developed by scholars of Indo-European languages, to historical geography, ethnography, and natural history.

The sinologist-naturalists' interests in natural history and the other areas of

research were not separate. Not only did they use historical geography to inform natural historical research, but they were able to mobilize natural history to assist their work in historical geography. For instance, Bretschneider, an eminent historical geographer among other things, and Sampson took part in a debate about the claim made by some European sinologists that a Chinese Buddhist monk discovered America in the sixth century.⁷⁰ The monk's account included descriptions of interesting plants and animals he came across in the country. Sampson and Bretschneider culled evidence from Chinese botanical works to refute their European colleagues' assertion. The "Fu-sang" tree was not the Mexican aloe, they argued. And the country in question was probably Japan.

v

Compared with the times of Old Canton, the British in China had access to much larger numbers of Chinese texts in the second half of the nineteenth century. The British could now buy books in major cities without difficulties. The increased availability broadened their contact with Chinese literature and enabled them to consult a much wider range of sources in their natural historical research. I have been very liberal in using terms like "Chinese works on natural history" or "Chinese botanical works", for the naturalists themselves used these descriptions. This habit of imposing their own categories on Chinese works originated, in part, from the general method of translating the unfamiliar by attributing to it the characteristics with which one was more familiar; that is, what has been called by Anthony Pagden "the principle of attachment".⁷¹ It also reveals the scientific lens through which the sinologist-naturalists' viewed the Chinese works. In fact, however, the Chinese did not have a discipline, a system of knowledge, or even a coherent scholarly tradition equivalent to Western notions of "natural history", "botany", or "zoology". The modern Chinese term for botany, *zhiwu xue*, the study of plants, was not coined until 1858 to denote the Western science of plants. It first appeared in a translation of John Lindley's *Elements of botany*. Similarly, the Chinese rendition of "natural history", *bowu xue*, was also a mid-nineteenth century coinage for translating Western works.⁷²

On the other hand, the Chinese studied and had produced a huge body of literature on minerals, plants, and animals. Moreover, they had developed various genres, methods, and intellectual traditions of analysing and organizing them. For instance, the culture of gardens and gardening, which was so widespread among the upper levels of society in the late Ming and Qing, promoted a vast gardening literature, including literary encyclopedias about ornamental plants, gardening handbooks, manuals about flower paintings, and so on. These writings were products of a literati culture that was busy breeding flowers, writing about them, and imbuing them with symbolism. They had books devoted to varieties of the orchid, the chrysanthemum, and the plum tree, classifying the varieties according to their aesthetic quality. Only within this "culture of flowers" can we explore what the literature meant to the Chinese audience.⁷³ The sinologist-naturalists were not oblivious to the

fact that the Chinese works had been written for an audience with tastes and needs very different from their own. Yet they could also reorganize these works in scientific terms, thereby assessing the value of the works to their natural historical research. In the ocean of Chinese literature, what sources did the naturalists find most useful?

First, there were Chinese works that were devoted principally to plants, animals, and other natural objects. This literature shared enough similarities with the Western tradition of natural history that Western naturalists readily likened it to their own tradition. However, Victorian naturalists in China, with Bentham's *Flora hongkongensis*, Siebold's *Fauna japonica*, Franchet's *Plantae Davidianae*, or David's *Les oiseaux de la Chine* side by side with a Chinese work, would likely find the latter a mess. To an unsympathetic Victorian naturalist, the Chinese way of ordering and describing the natural world could only be disappointing at first glance.

The most widely used Chinese work was Li Shizhen's *Bencao gangmu* (1596), commonly translated as the "Great Materia Medica". It was mammoth in size and comprehensive in content. Filling thirty-six Chinese volumes (*juan*) in a seventeenth-century edition, it covered more than twelve hundred kinds of plants, animals, and minerals. It had been known to Western scholars since the early eighteenth century and remained "the text book for every student of Chinese natural history" in the nineteenth century.⁷⁴ Animals were grouped into five *bu* — insects/worms, scaly animals, shelly animals, birds, and quadrupeds — each of which consisted of several *lei*. Birds, for example, comprised water birds, field birds, forest birds, and mountain birds. Each *lei* consisted of many *zhong*, which sometimes corresponded to species. Scaly animals were likewise organized into four *lei*, but the categories were based on appearance rather than the habitats of the animals: They were dragons (for example, the dragon, lizards, the pangolin), snakes, fish, and scaleless fish (e.g., squid). Like animals, plants were grouped into five *bu* — herbs, cereals, vegetables, fruits, and trees — which were further divided into 31 *lei* and then innumerable *zhong*. Some of the subdivisions were defined according to habitat; others, by appearance and utility. So one *zhong* might correspond to one or several species or even items from widely different genera.

The taxonomy used in *Bencao* was derived from earlier works and, with variations, continued to be used in many later works of its kind. S. Wells Williams, an American missionary and friend of the botanist Asa Gray, thought the Chinese taxonomy "rude and unscientific" and, in referring to the botanical classification, declared that "the members of these families have no more relationship to each other than the heterogeneous family of an Egyptian slave dealer".⁷⁵ He placed *Bencao* "far behind the writings of Pliny and Dioscorides" and warned others that "its reputation tends greatly to perpetuate the errors".⁷⁶ Not everyone shared his view. Otto F. Von Möllendorff, a zoologist and member of the German Consular Service, considered the system of zoological classification in *Bencao* "certainly equal, if not superior to, the systems of Ante-Linnaean Zoologists in Europe".⁷⁷ He

also praised earlier Chinese works on natural history for the “signs of considerable acuteness of observation” exhibited therein.⁷⁸ Western zoologists in China focused mainly on mammals, birds, and fish — all of which were relatively big animals — and it did not require many observational details to figure out which animal is meant in a description. Consequently, they found the descriptions in some Chinese books reasonably accurate. Some Western naturalists also learned to be more appreciative of Chinese works as they became more familiar with them. As Joseph Needham noted, Bretschneider cast away most of his early criticisms of the Chinese works after eleven more years of study.⁷⁹ With sharpened perception of the similarities and differences between Chinese works and Western botanical literature, he recommended the Chinese works be “translated into European languages and to be commented upon”.⁸⁰

In *Bencao* and other substantive Chinese herbals, an animal or a plant is described, its synonyms listed, its medicinal qualities explained, and the places of production mentioned. The *mulan* tree may be taken as an example. Four synonyms were listed, each with the reference cited. The author then explained why the tree is called by these names. Then came descriptions, which included four quotations from earlier works and one from the author himself. They describe the shape and colour of the leaf and flower, the size of a mature tree, its provinces of production, utilities, vernacular names, etc. The author goes on to explain that the tree blooms in the fourth month of the Chinese calendar and that its blossoms fall in twenty days. It produces no fruits. He then comments on a couple of legends associated with the tree. Finally, he explains its medicinal qualities and usage, and gives prescriptions for some diseases; for example, the flower may be used to dissolve a fishbone stuck in the throat.

Bretschneider, and probably many others, did not find the writing in Chinese botanical works particularly difficult.⁸¹ It was usually clear and straightforward. *Bencao* used the same organizing principles and descriptive vocabulary throughout. The colour of the flower and the flowering season were always mentioned. Yet he still found “the descriptive details of plants” in the works “meager and unsatisfactory”.⁸² The Chinese did not have a shared set of botanical terminology like botanical Latin in modern botany. In describing a plant, they often relied on comparing its organs with those of another plant. A European reader, who had usually never seen either of the plants, could hardly learn anything definite from the descriptions. Bretschneider lamented this problem, but acknowledged that the same technique was widely adopted in European botanical works until the time of Linnaeus.⁸³

Verbal descriptions in the Chinese works were often supplemented by illustrations.⁸⁴ *Bencao*, for example, included more than one thousand illustrations of wildly different qualities and origins. However, like Renaissance and early modern European books on natural history, Chinese works often reproduced, quite indiscriminately, the drawings from earlier books. Ernst Faber, a missionary sinologist, complained of this Chinese practice that “the authors were commonly

more familiar with books than with nature, and the block-cutters had no understanding of either”.⁸⁵ Even today sinologists know practically nothing about how the Chinese used the illustrations in *Bencao* — many of which were simply too sketchy for the practical purpose of identification — and what these visual representations meant to Chinese readers. *Bencao* claimed that the drawings might be used as aids to identify the objects, yet, given the quality of the plates, there could only be a gap between the rhetoric and the practice in most instances. When the Chinese works included original drawings, delineated from nature, however, they could achieve a level of accuracy that impressed the naturalists. Bretschneider praised the woodcuts in *Jiuhuang bencao*, a treatise on plants for famine relief published in the early fifteenth century, claiming that many of them were “certainly superior to some European wood-cuts of the 17th century”.⁸⁶

