

Letter from Paris

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AMONG THE living beings to whom my daughter Madeleine formed ardent attachments as a little girl is a *Prunus* Sato-zakura ‘Shirotae’ (“snow white” in Japanese), or Japanese cherry tree, living in the Jardin des plantes in Paris. At about sixty years old, it is by far the youngest of the five officially designated *Arbres Remarquables* (Remarkable Trees) in the garden. The *Prunus* sprawls out laterally, forming a giant, lumpy tent over the ground, which it grazes with the tips of its outermost branches (fig. 1). In March and April, garnishing itself all over in snowy blossoms, it draws hordes of enchanted iPhone-wielding admirers, whom Madeleine considers fair-weather fans: she finds the tree diversely lovely at every stage of its annual cycle. She first began visiting the Shirotae at age eight with her grandmother, who walked her there for botanical pilgrimages, followed by hot chocolate in the garden’s restaurant. During the terrible winter and spring of 2021, while on a pandemic-induced leave of absence from college, she passed the tree each day on her way to and from work. Sometimes, I met her at the *Prunus*, and from behind our masks we took comfort in its indifference to the travails of the human world.

After she continued on her way to work, I lingered, at first in frustration. This was Paris during the pandemic lockdown, so the libraries and archives, along with everything else except grocery stores, were closed. I’ve been writing a book about the history of evolutionary theory, centering on the life and career of Jean-Baptiste Lamarck, who proposed a science of living things to be called *Biologie* and developed, at its foundation, the first modern theory of evolution. Lamarck lived and worked in the Jardin des plantes, and I would have liked to be inside the library of the Muséum d’Histoire naturelle, situated near the Jardin’s entrance, which houses a major collection relating to the early history of evolution including Lamarck’s papers. But at least the parks and gardens were open, unlike during the first lockdown in

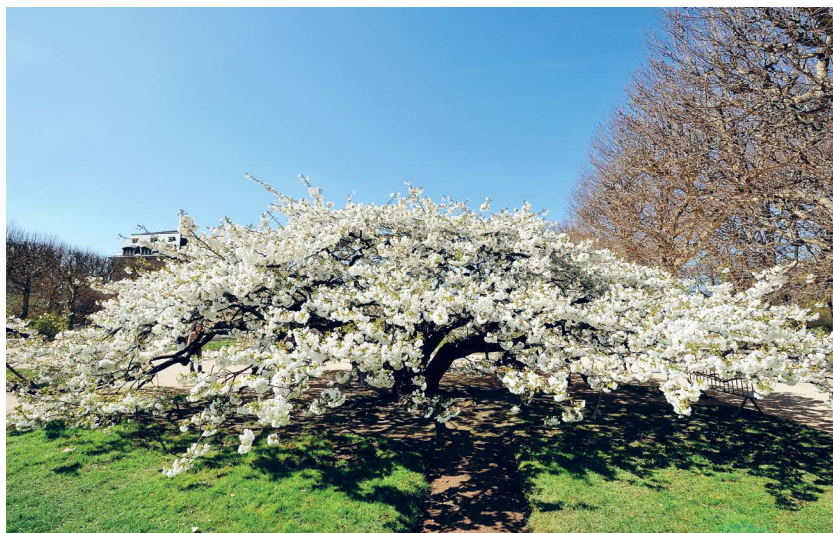


Fig. 1. *Prunus* Sato-zakura 'Shirotae' (5 April 2010).

© Muséum national d'Histoire naturelle. Photo by François-Gilles Grandin.

March of 2020. As I dawdled among the trees and along the paths, I began to think about how the garden itself sets the scene for the story I'm trying to tell.

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It was here in this garden that the first ideas of evolution emerged, between roughly the middle of the eighteenth century and the early nineteenth. This was a peculiar moment: a brief interval of naturalism during which people, particularly in France, sought natural causes for everything, including living beings. Before this, God had played the starring role in theories of the origins of living things. Afterward, evolutionary biologists—not Charles Darwin himself but his most influential interpreters, people such as the German biologist August Weismann—described evolving organisms as passive in the process of evolutionary transformation. This made room for an implicit divine engineer directing that process. But in between, naturalists working in and around the Jardin des plantes did an extraordinary thing:

they described living beings as actively producing and transforming *themselves*.

In doing so, these early evolutionary theorists made an assumption of “causal pluralism,” to borrow a phrase from my late undergraduate advisor, the evolutionary biologist, paleontologist, and historian Stephen Jay Gould. I once spent an afternoon with him exploring the Jardin des plantes and the Muséum d’Histoire naturelle, talking about the work that went on there during their early years. By “causal pluralism,” I mean that rather than assuming a divine presence monopolizing causal power, people supposed the world must be shaping itself in myriad ways, through many kinds and levels of causal agency, and they sought to understand it accordingly, drawing upon every form of understanding at their disposal: their science included history, literature, philosophy, the arts, moral and political thought.

This holistic, pluralist mixture of ideas and approaches constituted the distinctive intellectual world of the early Jardin des plantes and of the first authors of evolutionary theory. It was the intellectual world where Lamarck developed his momentous theory that living things are in a continual state of self-transformation. The giraffe became the emblem of Lamarck’s theory; although he devoted only a couple of paragraphs to it in voluminous writings, it perfectly encapsulated his idea that animals have the power to transform themselves heritably. Giraffes had acquired their distinctive form by stretching to reach high branches, Lamarck wrote, lengthening their neck and forelegs by tiny yet heritable amounts, which then had accumulated over many generations.

Soon, there came the reactionary overthrow I’ve mentioned, when an influential generation of evolutionary theorists moved to eradicate Lamarck and his self-transforming organisms from biology. These new theorists described living beings as purely passive in the process of evolutionary transformation, eliminating the threat that the evolving organism might usurp God’s monopoly on creation. Coinciding with this passive image of living things came a new and different model of evolutionary biology, and of science in general. A passive, artifact-world implied an engineering sort of science to grasp

it: a dry, dispassionate documentation of parts and their constrained movements. This was a mode of science that defined itself by its strict contrast with historical, literary, and artistic ways of understanding, which dwelt in living experience and activity.

