The Ibis and the Crocodile: Napoleon's Egyptian Campaign and Evolutionary Theory in France, 1801–1835

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There is today broad scientific consensus, and general if contested acceptance among nonexperts, that human beings are related to nonhuman animals by paths of shared evolutionary descent. This view was consolidated at the end of the nineteenth century with Darwin's theory of natural selection, but evolutionary models of natural diversity had by then already been gaining in interest over the course of at least the prior two centuries. This gain had to do, not just with empirical observation and abductive inference from what was observed, but also with a number of other developments in European intellectual history that might at first glance seem rather distant. A first such is a general rise in philosophical and aesthetic appreciation of diversity, which issued in the cataloging, charting, and assessing of the multitudinousness of natural kinds, as central to the project of natural science. This shift is articulated and anticipated at a philosophical level in the Leibnizian vision of nature as an infinite ensemble of diverse substances reflecting the same underlying metaphysical unity. The shift is further taken up and developed in later natural science, particularly in the work of French natural historians such as Étienne Geoffroy Saint-Hilaire and associated figures. A second important element in the history of modern reflection on human-animal kinship may be the increased exposure, from the seventeenth century on, to non-European cultural representations of the intersection of humanity and animality, in which are missing the classical elements of the Christian and European representation, grounded in the myth of Adam's fixing the essences of animals once and for all by

a sort of naming ceremony and in the taxonomical picture offered by the story of Noah's Ark of neatly and permanently bounded-off species existing across an ontological divide from humans.

These various elements come together with remarkable clarity in French natural science in the wake of the Napoleonic expedition to Egypt at the dawn of the nineteenth century. Here, we see the impact of Egypt—its flora, fauna, and human history—in the emergence of a new understanding of the project of philosophy and its relationship to natural science and of the nature of humanity and its relationship to animality. These transformations can perhaps best be illuminated by attention to a pair of animal kinds, the ibis and the crocodile, in both their zoological and their cultural roles, as they moved from Egypt to France.

The past two centuries or so since the Napoleonic expedition have been characterized by an inculcation, at least among the educated classes, of a new vision of humanity's place in the world, in which we are said to inhabit the earth alongside numerous other "nonhuman animals," and in which we are, ourselves, animals, not just contingently or by some sort of accident but essentially: we are just as much part of the order of nature as are frogs or fish, nor can we claim to have some deeper source of our essence, an immortal immaterial soul, that removes us altogether from that order. This most recent period was preceded by a much longer stage of human history, which synthesized the philosophical anthropology of both Near Eastern monotheism and Greek philosophy, both of which took for granted that the human being is in some way or other the center of the cosmos or is the focus of divine solicitude: that the human being, but not the frog or the fish, is created in the image of god.

Earlier than this synthesis, in turn, we find the great expanse of most of human history, which includes the worldviews of most non-Western, nonurban human communities, and of which the urban religion of pharaonic Egypt may be seen as a late expression. Here, human beings might not be animals, but animals, for their part, most certainly are persons: not human persons but intention-driven, somewhat rational actors who share in the same sociocosmic reality as human beings. Crocodiles and ibises were part of human social reality, not mere brutes existing outside that reality, and so when it came to conceptualizing divinity, the representations took a hybrid form, showed human bodies with ibis heads, for example: not as monstrous hybrids but as reminders of our shared community, of our kinship.

THE WORLD OF DETAILS

In the summer of 1801, in the gardens of the Ezbekieh Palace at Cairo, three voyagers are out of place and killing time. One is a great general; the other two are men of science. They are waiting to return home, to France, after what had been, from a military point of view, an utterly disastrous campaign. As a scientific expedition it was, however, an unprecedented success, securing for the French a sort of dominion over Egyptian culture and history even as political power was in the process of shifting to the British.[1]

The general is petulant and full of big talk. He declares that it had been his dream, since the age of fifteen, to become himself a man of natural philosophy. "When I was young," he boasts, "I

[1] See Jane H. Murphy, "Locating the Sciences in Eighteenth-Century Egypt," *British Journal for the History of Science* 43, no. 4 (December 2010): 557–71. See also Antoine-Claire Thibaudeau, *Histoire de la campagne d'Égypte sous le regne de Napoléon le Grand* (Paris: Imprimérie de Mme. Huzard, 1839); Darrell Dykstra, "The French Occupation of Egypt, 1798–1801," in *The Cambridge History of Egypt*, vol. 2, ed. M. W. Daly and Carl F. Petry (Cambridge: Cambridge University Press, 1998), 113–38; Piers Mackesy, *British Victory in Egypt, 1801: The End of Napoleon's Conquest* (New York: Routledge, 1995).

got it into my mind to become a discoverer, a Newton."[2] Circumstances compelled him to take a different path in life, to take up arms, but his adolescent dream did not fade. If he could not be a discoverer himself, he had taken to reassuring himself, he could at least, as an imperial ruler, promote science by surrounding himself with its most distinguished practitioners.