Western botanists and zoologists held different opinions about the quality of the woodcuts in Chinese works on natural history. His praise of *Jiuhuang* notwithstanding, Bretschneider thought Chinese illustrations were usually “so rude that it is very seldom that any conclusion can be drawn from them”.⁸⁷ Another botanist, referring to the plates in *Bencao*, declared that “it is often difficult to tell whether the figure is intended for that of a plant or a bird”.⁸⁸ Albert Fauvel, on the other hand, used a drawing from the same work in his study of alligators in China.⁸⁹ Swinhoe and Möllendorff, both zoologists, found the pictures in a medieval edition of the ancient Chinese dictionary *Er ya* useful.⁹⁰ Bretschneider, however, thought otherwise.⁹¹ Some differences stemmed from the fact that more details were necessary in order to identify a plant as opposed to a big animal. Identification of the former usually required fine details of the flower and leaves, but these were often reduced to one or two strokes in a Chinese illustration. The only Chinese work widely admired for its illustrations was *Zhiwu mingshi tukao* (1848), the “Pictorial Treatise on the Names and Natures of Plants”.⁹² The author, Wu Qijun, did most of the drawings himself from live specimens. The figures were often exact enough for narrowing down the possibilities of the identity of a plant, so that further research would not be a wild goose chase. Bretschneider duplicated some of Wu Qijun’s drawings in one of his influential treatises.⁹³ Sampson also included one in his paper on the *puti* tree.⁹⁴ When A. Henry tried to explain a plant to William Thistleton-Dyer, Director of Kew Gardens, he enclosed the figure of the plant from *Zhiwu mingshi tukao*.⁹⁵

However unsatisfactory they might have appeared to a Victorian naturalist, *Bencao* and *Zhiwu* counted as the most empirical of Chinese works on natural history. The naturalists often had to wrestle with works whose purpose was primarily literary. One of the most widely used works for botanical research, *Guang chunfang pu* (1708), was commonly translated as the “Enlarged Botanical Thesaurus”. In spite of this translated title, *Guang chunfang pu* was basically a literary anthology, composed of quotations from a wide range of Chinese literature. The quotations were arranged according to the plants. Although the naturalists seldom bothered to distinguish it from the genre of *bencao* or the herbal, lumping them together

as botanical works, this work actually belonged to the tradition of gardening literature. In *Guang chunfang pu*, empirical observations mingled with poems, recipes, fables, prescriptions, and historical legends. The work was enormous: It comprised one hundred Chinese volumes and covered more than fifteen hundred kinds of plants. It was this comprehensiveness that made it a useful storehouse of information.

Large numbers of Chinese geographical works were also frequently consulted by Western naturalists in China. Not only did the naturalists' interest in historical geography and the history of cultivated plants lead them to the works, but fieldwork and the need to cross-examine accounts and references in an herbal prompted them to delve into Chinese geography. Chinese geographical writings encompassed various forms, but the gazetteer or local history was the staple source. The gazetteer, *fangzi*, was an official publication, issued by the county, provincial, or prefectural government, that described in detail the history and geography of the jurisdiction. Westerners in China relied heavily on the gazetteers for intelligence about areas of which they had little firsthand knowledge. The gazetteer, as a rule, had a section on the natural products of the place, which listed and described local plants, animals, and minerals. The purpose of such lists was to showcase the natural riches of the area, and their quality varied greatly from one gazetteer to another. Sketchy lists, like the one in the *Guizhou tongzhi* (general gazetteer of Guizhou, 1742 edn), included a few hundred items. A majority of them had no annotations, just names. More detailed lists, like the one in the *Sichuan tongzhi* (general gazetteer of Sichuan, 1816 edn), required dozens of Chinese pages, and the items mentioned were usually accompanied by brief descriptions. One of the most valuable features of the gazetteers was that they specified the place of production to the level of city or county. The naturalists could therefore direct their attention to a precise locality.

To be sure, these annotated lists hardly met the particular criteria of Western naturalists, whose strict demands for empirical accuracy and completeness would have baffled a regular Chinese local magistrate. Nevertheless the gazetteers provided Western naturalists with a handy starting point. In addition to information on natural objects, gazetteers also had sections on agriculture, manufacture, and trade, from which the naturalists could gather desultory but unique data on economic botany. When the British began to explore southwestern China in the 1870s and '80s, they always took the local gazetteers with them on the road.⁹⁶

But the gazetteers were important even to more specialized research. Swinhoe used them frequently in his pioneering studies of the fauna of Taiwan and of Hainan, an island south of the mainland, though he complained about their rough quality.⁹⁷ He learned from gazetteers, among other things, about animals he had not previously known existed on the islands.⁹⁸ Möllendorff found a gazetteer "very useful" for studying the *vertebrata* in North China.⁹⁹ Bretschneider thought that the descriptions of natural productions in the gazetteer were sometimes "specific in great detail, accompanied by interesting remarks derived from local observations"

and were of great interest to students of geographic botany.¹⁰⁰

The sinologist-naturalists did not limit their attention to obvious sources, such as herbals and geographies. They consulted a wide range of other genres of writings, including travel literature, dictionaries, and even Buddhist texts, which contained information about the transmission of plants from India to China.¹⁰¹ A large number of Chinese works had been combed through by the end of the nineteenth century. Bretschneider's treatise on Chinese botanical works, *Botanicon Sinicum*, the most comprehensive work of its kind, listed more than one thousand references.

VI

The naturalist-sinologists in China were not the only naturalists who sought information in texts. At the beginning of the essay, I proposed the concept of "textual practice", arguing that the use of texts was fundamentally important in nineteenth-century natural history. To further explain the concept, let us consider an obvious example: recently extinct species. When Victorian ornithologists were after the great auk, a newly extinct bird, they ploughed through, in addition to natural history books, a wide range of works, including voyages, travelogues, geographies, and even old manuscripts kept in an Icelandic library.¹⁰² Natural history was more than collecting fossils and mounting dead birds, doped butterflies, and dried plants. Nor was it limited to classifying specimens according to the Linnean or some other taxonomic system. Natural historians wanted to know the history of particular plants and animals, their habits and behaviour, the nature and diversity of regional flora and fauna, and so on. These problems were crucial to the research of field naturalists and important to certain branches of natural history, such as economic botany and botanical geography, and they could not be answered by examining specimens or fieldtrip observations alone.

In fact, even classifying a plant or animal required naturalists to check descriptions in old natural history books in order to avoid unnecessarily multiplying species and to keep descriptions simple and consistent. If a plant or animal had been properly described, it would not be acceptable to create a new species, much less a new genus. If old descriptions were applicable, it was advisable to adopt them as much as possible. Few naturalists in Europe or China had access to type specimens, even when such things existed, or any specimens of a given item at all; scientific descriptions in books were the only source for taxonomic practice.¹⁰³ Henry Hance, a world authority on Chinese plants and British Vice-Consul at Whampoa, advised a beginner to purchase a dozen or so botanical books, many of which were multi-volumes, for a start.¹⁰⁴ When E. C. Bowra, newly arrived to join the Chinese Customs, wanted to work on Chinese plants, the first thing he discovered was that he "must write home for some books on Botany" for he was "continually stumbling over" plants which were new to him.¹⁰⁵

In a sense, therefore, consulting Chinese texts for natural historical research was not a radical departure from what a naturalist regularly did. He had to engage

in textual practice in almost any research. Working at Chinese texts nonetheless presented unique challenges and problems. It required special training, knowledge, and scholarly techniques, and even a well-equipped researcher did not find his way easily in the labyrinth of Chinese literature. The works encompassed different genres of writing, spread over a long time period, and were written in different styles. True, the language barrier had become less forbidding since the mid-nineteenth century. Not that the Europeans now considered learning Chinese easy. Bretschneider, one of the best sinologists of his time, repeated Ricci's statement from nearly three hundred years earlier: "for western people, Chinese is of all languages the most difficult..."¹⁰⁶ But there was already a community of sinologists in China, and they could easily obtain linguistic assistance from native scholars. Basic linguistic difficulties were, therefore, no longer insurmountable. However, once sinologist-naturalists ventured into the literature on natural history, they could no longer depend upon their Chinese teachers, "whose erudition seldom extends beyond the classics".¹⁰⁷

Under this circumstance, familiarity with the literature itself became the surest guide. It was no easy task to track down particular plants and animals in Chinese works. The Chinese literary tradition of citing, quoting, and alluding to previous authors and works made the process less daunting, but the quest led immediately to philological detective work. To discover and locate the information, to comprehend the contents, to tease out the tangle of often obscure names of people, plants, and places required a wide learning in Chinese literature.