While the older model of science had been open, holistic, and causally pluralist, the new one was isolated, reductive, and causally monist. This new model eliminated the many agencies at work in the older one—such as the desires, behaviors, and willful actions of living beings—leaving only the mechanical fitness of form to function. Evolutionary theorists and popularizers writing in the second half of the nineteenth century including Weismann, the philosopher and social theorist Herbert Spencer, and the anatomist T. H. Huxley announced the separateness of science from all other modes of understanding. They insisted greatly on the distinction between the “scientific” and the “unscientific,” favoring catchphrases such as “scientific method,” the “scientific spirit,” “scientific men,” “scientific minds,” and they remade evolutionary theory to exemplify this new, exclusionary model of science. In their hands, science became a thing apart: exceptional, enthroned, existing in splendid isolation.

In this way, the history of evolutionary theory—the history of its development and popularization—is also a history of the changing nature and public image of science. The concerted reactions against Lamarckism represented the major political forces and interests—imperial, industrial, commercial, racial, religious, socioeconomic—that reshaped science over the course of the nineteenth century. Contemplating Lamarck’s science and its fall from favor, I’ve become interested in the larger development it represented: the redefinition of science, setting it apart from all other forms of knowledge, which took place within fifty years around the turn of the twentieth century. To seek a whole, integral, interpretive understanding of the world in the manner of Lamarck’s science became, at least in many areas and in popular understanding, a thing of the past.

As I walked the paths of the *Jardin des plantes*, I began searching for remnants of the lost intellectual world of causal pluralism and interconnected forms of understanding that generated the theory of



Fig. 2. *Pistacia vera* L. (9 June 2015).

© Muséum national d'Histoire naturelle. Photo by Bruno Jay.

evolution: its geography, its landscape, and its inhabitants, some of whom are still alive today. Come and meet them.

Sexy Trees

At the opposite end of the chronological spectrum from Madeleine's *Prunus*, the oldest of the garden's Remarkable Trees is a pistachio (*Pistacia vera* L.). Less eye-catching than the Shirotae in full bloom, the venerable pistachio is nevertheless impressive, a striking combination of age and youth: its bent, gnarled trunk is supported by the iron pole that holds its plaque, but its twisted branches bear an abundance of glossy, dark-green leaves (figs. 2 and 3). This impressive tree enjoys the additional distinction of having demonstrated to the human world the sexuality of plants. It was planted in 1702, but



Fig. 3. Pierre-Joseph Redouté, *Pistacia vera*, ca. 1801–1819.
From the Moquin-Tandon herbarium, courtesy of Muséum national
d'Histoire naturelle. Special thanks to Mme Liliane Rayer for identifying
this colored lithograph, which the artist probably executed from
specimens from Vaillant's pistachio in the Jardin des plantes.

I'll begin its story sixty-seven years earlier, in 1635, when Louis XIII acquired a chateau and estate on the Left Bank in central Paris and, under the influence of his doctor, Guy de la Brosse, made a garden there for doctors and apothecaries. This garden, the Jardin du Roi, which would later become the republican Jardin des plantes when the Revolution removed the Roi, opened to the public in 1640 as a place to stroll, or to attend free public lessons in anatomy, chemistry, and botany, offered accessibly in French rather than, as at the university, in Latin. In 1700, Louis XIII's elder son, Louis XIV, dispatched his chief botanist, Joseph Pitton de Tournefort, on an expedition to the Levant to find out everything he could about the plants, minerals, illnesses, and remedies of that region. Tournefort returned to Paris two years later bringing marketable intelligence and goods, including the seeds from which the Remarkable Pistachio took root.

As the tree grew, it produced flowers, but these yielded no fruit, only pollen, which in Tournefort's opinion was the tree's excrement. However, Tournefort had an upstart colleague and former student named Sébastien Vaillant, who got it into his head that pollen was not tree excrement but tree semen. In fact, the idea of plant sex was abroad in the land, although Tournefort rejected it; Vaillant was drawing on suggestions that several naturalists had begun to make over the previous decades. In 1682, the English doctor Nehemiah Grew had asserted that plants were hermaphroditic, "or *Male* and *Female*," that a plant's "Attire [stamens] doth serve, as the *Male*, for the *generation of seed*," and that "the *Seed-Case* is the *Womb*." A dozen years later, the German doctor Rudolf Jakob Camerarius, professor of medicine and director of the botanical garden at Tübingen, wrote a long letter to a friend and colleague describing a series of experiments he had performed on plant sexuality. Unlike Grew, Camerarius believed that while some plants were hermaphroditic, others were dioecious, meaning that individuals were either male or female. Dioecious plants, Camerarius thought, were best suited to experiments designed to test the hypothesis of sexual reproduction in plants. His experiments suggested that for female plants to bear fruit, they needed to come into contact with pollen from the anthers of male plants.

Vaillant, eager to test this hypothesis for himself with regard to the Jardin's barren pistachio tree, thought of another pistachio just fifteen minutes' walk away in the Jardin des apothicaires that also produced flowers, though slightly different ones, and no fruit. Taking a flowering branch from the Jardin du Roi pistachio, he carried it carefully over to the Jardin des apothicaires, where he shook it over the flowers of the pistachio there. Several weeks later, Vaillant's experiment bore fruit when baby pistachio nuts appeared on the female tree in the Jardin des apothicaires.