Western naturalists also practised certain interpretative strategies in approaching Chinese texts. Their tendency to compare the Chinese works with early Western herbals reflected a confidence in the superiority of their post-Linnean natural history and a mode of thinking which involved arranging everything according a ladder of progress. Both were characteristic of the comparative method of Victorians.¹⁰⁸ By defining the Chinese works as analogous to early Western ones, the naturalists simply ignored the fundamental issue of translation between two independent traditions of natural history. This attitude was in sharp contrast with the missionaries' towards Christianity and Chinese religions, which emphasized the categorical difference between Christianity and heathenism, and caused serious debates about correct translations of key concepts like 'God'.¹⁰⁹ More importantly, it also differed from the diverse opinions about the possibility of translating Western scientific works into Chinese and of teaching science in Chinese. Many of the Western intellectuals in China asked by the *Journal* of NCBRAS about this question thought that one could not teach or express scientific ideas in Chinese because of its linguistic limitations. Their reasons included that its ideograms could not convey with full precision abstract ideas, logic, and rationality, that it was extremely cumbersome and hard to learn even for Chinese themselves, and that the innumerable neologisms required in order to translate scientific works accurately would make the whole enterprise impossible.¹¹⁰ But others disagreed and actually participated in translating Western scientific works into Chinese.

When the translation worked the other way, from Chinese to English, the issue was no longer the intrinsic limitations of the receptor language. The sinologist-naturalists never thought twice about the cognitive and linguistic superiority of Western science and languages over Chinese ones.¹¹¹ They tacitly assumed that it was possible and desirable to separate empirical facts in Chinese works from the middle-headed Chinese system of knowledge. The naturalists were not interested in exploring the general framework of Chinese lore on natural history. Many of them made casual remarks on the Chinese classification system of nature's objects, but none of them devoted more than incidental attention to it. I have found no serious attempt made to explain the conceptual foundation or the organizing principles of the Chinese lore. Western naturalists had little time for discussion about reconciling the two knowledge traditions or about absorbing the Chinese system *en bloc*. They focused on the practical matters of identifying individual plants and animals. The Chinese literature was treated more as a backward, immature, and miscellaneous source of information, like early Western works, than as the product of a tradition with its own history and logic. In their scientific research, the naturalists had first to "misinterpret" Chinese works or translate them to a new context of meanings, in which "a mass of other matter, appreciated only by Chinese readers" could be peeled off.¹¹²

The central task that the sinologist-naturalists set for themselves was to sort out "useful data" from heaps of literary allusions, dubious anecdotes, and misinformation. They thought their job was to, so to speak, fish pearls out of the mud. However, even the mundane process of distilling natural historical data involved operations far more complicated than sieving out or selecting useful bits. It involved textual and cognitive interpretation of Chinese works. There were no ready-made facts, labelled as such, to be collected. A piece of information, a description, a picture in a text became a fact only after it was interpreted to be one. Westerners had to bring their experience and training as naturalists and sinologists to the task. The hermeneutic process was embedded in, among other things, their understanding and perceptions of the Chinese literary tradition and of the Chinese people. They had to decide how much they wanted to trust the Chinese texts, and what to make of a particular statement in a particular Chinese text.¹¹³ Personal experiences with the Chinese people, familiarity with Chinese literature, and a welter of other reasons might come into play in assessing evidence.

Whatever the sources of his opinions were, a naturalist's evaluations of Chinese achievement in natural history had direct bearing on the conclusion he drew from the literature. Swinhoe, for example, was inclined to believe that the tapir had existed in China into historical time because its figure in an ancient Chinese book appeared to be delineated from nature.¹¹⁴ Richard Owen, an eminent naturalist at the British Museum, however, was more sceptical: the figure could have been one of a tapir from Malaya, or one by a traveller to the region.¹¹⁵ No powerful evidence could be cited to support either one of these possibilities. Swinhoe's hunch had come from his experience with Chinese works. Similarly, Hance was ready to

accept the conclusion of Mayers's study on maize in China, which suggested that maize might have come to China from central Asia instead of America, because he believed that Chinese literature on natural history of the sixteenth and seventeenth centuries was in a "comparatively far more advanced state of development" than Western literature.¹¹⁶ If it was stated as such in a generally reliable Chinese book, he thought one should take it seriously.

The problem of interpreting and employing Chinese works also involved challenges and judgements of a more technical kind. For instance, using the data gathered from *Guang chunfang pu*, a literary encyclopedia on plants, Sampson was able to put together a satisfactory (to him) description of the *fung* tree. In the process, he rejected the statement of the fruit "being the size of a duck's egg", as "doubtless an oriental exaggeration".¹¹⁷ Focusing on Sampson's cultural chauvinism or orientalism, however, would not get us far in explaining why he found the other descriptions from the same work trustworthy. More importantly, it would not tell us much about the naturalist's chief tasks in working with Chinese texts for natural historical research. This is not to deny that the discourse of natural history might contain an orientalist desire to collect the exotic and an imperialist will to name and order things from a Eurocentric perspective.¹¹⁸ These are important points. But to further grasp the research practice of the naturalists, we need to examine the nuts and bolts of their reading of Chinese works for natural historical research and to unpack the working of textual practice as a research method.

Pursuing inquiries about China's natural history often entailed a great deal of philological, geographical, and historical research, and it required the techniques and knowledge of the sinologist to parse, analyse, compare, and interpret the texts. The naturalists mobilized both natural history and sinology in interpreting Chinese texts. They produced a hybrid discourse and created a discursive domain in which the boundary between the two disciplines was blurred and evidence from them valorized. Statements from a Chinese text might be taken as evidence to support or challenge arguments in natural history. Knowledge of natural history might be, in turn, cited to determine sinological queries.

VII

To illustrate how the sinologist-naturalists employed Chinese texts in their research, let us take a close look at a single example. Albert A. Fauvel's compact article on alligators in China crystallizes the different aspects of the sinologist-naturalist's method and enterprise, and will serve our purpose well.¹¹⁹ Although Fauvel was French, he worked closely with the British, as a member of the Chinese Customs and an ardent naturalist. He was in charge of the Natural History Museum of Shanghai, an establishment of the North China Branch of the Royal Asiatic Society, in the late 1870s. His article on alligators made a small splash among Western scholars in China, in part because it was the first scientific paper to show the existence of alligators, a novel species, in China, but also because it advanced some sinological inquiries. In fact, the article was as much a sinological as a zoological

study, and its multifaceted and interconnected concerns reflected the scope of the sinologist-naturalists' research. Fauvel's interest in the subject had first been aroused by some reports of alligators in China. Accordingly he conducted a series of investigations, making fieldtrips, examining actual specimens, and inquiring into Chinese literature. What he finally accomplished went far beyond a technical description of an alligator new to European scientists.

Fauvel's article began with a philological inquiry, trying to establish that certain Chinese characters represent the alligator (or the crocodile, for that matter), not any other animals that had been suggested by other Western authors. The character *to* (rendered as "Tó" in the paper), for example, had been previously identified as the iguana or lizard. Fauvel dismissed the first possibility based on his knowledge about the geographical distribution of the iguana, and, citing Chinese classics, he disputed the second possibility. The skin of *Tó* was used by ancient Chinese to make big drums, and no lizards in China could be large enough for the purpose. So *Tó* must be something else. He moved rapidly from natural historical to sinological arguments in the same paragraph and drew evidence from ancient Chinese texts as well as contemporary scientific works.

Fauvel devoted a significant proportion of the article to philological discussion and explicating the synonyms that he had collected from Chinese classics, dictionaries, and natural history books. Although compiling and determining synonyms might appear to be little more than an after-dinner game for pedantic sinologists, it actually occupied an important place in the naturalists' research. For an empire with such a long history and vast territories, a plethora of synonyms for any plant or animal was only to be expected. Historical change and regional variation created confusion. The problem was further compounded by the coexistence of numerous dialects in the empire at any time in history, which gave rise to local names often wildly different from each other and from the common names. Alligators in China were a relatively easy case. Fauvel had to deal with only half a dozen archaic Chinese characters and terms. In the case of introduced plants, contorted foreign tones joined the Babel of names. An introduced plant, usually from India or central and western Asia, could have arrived in China with phonetically translated names, which then went through a long evolution and many metamorphoses.¹²⁰ They could also have been named after places or after their shapes, tastes, colours, or smells. In an inquiry into Chinese figs, Sampson came up with more than a dozen plant names, probably all synonyms, which had their origins respectively in Sanskrit, Levantine, Persian, the appearance or taste of the fruit, and so on.¹²¹ Not surprisingly, the sinologist-naturalists saw determining the synonyms as an essential step towards investigating a plant or animal. How else could one know which plant/animal was referred to in a statement in a Chinese work? Bretschneider suggested that his colleagues compile indices of plant names, and Ernst Faber, a German missionary, heeded his call.¹²² Augustine Henry provided himself with "the best Chinese books on plants", and commenced to identify the Chinese plant-names.¹²³ He confessed later that "such a work ... can only be done

very gradually...” and that “[it] also requires an expert...”¹²⁴

Once the naturalist had the synonyms of the plant or animal in question, he could systematically collect the descriptions of it in Chinese works. In his paper, Fauvel turned to Chinese works on natural history, including *Bencao gangmu*, to see what they had to say about *Tó*. *Bencao* placed the animal in the category of dragons, and provided synonyms and descriptions. The animal was said to be an earth dragon and it was described as looking like a gigantic gecko or pangolin. It was extremely strong, slept a lot, cried at night, and laid “up to one hundred” eggs. Its back and tail were covered with armour. Fauvel quoted at length the descriptions from *Bencao* to demonstrate that, with one or two exceptions, they agree “wonderfully well” with those by Audubon and others of the alligators of the Mississippi and Guyana.¹²⁵ The “somewhat quaint but sufficiently characteristic picture” in *Bencao* was reproduced to back up his argument.¹²⁶

Having shown that *Tó* was the alligator and having collected the synonyms, Fauvel then tackled the issues of history, distribution, and the alligator in Chinese culture and society. Fauvel had two excellent libraries to work at — the one at the NCBRAS and an even better one at the Jesuit missionary station at Sicawei (Xujiahui), only a few miles from Shanghai. He found next to nothing about alligators in works by early Western travellers and missionaries in China. As I have argued, grubbing about in old travelogues, geographies, etc. for data remained a strong tradition in nineteenth-century natural history, and Fauvel was operating within the tradition. Unfortunately, in this case, early Western accounts proved to be of little value. Luckily, Fauvel had at his disposal numerous Chinese works. Citing as authorities Chinese classics, herbals, dictionaries, encyclopaedias, local histories, etc., Fauvel argued that historical records confirm that alligators used to rule the lakes and rivers in central and southern China, though they had disappeared almost entirely in recent times. Testimonies in Chinese books were absolutely critical to Fauvel’s reconstruction. Unlike in Europe, there was no possibility for Westerners to do systematic archeological fieldwork in China. They had to be content with historical documents. While naturalists in Europe were busy putting together the remains of pre-historical animals, Mayers dug out of ancient Chinese books descriptions and drawings of a huge hairy, rat-like creature living underground, which he believed to be the mammoth.¹²⁷

Fauvel’s sinological interest led him to explore the alligator in Chinese legends and mythology, thereby examining the cultural meanings of the animal in Chinese history. This section of the article addresses the concerns of sinologists. The last part of this article is a scientific description based on the specimens sent to him, which he believed to be a new species. Only with specimens could he determine if the alligator was a new species or not, as descriptions in Chinese books were too crude for taxonomic purposes. But even this part of his research depended heavily on books. Without access to the specimens of alligators from other parts of the world, Fauvel worked from taxonomic books. His discovery proved to be an uncontroversial case and was immediately confirmed by the Muséum d’Histoire Naturelle.

In fewer than forty pages, Fauvel not only presented a zoological discovery, but made some sinological excursions. He determined the meanings of certain Chinese characters and elucidated a few aspects of alligators in Chinese life and literature. Natural history and sinology were deeply interrelated in his examination of the history of alligators in China. With textual evidence, he had reconstructed the habitats, behaviours, and vicissitudes of alligators in China.

VIII

In this essay, I have mapped out the intersections between sinology and natural history in the nineteenth century in relation to the Western presence in China. Western diplomatic and missionary institutions in China expanded rapidly during the second half of the nineteenth century. This development fostered the growth of sinology and provided talent and infrastructure for natural historical research. A group of scholars whose interests encompassed natural history and sinology found a forum for their research in the NCBRAS and Western journals published in China. Influenced by their humanist background, they directed their attention to economic botany, geographical botany, and the history of cultivated plants; their philological training provided them with powerful research tools. The tradition of textual practice in natural history allowed them to incorporate their sinological learning into their natural historical research.

To naturalists in Europe, the sinologist-naturalists' work certainly appeared distinctive, involving as it did the detailed reading and interpretation of recondite sources in a forbidding language. Although few European scientific journals were willing to publish articles so specialized in their philological and historical inquiries, scientific communities in Europe nonetheless took great interest in the conclusions that were to be drawn from the sinologists' research.¹²⁸ Their ignorance of sinology did not prevent them from appreciating the efforts of their colleagues in China.

Alphonse de Candolle's influential *Origin of cultivated plants*, for example, relied heavily on Bretschneider's treatise on Chinese botanical works.¹²⁹ Bretschneider, Sampson, and others had identified numerous Chinese plants and determined by using Chinese texts whether they were exotic, naturalized, or indigenous species. The information contributed to the mapping of global biogeography. But perhaps it was in economic botany that the research on Chinese works played a most significant role. The directors of Kew Gardens and other scientists in Europe constantly sought assistance from naturalists in China about matters in economic botany, and most of the investigations involved research into Chinese literature on natural history. Joseph Hooker and William Thistleton-Dyer circulated through the Foreign Office queries about plants of commercial values among the China consuls. The members of the Consular Service could rarely make long-term fieldtrips to collect detailed observations concerning the behaviour, habits, distribution, seasonal change, and economic utilities of an animal or plant. They typically gathered the data from Chinese works and from interviews with Chinese people, and then transmitted

the digested information to Europe by correspondence.¹³⁰

The sinologist-naturalists practised cross-cultural translation of knowledge. They translated Chinese knowledge about animals and plants into a new context of meanings. Thus, an earth dragon whose flesh was of medicinal value became *Alligator Sinensis*, which was distinguished from other alligators by the number of its teeth. Legends and histories were turned into evidence to construct the geographical distribution of the animal in the past. In making their translations, the naturalists assumed that the cognitive and linguistic superiority of Western science and languages empowered them to dissect Chinese knowledge and to select the factual data from this knowledge. Identifying this imperialist conception alone, however, is not enough for a detailed analysis of the sinologist-naturalists' research into Chinese works. When they encountered particular Chinese texts for their scientific investigations, they had constantly to draw boundaries between facts and false information contained in those texts, but the process was informed by many factors that cannot be reduced to imperialist ideology, the European gaze, worldview, or any other broad epistemological units. A nuanced understanding of the hybrid discourse in which the sinologist-naturalists combined textual evidence, philological data, historical documents, and indigenous knowledge of the living world with Western concepts of natural history can only be attained if one follows the historical actors themselves and observes how and why they made the decisions that they did during their encounters with Chinese texts.

ACKNOWLEDGEMENTS

I would like to thank Harold Cook, Lorraine Daston, Victor Hiltz, Lynn Nyhart and Julia Thomas for their valuable comments on an earlier draft of this paper.