Soon afterward, at the decidedly unsexy hour of 6:00 on the morning of 10 June 1717, Vaillant stood triumphantly before the audience assembled for the first lecture of the annual course on botany in the Jardin du Roi and announced that plants had sex. Vaillant, a lowly underdemonstrator of plants, was filling in for his boss, the regular professor of the course and director of the Jardin du Roi, Antoine de Jussieu. While the unsuspecting Jussieu traveled in Spain, Vaillant exposed his students' minds to the salacious idea that flowers were sex organs. Stamens, he said, were testicles, and pistils ovaries. Petals surrounded these organs to cover and protect them, and to preserve their vegetal version of modesty. During reproduction in certain flowering plants, Vaillant recounted with Rabelaisian relish, "the tension or swelling of the male organs occurs so rapidly that the lips of the bud, giving way to such impetuous energy, open with surprising speed. In that moment, these fiery organs, which seem to think only about satisfying their violent desires, abruptly discharge in all directions, creating a tornado of dust which expands, carrying fecundity everywhere; and by a strange catastrophe they now find themselves so exhausted that at the very moment of giving life they bring upon themselves a sudden death." Vaillant's listeners, if somnolent at the start of the dawn lesson, were surely wide awake by its end. Indeed, after Jussieu's return from Spain, his students clamored to have Vaillant continue lecturing to them, which Jussieu reluctantly allowed.

Tournefort had not lived to witness this irreverence: nine years earlier, on a spring day in 1708, rushing with a big bundle of plants across a street bordering the Jardin des plantes, he had been struck

by a cart and crushed against a wall, and died from his injuries shortly afterward. But he had followers in the Academy of Sciences, botanists who had hitched their careers to his views. These Tournefortians rose up against Vaillant's betrayal of the master along with his bawdy approach to botany. Jussieu himself was working on an edition of Tournefort's works; once back from Spain, he hastily presented his own discourse omitting the idea of sexual reproduction in plants. When Vaillant died five years later, the Academy did its best to relegate him to professional oblivion, for instance by declining to publish the usual eulogy. Jussieu did value Vaillant's personal herbarium sufficiently to preempt its sale to an English botanist, claiming it instead for the Jardin, where it still remains.

In the end, Vaillant's conviction that plants have sex prevailed. A few decades later, the Swedish botanist Carl Linnaeus invented modern biological nomenclature beginning with a "sexual system" of plant taxonomy inspired crucially by Vaillant. "This sun affords such joy to all living things that words cannot express it. . .," rhapsodized Linnaeus in his university thesis. "Why, all animals feel the sexual urge. Love even seizes the very plants," whose "nuptials" he then goes on to describe. A lover of classical poetry, especially Virgil and Ovid, throughout his career Linnaeus pursued his pet theme of love and sexual desire as universal among living things, including plants.

Vaillant was a causal pluralist: he saw causes in the pistachios' pollen, stamens, and pistils, and also in the desires of all organic beings. Understanding a world made by more than one kind of cause requires an approach of more than one dimension. When Vaillant contemplated the barren pistachio in the Jardin des plantes and had a momentous idea, poetry and sympathetic identification were as fundamental to his discovery as experimentation and careful observation. The same goes for Linnaeus: when he encountered Vaillant's idea and built a new system of taxonomy around it, sentiment and literary expression were again essential to the process. It's not that these were writers as well as scientists, or that they wrote poetically about their science. No, this is what their science *was*: literary, philosophical, empirical, experimental. We owe our understanding of plant reproduction and

our system of biological nomenclature to poetry as much as to what we would now call biology.

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In addition to co-opting Vaillant's herbarium, Jussieu also appropriated the now-vacant position of underdemonstrator of plants, which he gave to his younger brother Bernard. It was thanks to Bernard de Jussieu that the Jardin came to house the most famous of its Remarkable Trees: the majestic cedar of Lebanon (*Cedrus libani*) that presides over the entrance to the twisting, climbing path called the Labyrinth (figs. 4 and 5). Just how Bernard de Jussieu came to plant the cedar in the Jardin has been a matter of imaginative speculation. Versions of the story proliferate, and, curiously, all of them involve a hat. According to the Christian version, Bernard carried the tiny seedling all the way from the Holy Land, cradled lovingly in his hat, depriving himself of water to keep the baby tree moist. A more



Fig. 4. *Cedrus libani* (9 June 2015).

© Muséum national d'Histoire naturelle. Photo by Bruno Jay.



Fig. 5. Jean-Baptiste Hilair, *The cedar in the Jardin du Roi*, 1794.

Courtesy of Bibliothèque nationale de France.

prosaic version has Bernard bringing the seedling home from England in a pot that broke during the crossing, whereupon he resourcefully transferred the baby cedar to, once again, his hat.

Jussieu's hat does seem to have played a role, in fact: it's well established that during a trip to London in 1734, he received a pot containing two cedar of Lebanon seedlings, that he placed the pot in his hat to protect it during the return journey—so he often told his nephew Laurent—and that he planted one of the cedar seedlings in the Jardin du Roi. A commemorative drawing by Charles Monnet from 1798 shows Bernard extending his already famous hat containing the tiny cedar sprouts toward a gigantic hole that has evidently just been dug; the digger stands in rolled shirtsleeves leaning on his pick, while assembled onlookers gesticulate excitedly (fig. 6). In the background, a camel peers down its long nose at the unfolding scene. A camel in central Paris, you are perhaps exclaiming? This brings us to the menagerie.



Fig. 6. Bernard de Jussieu plants the Cedar of Lebanon. Drawing by Charles Monnet, engraving by Charles-Étienne Gaucher, 1798.
Courtesy of Musée national de l'éducation.

Elephant Erotica

The northwest quadrant of the Jardin houses the world's second oldest zoo, after the Tiergarten Schönbrunn in Vienna, though Monnet's addition of a camel to the scene shows artistic license, since when Bernard planted the Lebanese cedar, the zoo didn't yet exist. It came to exist soon thereafter, first as a gleam in the eye of Georges Buffon, who served for half a century as the Jardin's intendant and mastermind.

Buffon managed to capture the intendance of the Jardin du Roi in 1739, as an aspiring young man of thirty-one, and he kept it until his death in 1788. During the intervening decades, his ambition and political skill transformed the Jardin into a major center of research in natural history: he doubled the size of the garden, extending it south all the way to the Seine; acquired an adjacent mansion to live in as intendant; expanded the king's natural history collection, the Cabinet du Roi, acquiring another adjacent mansion to house it; and commissioned the architect Edme Verniquet to design an amphitheater for lectures, the elegant, neoclassical Verniquet Amphitheater.