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4. Many of the essays in N. Jardine *et al.* (eds), *Cultures of natural history* (Cambridge, 1996) and Bernard Lightman (ed.), *Victorian science in context* (Chicago, 1997) concern the practice of natural history. On fieldwork, see, for example, Henrika Kuklick and Robert Kohler (eds),

- “Science in the field”, *Osiris*, n.s., xi (1996); Jane Camirini, “Remains of the day: Early Victorians in the field”, in Lightman (ed.), *Victorian science in context*, 354–77. On the natural history museum, see, for example, Mary Winsor, *Reading the shape of nature: Comparative zoology at the Agassiz Museum* (Chicago, 1991); Sally G. Kohlstedt, “Museums: Revisiting sites in the history of the natural sciences”, *Journal of the history of biology*, xxviii (1995), 151–66; Sophie Forgan, “The architecture of display: Museums, universities and objects in nineteenth-century Britain”, *History of science*, xxiii (1994), 139–62; Timothy Lenoir and Cheryl Lynn Ross, “The naturalized history museum”, in Peter Galison and David Stump (eds), *The Disunity of science: Boundaries, contexts, and power* (Stanford, 1996), 370–97.
5. William Ashworth’s “Emblematic natural history of the Renaissance”, in Jardine *et al.* (eds), *Cultures of natural history* (ref. 4), 17–37, takes the mid-seventeenth century as the turning point. On the other hand, some see Buffon and Linnaeus as pivotal figures. See Rhoda Rappaport, *When geologists were historians, 1665–1750* (Ithaca, 1997), chap. 3; Phillip Sloan and John Lynn, *From natural history to the history of nature: Readings from Buffon and his critics* (Notre Dame, 1981), chap. 1; Sten Lindroth, “Two faces of Linnaeus”, in Tore Frängsmyr (ed.), *Linnaeus: The man and his work* (Canton, Mass., 1994), 1–62.
 6. Several scholars have pointed out the connections between humanism and natural history during an earlier period. E.g. Barbara Shapiro, “History and natural history in sixteenth- and seventeenth-century England: An essay on the relationship between humanism and science”, in Barbara Shapiro and Robert Frank, *English scientific virtuosi in the 16th and 17th centuries* (Los Angeles, 1979), 3–55; Paula Findlen, *Possessing nature: Museums, collecting, and scientific culture in early modern Italy* (Berkeley, 1994). William Ashworth suggests the importance of antiquarianism in natural history, see his “Natural history and the emblematic world view”, in David Lindberg and Robert Westman (eds), *Reappraisals of the Scientific Revolution* (Chicago, 1990), 303–32. Joseph Levine, *Dr. Woodward’s Shield: History, science, and satire in Augustan England* (Ithaca, 1977); *idem*, “Natural history and the new philosophy: Bacon, Harvey, and the two cultures”, *Humanism and history* (Ithaca, 1987), 123–54; Paolo Rossi, *The dark abyss of time: The history of the Earth and the history of nations from Hooke to Vico* (Chicago, 1984), part 2, 3; Ann Blair, “Humanist methods in natural philosophy: The common place book”, *Journal of the history of ideas*, liii (1992), 541–51; Jerome Bylebyl, “The School of Padua: Humanistic medicine in the sixteenth century”, in Charles Webster (ed.), *Health, medicine and morality in the sixteenth century* (Cambridge, 1979), 335–70; Peter Harrison, *The Bible, Protestantism, and the rise of natural science* (Cambridge, 1998). Anthony Grafton has emphasized the broad and lasting influence of humanist scholarship in a different context. See, for example, his *Defenders of the text: The traditions of scholarship in an age of science, 1450–1800* (Cambridge, 1991) and *Forgers and critics: Creativity and duplicity in Western scholarship* (Princeton, 1990).
 7. E.g. Jacques Gernet, *China and the Christian impact* (Cambridge, 1987), esp. 238–47; Alain Peyrefitte, *The immobile empire* (New York, 1992).
 8. Benjamin Schwartz, “Culture, modernity, and nationalism — Further reflections”, *Daedalus*, no. 122 (Summer 1993), 207–26, esp. pp. 207–8. Schwartz criticizes and modifies this view.
 9. I have benefited from the insights in a number of otherwise very different works. Lydia Liu, *Translingual practice: Literature, national culture, and translated modernity – China, 1900–1937* (Stanford, 1995), 1–44; James Hevia, *Cherishing men from afar: Qing Guest Ritual and the Macartney Embassy of 1793* (Durham, 1995); G. E. R. Lloyd, *Demystifying mentalities* (New York, 1990). The controversy around Hevia’s book concerns to some extent this methodological issue. It seems to me that one does not have to embrace Hevia’s interpretation of the Macartney Embassy to appreciate some of his methodological concerns. Joseph Esherick, “Cherishing sources from afar”, in *Modern China*, xxiv (1998), 135–61; James Hevia, “Postpolemical historiography”, *Modern China*, xxiv (1998), 319–27; Joseph Esherick,

- “Traduttore, traditore”, *Modern China*, xxiv (1998), 328–32.
10. Emil Bretschneider, “Botanicon Sinicum: Notes on Chinese botany from native and Western sources”, *Journal of the North China Branch of the Royal Asiatic Society* (hereafter *JNCB*), xvi (1882), 18–230, p. 19.
 11. By comparison, the Chinese intellectuals’ roles in translating Western science into late Qing China are much better documented and studied. The best survey is Xiong Yuezhi, *Xixue dongjian yu wan Qing shehui* (Shanghai, 1994). See, also, John Rear-Anderson, *The study of change: Chemistry in China 1840–1949* (New York, 1991), chaps. 1 and 2; David Wright, “Careers in Western science in nineteenth-century China: Xu Shou and Xu Jianyin”, *Journal of the Royal Asiatic Society*, 3 ser., v (1995), 49–90; *idem*, “John Fryer and the Shanghai Polytechnic: Making space for science in nineteenth-century China”, *The British journal for the history of science*, xxix (1996), 1–16; *idem*, “The translation of modern Western science in nineteenth-century China, 1840–1895”, *Isis*, lxxxix (1998), 653–73; Horng Wann-Sheng, “Li Shanlan: The impact of Western mathematics in China during the late nineteenth century” (Ph.D. diss., City University of New York, 1991); Zhang Hailin, *Wang Tao ping zhuan* (Nanjing, 1993); Paul Cohen, *Between tradition and modernity: Wang Tao and reform in late Ching China* (Cambridge, 1974); James Pusey, *China and Charles Darwin* (Cambridge, 1983); Sakade Yoshinobu, *Chūgoku kindai no shisō to kagaku* (Kyoto, 1983), chap. 4; Bridie Andrews, “Tuberculosis and the assimilation of germ theory in China, 1895–1937”, *Journal of the history of medicine and allied sciences*, lii (1997), 114–57; Sean Hsiang-lin Lei, “From Changshan to a new anti-malarial drug: Re-networking Chinese drugs and excluding Chinese doctors”, *Social studies of science*, xxix (1999), 323–58.
 12. The literature on Jesuits in China is legion. See, e.g., Willard Peterson, “Learning from the heaven: The introduction of Christianity and other Western ideas into late Ming China”, *The Cambridge history of China*, viii/2 (Cambridge, 1998), 789–839; Gernet, *China and the Christian impact* (ref. 7); Charles Ronan and Bonnie Oh, *East meets West: The Jesuits in China* (Chicago, 1988); Jonathan Spence, *The memory palace of Matteo Ricci* (London, 1985). John Young, *Confucianism and Christianity: The first encounter* (Hong Kong, 1983).
 13. Matthew Ricci, *China in the 16th century: The journals of Matthew Ricci, 1583–1610* (New York, 1953), 28.
 14. The Chinese interpreters were Catholic converts brought to Europe by the Jesuits. See Barrett, *Singular listlessness* (ref. 1), 37–38, 49; Jonathan Spence, “The Paris years of Arcadio Huang”, in his *China roundabout* (New York, 1992), 11–24; *idem*, *The question of Hu* (New York, 1989).
 15. E.g. Knud Lundback, *T. S. Bayer (1694–1738), pioneer sinologist* (London, 1986), 31–140.
 16. John Bold, “John Webb: Composite capitals and the Chinese language”, *Oxford art journal*, iv (1981), 9–17. Rossi, *The dark abyss of time* (ref. 6), 137–44. David Mungello, *Curious land: Jesuit accommodation and the origins of sinology* (Stuttgart, 1985), chaps. 4–6.
 17. Antonello Gerbi, *The dispute of the New World: The history of a polemic, 1750–1900* (Pittsburgh, 1973), 150–4.
 18. Mary Slaughter, *Universal languages and scientific taxonomy in the seventeenth century* (Cambridge, 1982), 112–13; James Knowlson, *Universal language schemes in England and France, 1600–1800* (Toronto, 1975), 25–27; David Mungello, *Leibniz and Confucianism: The search for accord* (Honolulu, 1977), 43–65; *idem*, *Curious land* (ref. 16), chap. 6.
 19. C. A. Wells, *The origin of language: Aspects of the discussion from Condillac to Wundt* (Le Salle, Ill., 1987), 61–62.
 20. Emil Bretschneider, *History of European botanical discoveries in China* (2 vols, Leipzig, 1962 [1898]), i, 8–20.
 21. L. C. Goodrich, “Boym and Boymiae”, *T’oung Pao*, lvii (1971), 135; J. Roi, “Les missionnaires