It was here that Buffon's protégé, Lamarck, would later present to the world his momentous theory of the continual self-transformation of living beings. Buffon himself proposed the beginnings of an idea of species change in 1753. From his vantage point in the Jardin du Roi, he had begun work on a tableau of the entire natural world that ultimately grew to thirty-six volumes. In the fourth volume, which embarks upon the nature of animals, Buffon observed that the family resemblances among different kinds of animals might tempt a naturalist to consider the possibility that all forms of animal life could have originated over time from a single animal. Little wonder that he wanted a zoo and tried to have the royal menagerie at Versailles transferred to the Jardin, where it could become a part of the research collections, but, unusually, he failed.

Thanks in part to this uncharacteristic failure, the menagerie in the Jardin des plantes is the world's oldest *national* zoo, having originated in a revolutionary, republican act. On the 3rd of pluviôse in the

year II of the one and indivisible French Republic (22 January 1794), the National Convention's Committee on Public Instruction drew up a decree abolishing the royal menagerie at Versailles and transferring its occupants to a new menagerie to be built in the Jardin des plantes in Paris.

Several months earlier, the National Convention had reconstituted the Jardin du Roi and Cabinet du Roi as a single national research and teaching establishment, with a staff of twelve professors, to be called the "Muséum d'Histoire naturelle." Lamarck, recently attached to the Cabinet as the botanist in charge of herbaria and anxious to shield the royal botanical garden and natural history collection, including his own position, from the gathering political storm, had proposed this plan of reorganization during the first stages of the Revolution. Diplomatically referring to what had hitherto been the Jardin du Roi as the "Jardin des plantes," Lamarck accomplished a bloodless king-removal by nomenclature. The Convention, having finished the job by guillotine, folded the Versailles menagerie into the new, national research and teaching facility, creating the world's first public zoo (its above-mentioned competitor, the Tiergarten Schönbrunn, originated in 1745, but as the imperial menagerie of Maria Theresia and Franz I).

In fact, there were few remaining occupants in the Versailles menagerie since it had been pillaged during the summer of 1792; many of the animals, including "a beautiful dromedary," several quadrupeds, and a great many birds had been either eaten or sent to the knacker. The director of estates at Versailles, Louis-Charles Couturier, under instructions from the revolutionary government, had written to the botanist and romantic novelist Bernardin de Saint-Pierre, who was then serving as director of the Jardin des plantes, offering him the survivors for the natural history cabinet, presumably to be killed and displayed either stuffed or as skeletons. After receiving repeated entreaties, Bernardin finally made a visit to Versailles in January 1793 to inspect the formerly royal, apparently doomed creatures.

When Bernardin and his colleagues arrived at Versailles, they found only five survivors: a quagga, a now-extinct subspecies of

southern African zebra; a bubal, a now-extinct kind of North African hartebeest; a crested pigeon from the Banda Islands; an Indian rhinoceros; and a “beautiful lion” from Senegal. The lion had been raised together with a puppy, and the two presented a scene to delight the author of *Paul et Virginie*. “Their friendship,” Bernardin observed, “is one of the most touching spectacles that nature could offer a philosopher for his speculations.” The dog, a pointer, seeing the inspection party arriving at his shared enclosure, came rushing over, tail wagging, while the lion paced gravely, rubbing his massive head against the bars. When the visitors spoke to the animals, the dog threw himself playfully at the lion’s mane and bit him on the ears. According to their keepers, the lion often invited the dog to play by lying on his back with his paws in the air and hugging the dog in his arms.

Later, after the pair had moved to the new menagerie at the Jardin des plantes, the Muséum librarian, Georges Toscan, wrote an essay, “Story of the Lion and his Dog,” describing how the majestic and ferocious lion’s character was “softened by the joys of friendship.” The “natural gaiety” of the dog, and his “frank and open air,” Toscan reported, “tempered the grave and serious humor of the king of animals.” The lion grew tender, as when “with one paw he softly pressed his friend to his breast, while with his tongue he licked under his belly.” When the dog became ill and died soon after arriving at the menagerie, Toscan recounts, the poor lion was inconsolable, his grief a monument to friendship.

Following his visit to Versailles, Bernardin made an earnest plea for including living animals, not just taxidermied ones, among the collections at the Jardin des plantes. The garden, he wrote, contained an active soil with growing plants, but “no animal that feels, loves, thinks.” How could the study of natural history proceed without these? “What use will it be,” Bernardin demanded, “to know [animals] only dead if we are never to see them living?” He urged that a living menagerie was essential to many areas of learning, such as the liberal arts, allowing artists to sketch, paint, and sculpt the animals from life. Best of all, a menagerie would present opportunities for moral and social instruction. The lion and his dog friend demonstrated that the

most savage of beasts could become sociable. As another example of interspecies sociability, Bernardin told the story of a cockatoo he'd encountered on the Ile de Bourbon (now Ile de la Réunion) that "took such a great affection for a spaniel" that whenever it saw the dog it flew up to him and followed him around "uttering cries of joy." When the dog went indoors to sleep, the bird sat for hours with its head between its talons.

Even the ferocious and stupid rhinoceros at Versailles was "sensitive to friendship": Bernardin had witnessed this sensitivity in 1770 during the rhino's passage through the Ile de France (now Mauritius). He loathed pigs and crushed them with his horn, but he developed a warm affection for a certain goat, which he allowed to eat hay between his legs. These relationships were suggestive. Perhaps humans' famous friendship with dogs could help us befriend other animals: dogs and other domestic animals might act as ambassadors, bringing wild animals into closer communion with humans. Bernardin also proposed that it might be possible to foster not just friendship but interspecies love, producing new creatures altogether. According to Aristotle, the Indians bred dogs with tigers to get dog-tigers; why not dog-lions?