- de Chine et la botanique”, *Collectanea Commissionis Synodalis in Sinis*, xi (1938), 695–706; Edward Kajdński, “Receptarum Sinensium Liber of Michael Boym”, *Janus*, lxxiii (1990), 105–24; Paul Pelliot, “Michael Boym”, *T’oung Pao*, xxx (1933), 95–151. Robert Chabrie, *Michel Boym: Jésuite polonais et la fin des Ming en Chine* (Paris, 1933) remains the fullest account of his life. Pan Jixing, *Zhongwai kexue zhi jiaoliu* (Hong Kong, 1993), 479.
22. For the musk deer, see Timothy James Billing, “Illustrating China: Emblematic autopsy and the catachresis of Cathay” (Ph.D. diss., Cornell University, 1997), 243–65; Martha Baldwin, “The snakestone experiments: An early modern medical debate”, *Isis*, lxxxvi (1995), 394–418.
 23. Clifford Foust, *Rhubarb: The wondrous drug* (Princeton, 1992); Daniel Carey, “Compiling nature’s history: Travellers and travel narratives in the early Royal Society”, *Annals of science*, liv (1997), 269–92, esp. p. 281. Denis Leigh, “Medicine, the city and China”, *Medical history*, xviii (1974), 51–67.
 24. Lisbet Koerner, “Nature and nation in Linnaean travel” (Ph.D. diss., Harvard University, 1993), 203–7, 224–34, 253–8.
 25. J.–B. du Halde, *Description géographique, historique, chronologique, politique et physique ... etc. etc.* (4 vols, Paris, 1735).
 26. Wilson and Caley, *Europe studies China* (ref. 1), 13–14.
 27. Frederic Wakeman, “The Canton trade and the Opium War”, in John Fairbank (ed.), *The Cambridge history of China*, x/1 (Cambridge, 1978), 163–212; Jonathan Spence, *The search for modern China* (New York, 1990), 117–64.
 28. The dramatic increase of British contributions to Western research into China’s natural history is documented in Bretschneider, *History of European botanical discoveries in China* (ref. 20).
 29. Barrett, *Singular listlessness* (ref. 1), 29–57.
 30. J. L. Cranmer-Byng, “The first British sinologists: Sir George Staunton and the Reverend Robert Morrison”, in F. S. Drake and Wolfran Eberhard (eds), *Symposium on Historical Archaeological and Linguistic Studies on South China, South-East Asia and the Hong Kong Region* (Hong Kong, 1967), 247–59; Susan Stiffler, “The language students of the East India Company’s Canton factory”, *JNCB*, lxix (1938), 46–82.
 31. *Chinese repository*, v (1836–37), 119. Postcolonial critics often emphasize the discursive liaisons between the objectifying vision of Europeans and a (gendered) Orient, between a desiring gaze and a (projected) seductively veiled body. There is ample evidence in the naturalists’ writings to confirm this view. And few will deny that imperial imagination and aggressive cognition were inscribed in the discourse of nineteenth-century natural history. Our job here is not to dwell on these well-explored points, but to discover the strategies the naturalists developed to overcome the “obstacles” to their natural historical research.
 32. *Chinese repository*, v (1836–37), 119.
 33. Yen P’ing Hao, *The comprador in nineteenth-century China: Bridge between East and West* (Cambridge, 1970).
 34. See P. D. Coates, *The China Consul* (Hong Kong, 1988), 81–86.
 35. Stanley Wright, *Robert Hart and the Chinese customs* (Belfast, 1950), 277.
 36. One can easily come up with a list of British missionary- and diplomat-sinologists: Robert Morrison, James Legge, Thomas Wade, Joseph Edkins, Herbert Giles, to name only the best known.
 37. See Fa-ti Fan, “British naturalists in China, 1760–1910” (Ph.D. diss., University of Wisconsin-Madison, 1999), chap. 3.
 38. Linda Cooke Johnson, *Shanghai from market town to treaty ports, 1074–1858* (Stanford,

- 1995), chaps. 7–12.
39. For an account of the early days of the Society, see *JNCB*, xxxv (1903–1904), pp. i–xx.
 40. E. C. Bridgman, “Inaugural address”, *Journal of the Shanghai Literary and Scientific Society*, 1 (1858), 1–16, p. 6. Bridgman was an American missionary.
 41. There are as yet no general accounts of these journals. But see Frank King, *The China Coast newspaper project of the Center for Research Libraries and the Center for East Asian Studies* (Lawrence, n.d.) focuses on newspapers, but it gives a general idea of the busy publishing scene in Western communities in China. Both the *Chinese repository* and the *Chinese recorder* were founded by American missionaries. On the *Chinese repository*, see Murray A. Rubinstein, “The wars they wanted: American missionaries’ use of *The Chinese repository* before the Opium War”, in *The American neptune*, xlviii/1 (1988), 271–82.
 42. British academic sinology never caught up with its Continental counterpart. But the large British population in China and their facilities made possible the growth of a wide range of areas of interest, including natural history.
 43. *Journal of the Shanghai Literary and Scientific Society*, 1 (1858), “Preface”. Emil Bretschneider made the same point in the preface to his *On the study and value of Chinese botanical works, with notes on the history of plants and geographical botany from Chinese sources* (Foochow [Fuzhou], 1871). The work first appeared in several parts in *Chinese recorder*, iii (1870).
 44. W. F. Mayers, “On the introduction of maize into China”, *The pharmaceutical journal and transactions*, 3rd ser., i (1870–71), 522–5.
 45. For the general importance of nomenclature in nineteenth-century natural history, see Harriet Ritvo, *The platypus and the mermaid, and other figments of the classifying imagination* (Cambridge, 1997), chaps. 1 and 2.
 46. Robert Swinhoe, “The small Chinese lark”, *JNCB*, no. 3 (1859), 288.
 47. Robert Swinhoe, “On a new rat from Formosa”, *Proceedings of the Zoological Society*, 1864, 185–7.
 48. Swinhoe to Newton, 23 Nov. 1869, in Cambridge University Library MSS, Alfred Newton papers. Swinhoe writes, “Soo Tungpo is a good classical Chinese name, and Science might well admit such worthy names. However, as it offends you....”
 49. Bretschneider, “Botanicon sinicum” (ref. 10), 110.
 50. Heude’s taxonomic work would, however, prove to be controversial because of his anti-Darwinian point of view. He was also an important scientific traveller and field naturalist in China. See *Mémoires concernant l’histoire naturelle de l’empire chinois*, v/2 (Shanghai, 1906), 1–29; P. Fournier, *Voyages et découvertes scientifiques des missionnaires naturalistes français* (Paris, 1932), 36–42.
 51. Fournier, *Voyages et découvertes scientifiques*, 67–91; Emmanuel Boutan, *Le nuage et la vitrine: Un vie de Monsieur David* (Bayonne, 1993) is a biography based on David’s correspondence.
 52. Peter Galison, *Image and logic: A material culture of microphysics* (Chicago, 1997), chap. 1.
 53. Similar issues have been discussed in colonial context. See, for example, Satpal Sangwan, “From gentlemen amateurs to professionals: Reassessing the natural science tradition in colonial India 1780–1840”, in Richard Grove *et. al.* (eds), *Nature and the Orient: The environmental history of South and Southeast Asia* (Dehli, 1998), 210–29; Nathan Reingold and Marc Rothenberg, *Scientific colonialism: A cross-cultural comparison* (Washington, D.C., 1987).
 54. There are as yet no adequate studies of the Chinese literature about their natural environment or the Chinese attitudes towards the living world. Joseph Needham, *Science and civilization in China*, vi/1: *Biology* (Cambridge, 1986) is the closest thing we have despite its tendency to impose modern scientific categories on Chinese knowledge traditions.