Wild beasts began showing up at all hours at the gates of the Jardin. On the 14th of brumaire (4 November 1793), the naturalist Etienne Geoffroy Saint-Hilaire, then holder of the principal chair in zoology at the Muséum d'Histoire naturelle, was going about his business "in the calm of his cabinet" when he received "a very unexpected piece of news": a panther, a civet, a monkey, and a polar bear were waiting in the street. This was the immediate result of an order of the municipal police banning the display of "dangerous animals such as lions, leopards and others" in fairs or on public squares; the creatures must be either slaughtered or delivered to the Jardin des plantes, where the owners would receive indemnities. The first four surprise arrivals had been displayed on the Place de la Révolution (now the Place de la Concorde), where Louis XVI and Marie Antoinette had been guillotined a few months earlier. Close on their heels came a tiger, another polar bear, two mandrills, and three eagles. Geoffroy hastily arranged temporary cages under the windows in the museum

and began the process of applying to the Convention for support to build a menagerie, which request was granted the following spring.

At last, on the 7th of floréal in year II (26 April 1794), four of the five Versailles beasts arrived at the Jardin des plantes (the rhinoceros had died meanwhile). The professors next succeeded in acquiring two dromedaries that had belonged to the Prince de Ligne; and one day in May, Geoffroy and Lamarck made a trip to Raincy, the former estate of the duc d'Orléans, to commandeer some large quadrupeds. Lamarck, having devoted his career principally to botany, was now, at age fifty, reinventing himself as a zoologist in order to take up the lesser of the two zoology chairs in the new Muséum, the Professorship in Insects and Worms. Lamarck himself had proposed the creation of this position, but he had had others in mind to fill it, since, being a botanist, he had hoped to take charge of the botanical collections himself. However, the other botanists associated with the Jardin had resented Lamarck's presence ever since his arrival in 1789. "Professor of Insects and Worms" was a sufficiently lowly sounding position that others were content to leave it to him. But on the trip to Raincy, Lamarck was after bigger prey; he and Geoffroy returned to Paris that evening driving before them a whole host of large herbivores, including several kinds of deer, through the streets to the Jardin.

Animals continued to arrive at the Ménagerie, most of them trophies of the Revolutionary army. Among the most spectacular were two elephants, whose entrance along the Seine on the evening of 24 March 1798 was greeted by throngs of admirers. Hans and Parkie (renamed Marguerite upon arrival in France) had begun life in Sri Lanka, where they were captured in 1784 and became gifts of the Dutch East India Company to William V, Prince of Orange. The elephants had been living in the menagerie at William's estate of Oude Loo, near Apeldoorn, until moving to Paris following the French occupation of Holland. When separated from one another for the journey, the elephants reportedly "first gave signs of the most intense sorrow, and soon abandoned themselves to excesses of the most violent fury." When they were reunited in Paris, the poet Louis-François Jauffret recounted that "they caressed one another with their trunks and made



Fig. 7. “The Elephants represented in the instant of the first caresses they gave one another after we had them listen to the music.”
 Jean-Pierre Houel, *Histoire naturelle des deux éléphants, male et femelle, du Muséum de Paris, venus de Hollande en France en L'an VI*, 1803.
 Courtesy of Muséum national d'Histoire naturelle.

the air resound with cries of joy. Their eyes . . . were wet with tears. It was the most touching scene.”

The elephants were the subject of one of the first experiments at the Ménagerie. Two months after their arrival, on 29 May, fourteen musicians came over by arrangement from the Conservatoire de Musique to play a concert for the pachyderms, to see how they might respond to different kinds of music. Toscan, the librarian, once again told the story in a two-part article for *La Décade philosophique*. The painter, draftsman, and engraver Jean-Pierre Houel also came to observe the event, which he later included in his illustrated account of the elephants (fig. 7). According to these contemporary accounts, the

elephants' English keeper, one Thompson, to safeguard the element of surprise, distracted them with food while the musicians set up out of sight in a gallery above the enclosure, connecting to it by a trapdoor. When the musicians began to play, the elephants stopped eating and ran toward the sound, exhibiting "curiosity, astonishment and disquiet." They circled beneath the trapdoor, directing their trunks at the opening. Gradually, though, they calmed down and began to respond to the music.

Unexpectedly, what follows reads like a contemporary erotic novel. Imagine Laclos or Sade, but with elephants. The musicians began with Gluck's Dance in B Minor from his opera *Iphigénie en Tauride*, arousing the elephants to move rhythmically to the music and utter piercing cries. Next came the song "O ma tendre musette," played in C Minor on solo bassoon, which Toscan reported put the elephants into "a sort of enchantment": gently waving their trunks, they "seemed to inhale the loving emanations." Marguerite appeared more moved than Hans, caressing both him and her own teats with her trunk, which she next stuck into her mouth and then into his ear in an effort to rouse him. When the orchestra moved on to the popular revolutionary tune "Ça ira," in D Major, which it repeated several times during the concert, both elephants grew impassioned, and Marguerite's passion developed into a delirious frenzy, as she galloped about, uttered various cries, flapped her ears furiously, and tried to get Hans to respond to her caresses. Finally, according to Houel, "the soft harmony of two human voices" descended like refreshing rain from the upper gallery, and Marguerite grew calm.

After a brief intermission, the orchestra resumed playing, this time in full view of the elephants, from right next to their enclosure. The pachyderms showed no interest in Haydn, but Hans was visibly aroused by the sound of a clarinet playing from the overture to *Nina, o sia La pazza per amore*, by Giovanni Paisiello. His mood died abruptly when the orchestra returned to "Ça ira" for the fourth time. Although Thompson and Houel both reported later witnessing the elephants in various suggestive positions, Marguerite's lust remained unfulfilled. Houel thought Hans must still be too immature for a consummation.

A couple of weeks later, also according to Houel, a group of student trumpeters came to test whether the elephants would respond differently to a cacophony of trumpets, oboes, and clarinets playing all at once than to music. Though unmoved by the noise, which the humans in attendance found earsplitting, the elephants responded as before when the horn players switched to playing harmonious music, with tender caresses.

The musicians, artists, writers, and naturalists who participated in the elephant concert experiments wanted to understand the elephants' experiences and emotions by making music a ground for comparison, measuring the elephants' responses against their own. Together, they took a variety of causes into consideration—sound, music, vision, emotion, physiology—and used various means of observation and description. The same plurality of causes and methods characterized Toscan's and Bernardin's accounts of interspecies friendships and romances, and their musings on the creative possibilities of animal and human sociability, which they thought might even produce new forms of animals altogether. Storytelling and social theory were fundamental to their description of a dynamic interconnectedness among living organisms, which was in turn essential to the earliest ideas of evolution.