55. Theophilus Sampson, *Botanical and other writings on China, 1867–1870*, ed. by H. Walravens (Hamburg, 1984), 19.
56. T. Watters, “Chinese notions about pigeons and doves”, *JNCB*, n.s., iv (1867), 225–41; *idem*, “Chinese fox-myths”, *JNCB*, n.s., viii (1873), 47–49.
57. The British were highly interested in Chinese medicine and medicinals. See Denis Leigh, “Medicine, the City and China”; Roberta Bivins, “The needle and the lancet: British acupuncture and the cross-cultural transmission of medical knowledge” (Ph.D. diss., MIT, 1997).
58. Daniel Hanbury, “Notes on Chinese materia medica”, collected in his *Science papers* (London, 1876). He corresponded with Henry Hance, William Lockhart, and F. Porter Smith. The latter two were missionary doctors. See Royal Pharmaceutical Society of London (hereafter RPS): Hanbury Papers, P273 [8], [62]; Hanbury Miscellaneous Letters, P300 [39]; P301 [34], P313 [1], etc. Most of the letters were replies to Hanbury’s questions about certain Chinese drugs.
59. F. Porter Smith, *Contributions towards the materia medica and natural history of China, for the use of medical missionaries and native medical students* (Shanghai, 1871). There was also a potential audience in Europe, and Hanbury helped to find a London publisher for the work. RPS: Hanbury Miscellaneous Letters 1871, P302 [72], [73].
60. *List of Chinese medicines*, China Imperial Maritime Customs, III, Miscellaneous series, no. 17 (Shanghai, 1889).
61. National Botanical Gardens (Glasnevin, Ireland): Augustine Henry Papers, 581.634, “Pharmac. Notes”. Augustine Henry, “Vegetable productions, central China”, *Bulletin of miscellaneous information (Royal Gardens, Kew)*, no. 33 (1889), 225–7; *idem*, *Notes on economic botany of China* (Kilkenny, Ireland, 1986 [1893]), and “Chinese drugs and medicinal plants”, *Pharmaceutical journal*, lxxviii (1902), 316–19, 322–4.
62. Charles Ford, Ho Kai and William Edward Crow, “Notes on Chinese materia medica”, *China review*, xv (1886–87), 214–20, 274–6, 345–7; xvi (1887–88), 1–19, 65–73, 137–61. Ford evidently took pride in this enterprise. See his letters to Thistleton-Dyer, Kew Gardens: Chinese and Japanese Letters, 150 (310), (322), (323), (356).
63. Janet Browne, *The secular ark: Studies in the history of biogeography* (New Haven, 1983); *idem*, “Biogeography and empire”, in Jardine *et al.* (eds), *Cultures of natural history* (ref. 4), 305–21; Michael Dettelbach, “Humboldtian science”, *ibid.*, 287–304; Philip Rehbock, *The philosophical naturalists: Themes in early nineteenth-century British biology* (Madison, 1984), Part 2; Malcom Nicolson, “Alexander von Humboldt and the geography of vegetation”, in Andrew Cunningham and Nicolas Jardine (eds), *Romanticism and the sciences* (Cambridge, 1990), 169–85.
64. E.g. T. W. Kingsmill’s presidential address, “Border lands of geology and history”, *JNCB*, n.s., xi (1877), 1–31.
65. Alphonse de Candolle, *Géographie botanique raisonnée, ou exposition des faits principaux et des lois concernant la distribution géographique des plantes de l’époque actuelle* (2 vols, Paris, 1855), ii, chap. 9; *idem*, *Origin of cultivated plants* (New York, 1967 [1886]), chap. 2.
66. De Candolle, *Géographie botanique raisonnée* (ref. 65), ii, 979–80.
67. Bretschneider, *On the study and value of chinese botanical works* (ref. 43), 6–7; *idem*, “Botanicon sinicum” (ref. 10), 20–21.
68. References are numerous and can be found in Berthold Laufer, *Sino-Iranica: Chinese contributions to the history of civilization in ancient Iran, with special reference to the history of cultivated plants and products* (Chicago, 1919), *passim*. Most of the disagreements were about if a particular plant was introduced by Zhang Qian. Few, if any, questioned the story that Zhang Qian brought back some exotic plants from central Asia.
69. Bretschneider, *On the study and value of chinese botanical works* (ref. 43), 7.

70. Bretschneider, "Fu-sang, or who discovered America?", *Chinese recorder*, iii (1870–71), 114–20; Sampson, "Buddhist priests in America", in his *Botanical and other writings* (ref. 55), 30–31.
71. Anthony Pagden, *European encounters with the New World* (New Haven, 1993), chap. 1.
72. Georges Métaillé, "La création lexicale dans le premier traité de botanique occidentale publié en chinois (1858)", *Documents pour l'histoire du vocabulaire scientifique*, ii (1981), 65–73; Pan Jixing, "Tan 'Zhiwuxue' yi ci zai Zhongguo he Riben de youlai", *Daziran tansuo*, iii (1984), 167–72; Zhongguo zhiwu xuehui (ed.), *Zhongguo zhiwu xueshi* (Beijing, 1994), 122–3. The term *zhiwu* means the plant, and *xue* means an organized body of learning. *Xue* was frequently adopted by the translators to denote Western or Western-styled disciplines of learning. *Bowu* is "a wide range of things". The Chinese did have a genre called *bowu zhi*, "records of a wide range of things", whose catholic inclusion of natural things must have reminded the Western translators of Pliny's *Natural history* and other similar works, hence the rendition of natural history into *bowu xue*. However, *bowu* did not have the connotation that it referred only to natural objects until it was associated with *xue* in the neologism. Similarly, *zhiwu* was a traditional term. It had been used to denote the plant, for example, in Wu Qijun's *Zhiwu mingshi tukao* (1848), which might be translated as "the pictorial study of the names and natures of plants".
73. Jack Goody, *The cultures of flowers* (Cambridge, 1993); Craig Clunas, *Fruitful sites: Garden culture in Ming Dynasty China* (London, 1996); Wang Yi, *Yuanlin yu Zhongguo wenhua* (Shanghai, 1990).
74. O. F. von Möllendorff, "The vertebrata of the province of Chili with notes on Chinese zoological nomenclature", *JNCB*, n.s., xi (1877), 41–111, p. 44. For a concise introduction to *Bencao gangmu*, see Paul Unschuld, *Medicine in China: A history of pharmaceuticals* (Berkeley, 1986), 145–64; Needham, *op. cit.* (ref. 54), 308–21. For Li Shizhen, see Nathan Sivin's essay in *Dictionary of scientific biography*, viii, 390–8. See also Zhongguo zhiwu xuehui (ed.), *Zhongguo zhiwu xueshi*, 69–81; *Li Shizhen yanjiu lunwen ji* (Wuhan, 1985); Georges Métaillé, "Des plantes et des mots dans le *Bencao gangmu* de Li Shizhen", *Extrême-Orient, Extrême-Occident*, x (1988), 27–43. Pan Jixing discusses the transmission of the *Bencao* to Europe in his *Zhongwai kexue zhi jiaoliu* (ref. 21), 206–14.
75. S. Wells Williams, *The Middle Kingdom* (2 vols, New York, 1913 [1882]), i, 372.
76. Williams, *The Middle Kingdom*, i, 370.
77. Möllendorff, "The vertebrata" (ref. 74), 44–45. For an interesting comparative study of *Bencao* and a Renaissance herbal, see Georges Métaillé, "Histoire naturelle et humanisme en Chine et en Europe au XVI^e siècle", *Revue d'histoire des sciences*, xlii/4 (1989), 353–74. He argues that there are significant similarities between the botanical knowledge in the two works, though one can probably question his grounds for comparison.
78. Möllendorff, "The vertebrata" (ref. 74), 42.
79. Needham, *op. cit.* (ref. 54), 22–23.
80. Bretschneider, "Botanicon sinicum" (ref. 10), 66.
81. *Ibid.*, 66–67.
82. *Ibid.*, 65.
83. *Ibid.*, 65–66.
84. Richard Rudolph, "Illustrated botanical works in China and Japan", in Thomas Buckman (ed.), *Bibliography and natural history* (Lawrence, 1966); André Georges Haudricourt and Georges Métaillé, "De l'illustration botanique en Chine", *Études chinoises*, xiii (1994), 381–416.
85. *JNCB*, n.s., xxv (1890–91), 403.
86. Bretschneider, "Botanicon sinicum" (ref. 10), 50. Haudricourt and Métaillé, "De l'illustration

botanique en Chine” (ref. 84) compare Chinese and Renaissance European herbals and argue that the representations of plants in Chinese herbals, such as *Bencao*, remained fundamentally verbal. It is a point well taken, though one still wonders why the works included plates at all.