Walking along the wall enclosing the Ménagerie, I see a red panda's fuzzy arms appear at the top of the climbing structure, then its tail, then its whole head as the panda peers over the wall. I feel a pang of compassion for this Himalayan creature, evolved to roam over an open mile of high mountain, now locked in an enclosure in central Paris.

The Ménagerie is a poignant contradiction. Bernardin insisted that, to observe animals' manners and habits, zoologists must study them not only alive but healthy, happy, and thriving. Hunting animals to kill and taxidermy them, you would "never see them except fleeing and trembling" or dead and stuffed. Likewise, Toscan, describing the elephant concert, praised "those Artists armed, not with scalpels and instruments of torture, but with oboes, flutes, and violins." He

thought it was both more humane and more logical “to study the springs and functions of life in life itself, rather than seeking these out in death, or in the convulsions of an expiring animal.” Causal pluralism has a humane implication: to take the emotions and behaviors of living organisms as natural causes suggests one cannot understand how animals work without having a measure of regard for their feelings. The zoologist Bernard-Germain de Lacépède promised that the new menagerie would abolish the small, squalid enclosures of old and would “erect, so to speak, on the ruins of these prisons,” an establishment worthy of a free and enlightened citizenry. The new zoo would resemble “a varied and cheerful countryside, where the different species of animals will enjoy all the freedom it is possible to allow them without danger,” and visitors would witness them in their natural state.

At the same time, in both its royal and republican guises, the Jardin, including the Ménagerie, was from the first a project of empire, an expression of conquest and political might. Despite Bernardin’s and Lacépède’s idealism, the animals continued to live in more or less terrible circumstances for want of space and funds. Many animals died because of their poor living conditions. Often, visitors harassed the animals, throwing stones at them or having their dogs chase them to make them move about. Conditions did improve a little during the first decades of the nineteenth century when an influx of money permitted several new buildings and other renovations. But during the four-month Siege of Paris in 1870–71, which culminated in the French defeat ending the Franco-Prussian war, many of the zoo animals were eaten.

A plaque at the entrance to the Jardin des plantes explains that “during the Siege of Paris, the animals served as food for the Parisians,” and the historical timeline on the Jardin’s website includes the following entry: “The darkest hours: during the siege of Paris by Prussian forces, many animals were killed by the bombardments, and others were slaughtered to feed the population.” This official history is misleading, though: many people were indeed starving, but they weren’t the ones who ate the zoo animals. Rather, the administrators of the Ménagerie, including Isidore Geoffroy Saint-Hilaire (who

had inherited his father Etienne's chair in zoology), sold animals—including two elephants named Castor and Pollux—to Coutier and DeBoos, elite butchers on the prosperous Boulevard Haussmann. To relieve the tedium of the siege and dramatize the extraordinary lengths to which brave Parisians would go in refusing to surrender, a wealthy clientele feasted on elephant soup and roast camel.

Amidst all this, on 17 October 1870, a small gathering attended a ceremony in the Jardin des plantes. In a typically weird expression of scientific sainthood—like Galileo's middle finger, which is preserved pointing eternally skyward in a glass egg in the Florence Science Museum—they were installing Buffon's actual brain in the Muséum, where it remains, in a crystal urn in the plinth of a statue of its original owner. An inscription on the urn identifies the "Cerebellum of Buffon, preserved in the Egyptian manner." For a time after Buffon's death, his brain traveled on its own, arriving back at the Muséum just under a century later. The brain had in fact been handed down through the family of Buffon's friend, the geologist Barthélémy Faujas de Saint-Fond. Buffon had left Saint-Fond not his brain but his heart. But the ungrateful wretch had traded the sentimental organ to Buffon's son, nicknamed "Buffonet"—about whom more presently—in exchange for the brain. (Buffonet was apparently unsentimental too; he regifted Buffon's heart to the writer and *salonnière* Suzanne Curchod, wife of the Genevan banker and Louis XVI's finance minister Jacques Necker, and mother of the writer and political theorist Madame de Staël.)

The world's oldest national zoo remains, according to some animal-rights activists, inhumane. They cite, for instance, the caging for the last half-century of an orangutan called Nénette. Trapped in Borneo in 1972, Nénette has borne four sons in captivity and entertained generations of zoo visitors. Another enclosure houses a pair of snow leopards, whose wilderness habitat ranges from five to fifteen miles. Orangutans, snow leopards, and red pandas are all endangered, and the Muséum d'Histoire naturelle participates in research and breeding programs for the sake of conservation. But whether these efforts necessitate or justify the confinement of the animals is debatable.

These caged animals' predecessors arrived as imperial booty and remained as symbols of political power, yet they also helped to shape a holistic and pluralist science of life founded on the principle that living beings actively create themselves and the world around them. The authors of this new science of life plainly saw a contradiction in their science of animal agency emerging from a practice of subjugating animals. If Bernardin, Toscan, and Lacépède were right, the moral failing was also a scientific mistake.

Giraffe Personhood

The Republic gave way to an Empire, which gave way to a restored Bourbon monarchy. *Plus ça change, plus c'est la même chose*. In 1826, Muhammad-Ali, Pasha of Egypt, offered a young Nubian giraffe to Charles X as a diplomatic gift, and the following spring, Géoffroy Saint-Hilaire went to pick her up and bring her to the Jardin des plantes (Lamarck was by then very frail and blind); she became the first living giraffe in France. The journey was long and complex. Bernardino Drovetti, the French Consul-General of Egypt, first arranged for the giraffe to sail across the Mediterranean from Alexandria to Marseilles aboard the Sardinian brig *I due Fratelli*. The very young giraffe required twenty to twenty-five liters of milk each day, so she traveled with three cows. She also had several handlers, including two people who had apparently been enslaved to Drovetti: Atir from Darfur, a groom, and Hassam from Sennar, a "servant" (fig. 8). In Marseilles, Géoffroy hired a young French-Egyptian boy named Youssef Ebed, who had been born a Napoleonic refugee in Marseilles and was bilingual in French and Arabic, to serve as interpreter. The giraffe was already too tall to fit below deck, so her transporters removed a panel at the base of the mainmast and, by lining the opening with straw, allowed her to pass her neck through in safety and comfort. They also stretched an oiled canvas above the opening attached to four posts, creating a canopy to shield her head from sun and rain.