87. Bretschneider, “Botanicon sinicum” (ref. 10), 55.
88. Sampson, *Botanical and other writings* (ref. 55), 41.
89. A. A. Fauvel, “Alligators in China”, *JNCB*, n.s., xiii (1878), 1–36.
90. Robert Swinhoe to Richard Owen, 18 Feb 1870, Natural History Museum of London: Owen Correspondence, xxv, ff. 69–70. Möllendorff, “The vertebrata” (ref. 74), 44.
91. Bretschneider, “Botanicon sinicum” (ref. 10), 35.
92. Both Georges Métaillé and modern Chinese scholars convincingly argue that Wu Qijun had been influenced by the *kaozheng* philological methodology popular among Chinese scholars since the late eighteenth century. The *kaozheng* school emphasized dogged evidential scholarship. Generically speaking, Wu’s *Zhiwu* was more a pictorial dictionary of plants than an herbal. Henan sheng kexue jishu xie hui (ed.), *Wu Qijun yanjiu* (Zhenzhou, 1991), 55–57; Haudricourt and Métaillé, “De l’illustration botanique en Chine” (ref. 84). For the *kaozheng* school, see Benjamin Elman, *From philosophy to philology: Intellectual and social aspects of change in late Imperial China* (Cambridge, 1984).
93. Bretschneider’s *On the study and value of Chinese botanical works* (ref. 43) includes eight plates from the *Zhiwu*.
94. Sampson, *Botanical and other writings* (ref. 55), 32.
95. Henry to William Thistleton-Dyer, 13 May 1887. Kew Gardens: Chinese and Japanese Letters 151 (604).
96. For example, E. C. Baber, *Travels and researches in Western China: Supplementary papers of the Royal Geographical Society*, i (1882); *idem*, *Report by Mr. Baber on the route followed by Mr. Governor’s Mission between Talifu and Momein*, Parliamentary Papers, China no. 3 (1878); *Report by Mr F. S. A. Bourne of a journey in South-Western China*, Parliamentary Papers, China no. 1 (1888); *Report by Mr. Hosie of a journey through the Provinces of Suu-ch’uan, Yunnan, and Kuei Chou: February 11 to June 14, 1883*, Parliamentary Papers, China, no. 2 (1884).
97. See, for example, Robert Swinhoe, “On the mammals of the Island of Formosa (China)”, *Proceedings of the Zoological Society*, 1862, 347–65; “The ornithology of Formosa, or Taiwan”, *Ibis*, v (1863), 198–219, 250–311, 377–435; “On the mammals of Hainan”, *Proceedings of the Zoological Society*, 1870, 224–36.
98. Robert Swinhoe, “Neau-show”, *JNCB*, n.s., ii (1865), 39–52.
99. Möllendorff, “The vertebrata” (ref. 74), 46. See also his “Trouts in China”, *China review*, vii (July 1878–June 1879), 276–8.
100. Bretschneider, “Botanicon sinicum” (ref. 10), 87.
101. Sampson, *Botanical and other writings* (ref. 55), 31–36; Bretschneider, “Botanicon sinicum” (ref. 10), 92–95.
102. Alfred Newton, “Abstract of Mr. J. Wolley’s researches in Iceland respecting the gare-fowl or the great auk (*Alca impennis*, Linn.)”, *Ibis*, iii (1861), 375–99; Symington Grieve, *The great auk, or garefowl (Alca impennis, Linn.): Its history, archaeology, and remains* (London, 1885), *passim*.
103. Paul L. Farber, “The type concept in zoology during the first half of the nineteenth century”, *Journal of the history of biology*, xi (1976), 93–119.
104. Hance to Henry, 1 April 1885; 7 June 1885, in National Botanical Gardens (Glasnevin, Ireland): Letters to Henry. (The letters are not numbered.)

105. School of Oriental and African Studies, London: Bowra Papers, MS. English. 201813, Box 2, no. 7, Bowra's 1863 diary, July 18.
106. Bretschneider, "Botanicon sinicum" (ref. 10), 19.
107. *Ibid.*, 67.
108. Michael Adas, *Machines as the measure of men* (Ithaca, 1990); J. W. Burrow, *Evolution and society: A study in Victorian social theory* (Cambridge, 1966), 11–14; George Stocking, Jr., *Victorian anthropology* (New York, 1987), 174–5; Robert Nisbet, *Social change and history: Aspects of the Western theory of development* (Oxford, 1969), 189–208.
109. W. H. Medhurst, *A dissertation on the theology of the Chinese* (Shanghai, 1847); Arthur Wright, "The Chinese language and foreign ideas", in *Studies in Chinese thought*, ed. by Arthur Wright (Chicago, 1953), 286–303; Gernet, *China and the Christian impact* (ref. 7), 238–47.
110. "The advisability, or the reverse, of endeavouring to convey Western knowledge to the Chinese through the medium of their language", *JNCB*, n.s., xxi (1886), 1–21. Some of the opinions resembled to some extent the controversy about education in India earlier in the century. See, e.g., Adas, *Machines as the measure of men* (ref. 108), 271–92. The uniqueness of the Chinese language, especially its many ideograms, presented new challenges to Western educators in China.
111. Tejaswini Niranjana, *Siting translation: History, post-colonialism, and the colonial context* (Berkeley, 1992) discusses some theoretical issues about power and translation.
112. Bretschneider, "Botanicon sinicum" (ref. 10), 21.
113. On "trust" in science, see, e.g., Steven Shapin, *A social history of truth: Civility and science in seventeenth-century England* (Chicago, 1994), esp. 243–66.
114. Robert Swinhoe to Richard Owen, 18 Feb 1870, Natural History Museum of London: Owen Correspondence, xxv, ff. 69–70.
115. Richard Owen, "On fossil remains of mammals found in China", *Quarterly journal of the Geological Society of London*, xxvi (1870), 417–34.
116. Hance's introductory remarks to W. F. Mayers, "On the introduction of maize into China", *The pharmaceutical journal and transactions*, 3rd ser., i (1870–71), 522–5.
117. Sampson, *Botanical and other writings* (ref. 55), 17.
118. Harriet Ritvo, "Zoological nomenclature and the empire of Victorian science", in Lightman (ed.), *Victorian science in context* (ref. 4), 334–53.
119. Fauvel, "Alligators in China" (ref. 89).
120. On the introduction of exotic animals and plants into China, see Laufer, *Sino-Iranica* (ref. 68); S. A. M. Adshead, *China in world history*, 2nd edn (London, 1995), *passim*; Edward Schafer, *The golden peaches of Samarkand: A study of T'ang exotics* (Berkeley, 1963); Shiu Ying Hu, "History of the introduction of exotic elements into traditional Chinese medicine", *Journal of the Arnold Arboretum*, lxxi (1990), 487–526.
121. Sampson, *Botanical and other writings* (ref. 55), 23.
122. Bretschneider, "Botanicon sinicum" (ref. 10), 66; Ernst Faber, "Contribution to the nomenclature of Chinese plants", *JNCB*, xxxviii (1907), 97–164.
123. Augustine Henry, "Chinese names of plants", *JNCB*, n.s., xxii (1887), 233–83.
124. Henry to H. B. Morse, 17 June 1893, Kew Gardens: A. Henry letters to H. B. Morse, 3–5.
125. Fauvel, "Alligators in China" (ref. 89), 4.
126. *Ibid.*, 4–5.
127. W. F. Mayers, "The mammoth in Chinese records", *China review*, vi (July 1877–June 1878), 273–6. The naturalists also obtained fossils by purchasing them from drug stores. The Chinese used them as drugs.
128. Darwin himself used many examples from Chinese texts to support his arguments in natural

- history. Pan Jixing, *Zhongwai kexue zhi jiao liu* (ref. 21), chap. 1.
129. De Candolle, *Origin of cultivated plants* (ref. 65), *passim*.
130. Fan, "British naturalists in China, 1760–1910" (ref. 37), chaps. 3 and 5.