The giraffe arrived in Marseilles in good health on 23 October 1826, and after a three-week quarantine, the prefect Count Christophe



Fig. 8. Nicolas Hüet, *Study of the Giraffe Given to Charles X by the Viceroy of Egypt, 1827*. The seated man, Atir, remained in Paris to care for the giraffe, lived with her in the Rotunda, and gave a daily performance in which he groomed her using a currycomb on a pole.

Courtesy of the Morgan Library and Museum.

de Villeneuve-Bargemont put her up in his garden. There she wintered, safe from the Parisian cold, resting and maturing. The prefect himself took her for long afternoon strolls in the countryside. She had such success in Marseilles that Géoffroy, arriving the following April to pick her up, found it difficult to persuade the prefect and his wife to part with her.

Finally, on 20 May 1827, the giraffe and her retinue set out on foot for Paris. The three milk cows went first, followed by the giraffe and her handlers, then a cart with luggage, food, and various other caged animals bound for the menagerie. The giraffe wore a blue oilskin raincoat decorated with golden fleurs-de-lis, representing the French throne, on one side, and on the other, the coat of arms of the viceroy of Egypt. Géoffroy often walked with her; at other times he rode in a coach, or else traveled ahead to make arrangements. Each night, the giraffe required special accommodations, which frequently involved remodeling stables on the fly. The cortège walked through Avignon, through Lyon. Everywhere, great crowds of admirers greeted the giraffe and Géoffroy delivered public lectures. In Joigny, a Mme Jeannot placed a haystack in a second-floor window so the giraffe could graze on it in passing.

The giraffe arrived in Paris on 30 June and was greeted by royalty, by the military, by essentially everyone in the city. Stendhal, together with the wife and stepdaughter of the comparative anatomist Georges Cuvier, took a steamboat up the Seine to Villeneuve-Saint-Georges to witness the giraffe's approach. Arriving at the Jardin des plantes, she took up residence in the Rotunda, which had been built under Napoleon to house large carnivores but had proved unequal to the task and instead held big herbivores (starting with Marguerite the elephant, who had died a decade earlier). The giraffe received six hundred thousand visitors during the first summer, financing an expansion of the menagerie with several new buildings. Giraffe merchandise became a craze: people rushed to produce, buy, and sell giraffe portraits and giraffe-themed books, clothing, dishes, toys, sculptures, and cartoons.

Géoffroy published his observations of the giraffe, in which he considered in particular her character, with its striking combination of mildness and courage. She was so "good-natured," so "gentle with us. . . so easy to handle, so docile, so good a person" that she even allowed a baby mouflon, born during the trip, to cavort all over her in "his childish games." And yet, this sweet creature would stand up to a lion and very possibly win. If the lion didn't take her by surprise,

Géoffroy explained, she would dispatch it with the “first blow of her hoof, the accelerated and violent throw of her front legs.” This defensive action was so instinctive that when the giraffe’s human keepers inadvertently startled her, she would begin to assume a kicking posture, but would immediately repress her own response “by means of her extreme goodness or her tame habits.”



The habits of animals interested Géoffroy keenly; unlike his colleague-turned-rival Cuvier, who believed only in function as an explanatory cause of anatomical structures, Géoffroy considered animal desires and actions as causes of animal forms. Géoffroy and Cuvier aired their differences during the winter and spring of 1830 in an official debate at the Académie des Sciences. Here, Cuvier argued that function determined animal structures, implicitly assuming a rational designer who suited forms to functions, and who was the only and ultimate cause in nature. Géoffroy rejected that approach, insisting that function followed structure and could not be its cause. Rather, according to Géoffroy, multiple causes—including animal habits—might bring about variations in structure, which then resulted in variations in function.

Géoffroy’s preoccupation with animal customs and behaviors shows the influence of his friend and colleague, Lamarck. Giraffes were in fact the most famous, not to say notorious, of Lamarck’s examples of how animals could alter their forms by means of habits and ways of life. “Concerning habits,” he wrote in his magnum opus *Philosophie zoologique*, in which he published his transformist theory of life, “it is curious to observe their results in the particular shape and size of the giraffe:

we know that this animal, the largest of mammals, inhabits the interior of Africa, and that it lives in an area where the terrain, being almost always arid and devoid of grasses, obliges it to graze the leaves of the trees, and to struggle constantly to reach these. The result of this habit, maintained over a long time in all individuals of the race, is that the front legs have become longer than

the hind legs, and the neck has elongated itself such that the giraffe, without standing up on its hind legs, lifts its head and attains a height of six meters [almost 20 feet].

Remaking himself belatedly from a botanist to a zoologist in order to assume the inglorious new professorship in insects and worms, Lamarck later recounted to his students that he had feared there would be a lot less interest in studying the “characters, manners and habits” of an earthworm than those of a lion. But then it had occurred to him that in simpler animals one could perhaps see the essence of life, and the processes by which it produced, transformed, and ramified itself, more clearly than in complex ones.

This was characteristic of Lamarck: he showed the same inclination to make a virtue of necessity throughout his life. As an ambitious, impoverished young medical student living in a Parisian garret, from whose window he could see only clouds, he had taken up the study of meteorology. Later, when Buffon had arranged for Lamarck to act as escort on a European tour to Buffonet, then a much-coddled seventeen-year-old princeling, Lamarck had accepted this chance to become a corresponding member of the Jardin and Cabinet du Roi and to study plants and minerals in the regions they visited. Now, in middle age, contemplating his insects and worms with a faint gleam of hope, he divined an organizing principle and renamed his creatures *invertebrates*, inventing a brand-new taxonomic category. Lamarck used these smallest and simplest creatures, the invertebrates, to reveal the irreducible dynamism of living things as they made and remade themselves and their surroundings. These beings became the basis of his theory that living organisms continually refashioned themselves and the world around them.

As “invertebrates,” Lamarck’s lowly insects and worms animated his courses of lectures in the Jardin des plantes for almost three decades, beginning at the height of the Revolution, in 1795, and ending during the Second Restoration in 1825. He and his family lived in rooms on the third floor of the mansion that Buffon had acquired to serve as the intendant’s residence, near the entrance to the Jardin.

This housing benefit was essential since Lamarck remained quite poor and came to have eight children. From his residence, it was a short walk across the garden to deliver his lectures at the Verniquet Amphitheater. There, Lamarck drew students from all over the world: his course register lists people from twenty-seven countries including Brazil, Jamaica, and Turkey. His auditors also came from every walk of life: artists, doctors, pharmacists, chemists, geologists, botanists, zoologists, military officers, engineers, lawyers, merchants, and writers, including Balzac and Sainte-Beuve.

To this diverse crowd, Lamarck announced a new science for which he coined a name: *biology*. This new science took in everything to do with living bodies, and especially studied the way living forms tended to move, develop, grow, and transform, producing new organs and structures. As Lamarck defined it, biology was the study of how living forms created and transformed themselves. He thought they did this by means of two different kinds of agencies. The first was a “life force,” a power intrinsic to living matter by which all organisms elaborated and complicated their organization over time. The other kind of agency acted in animals with sensation, who, Lamarck was sure, must have a certain intimate, inner sentiment of their own existence, a sentiment that allowed them to respond to their environment in myriad ways. We ourselves experience the movements of our inner sentiment, Lamarck observed, whenever we are moved by a scene at the theater or by a painting or piece of music.

The simplest animals responded in rudimentary ways; but complex animals—such as the giraffe—could respond to their environments by exercising their will, forming “habits” and “ways of life” in response to their circumstances. Since he considered living organisms’ feelings, desires, and acts of will as causes, Lamarck treated them as elements of his science, along with all that influenced, studied, or represented them: for instance, theater, art, music, literature, introspection, and sympathetic observation. He defined the science of biology during the brief window of opportunity around the turn of the nineteenth century between religious causal monism—with a single divine cause—and scientific reductionist causal monism, rendering

living beings as passive mechanisms compatible with a divine engineer. Lamarck's science of biology was resolutely pluralist. His explanatory mode was integral, narrative, and explicitly interpretive. He emphasized that knowledge resided in interpretive judgment and that "moral" causes—habits, behaviors, willful actions—influenced physical things as well as vice versa.

Lamarck's lectures were so popular that even fictional characters attended them. In his autobiographical novel *Volupté*, Sainte-Beuve sends his lightly fictionalized doppelgänger, the lovelorn young Amaury, to Lamarck's course. In Amaury's voice, Sainte-Beuve offers an evocative description of what it was like to sit in the Verniquet Amphitheater and listen as Lamarck spoke. He describes the "passionate and almost painful tone" in which Lamarck raised "serious primordial questions," vehemently opposing what he called "analysts on a small scale" along with all religious explanations of natural history. Lamarck's own approach, as Sainte-Beuve/Amaury describes it, operated neither by analytical reduction nor by theological transcendence, but instead by a kind of vital, holistic materialism. His worldview

had much simplicity, starkness, and much sadness. . . . According to him, things made themselves by themselves, all alone in continuity, with sufficient lapse of time. . . . A long blind patience was his Genius of the Universe. The present shape of the earth, as he told it, depended only on the slow degradation of rainwater, the daily oscillations and successive displacement of the seas; he allowed no great stirring of the bowels in this Cybele, nor the renewal of her face by some passing star. Likewise in the organic order, this mysterious power of life, as small and as elementary as possible, once admitted, he supposed it to be developing itself, composing itself, building itself up little by little with time; . . . I loved these questions of origin and end, this frame of a dreary nature, these outlines of obscure vitality. My reason suspended and, as it were, inclined toward these limits, enjoyed its own bewilderment.

Sainte-Beuve's romantic description gives us the feel of Lamarck's lectures and his mode of science, which mixed emotion, poetry, and

philosophy with material causation and rational investigation. When Cuvier dismissed Lamarck's theory as poetry rather than science, he was condemning both the theory that organisms create and transform themselves and the approach that gave rise to it.

The Verniquet Amphitheater, where Sainte-Beuve's fictive young Amaury encounters Lamarck's starkly tragic and mysterious view of nature, is just steps away from Vaillant's sexy pistachio. In fact, in addition to the neighborhood and landscape of the Jardin des plantes, Lamarck and Vaillant had much else in common: a conviction about the dynamic interconnectedness of living things; a willingness to insist on their ideas in the face of prevailing authority; and, in consequence, the dangerous disapproval of powerful people. Lamarck vindicated his fellow sufferer, praising Vaillant's knowledge and wisdom and singling out his discourse on the structure and function of flowers as having established the sex of plants. He declared Vaillant's refutations of Tournefort nothing less than "excellent."

♦ ♦ ♦

I have traveled from the *Prunus* to the pistachio to the menagerie to the intendants' mansion to the amphitheater to the museum. It was in this landscape that the theory of evolution first emerged—a landscape of tree erotica, interspecies romances between lions and puppies, elephant concerts, and giraffes with kindly habits. All exemplify an assumption of the dynamic interconnectedness of living beings and the impulse to study them in various interconnected ways. The first evolutionary theorists rejected the idea of a single cause of life in favor of a plurality of interacting causes requiring a plurality of interacting modes of understanding.

I will end where I began, at the *Prunus*, in whose celebrity I see a continuation of the centuries-long interspecies engagement—sensitive, intellectual, emotional—that informed an organizing idea of modern biology, the idea that living things continually transform themselves and their world. The *Prunus*'s splendid effusion seems to display Lamarck's fragile yet inexorable power of life, and the insufficiency of any reductive approach to grasping it.