One of the men at the palace is the mathematician Gaspard Monge, who protests that the general could not have become another Isaac Newton anyway, since, as Monge's colleague Joseph-Louis Lagrange had said, "No one will attain the glory of Newton: there was only one world to discover."[3] But Newton had already discovered it. Not just for the sake of debate but evidently out of true conviction, the general protests that Newton's discovery was only the beginning, that it was the discovery only of nature's *uniformities*, of the hidden principles that unite all the things of nature. What remains to be discovered, he insists, is all the *variety* that this uniform frame contains within it.

The other party to the conversation is the great French naturalist Étienne Geoffroy Saint-Hilaire, who reports to us in a text written decades later and published in 1835, entitled *Sur une vue scientifique de l'adolescence de Napoléon Bonaparte, formulée dans son âge mûr sous le nom de "Monde des détails"* (On a scientific vision from the adolescence of Napoleon Bonaparte, formulated in his later years under the name of "World of Details"), that this "world of details" was described by Napoleon that day as an idée fixe, which he had treasured since his youth as a singular and epoch-making discovery, and the abandonment of which, necessitated by his military calling, had left him with the greatest regret of his life. Lagrange's dictum is out of place, the general insists, as Geoffroy tells it, "since the World of Details remains to be explored. This is the other world," Napoleon is reported to have said, "and it is the most important of all, which I flatter myself with having discovered. Thinking about it, I am still filled with regrets. Thinking about it, I feel pain in my soul."[4]

Geoffroy explains that Napoleon had coined the term "world of details" in explicit contrast to the Newtonian "astronomical world." He adds in a footnote that "phenomenal world" might have better captured what "our young philosopher" had in mind: a world not of universal abstract laws but rather of "all the things and actions of the universe," to be studied not by a priori reasoning but by comprehensive and systematic survey.[5]

The world of details is of no less importance than the astronomical world, even if the special sciences that it encompasses have since Newton's era been placed somewhat lower in the hierarchy of knowledge than mathematical physics: zoology, botany, hydrology, the study of electric fishes and eels, embalming, hieroglyphics. "For is it not," the naturalist asks on the general's behalf, "in the depth of those *details* proper to our planetary body that the human species finds itself living there and finds its needs taken care of? What is this, if not the immense laboratory in which we have been placed, one of the regions of the world of details, of the phenomenal world?"[6]

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2 Étienne Geoffroy Saint-Hilaire, *Sur une vue scientifique de l'adolescence de Napoléon Bonaparte, formulée dans son âge mûr sous le nom de "Monde des détails"* (Paris: De Brun, 1835), 2–3.

3 Ibid., 3.

4 Ibid., 5. Here Geoffroy is citing another of his own works, published the same year: Étienne Geoffroy Saint-Hilaire, Études progressives d'un naturaliste pendant les années 1834 et 1835 (Paris: Roret, 1835), 185.

5 Geoffroy, *Sur une vue scientifique*, 3 ("monde phenoménal eût, je crois, mieux rendu le sens des idées scientifiques et philosophiques de l'illustre penseur").

6 Ibid., 3–4.

Napoleon is irascible and can't stop needling the mathematician about the world of details: "I ask you, Monge, would it have been discovered? Would you, Monge, or your Newton, have discovered it?" The general contrasts his world, again, with Newton's, calling the English physicist's system "philosophical," in the pejorative sense of being suited to individual passive reflection, in contrast with his own vision of a cooperative and systematic engagement with the real world.[7] The basis of this engagement would be the study not of planetary orbits and the gravitation of large bodies but rather the way in which earthly bodies form from minimal constitutive elements. In the living world these cannot be reduced to mass, figure, and motion, as had been the case for the corpuscles of mechanists such as Descartes and Gassendi. Rather, these constitutive elements are for Napoleon, as Geoffroy describes him, the living atoms of nature, and they are to be the basis of the science of the world of details. Newton's system is "beautiful for you men of the mind and of mathematics," the general continues. "But that I should have come to teach men how the movement arises that communicates and is determined by the intervention of the smallest bodies, I would have solved the problem of the life of the universe. And had I done this, which I take to be a real possibility, I would have surpassed Newton by all the distance that exists between matter and intelligence."[8]

Geoffroy is by now convinced that his general in chief has happened, however confusedly, upon the very philosophical principles that the naturalist would seek to expand and articulate over the course of his long career. At the basis of Geoffroy's system is the principle of "elective affinity." Borrowed from eighteenth-century chemistry's attempts to explain the affinities and antipathies between different elements, adapted most famously for allegorical purposes in Goethe's 1809 novel, *Die Wahlverwandtschaften*, in Geoffroy the theory is elevated to the "first principle of things," which "leads us to the sentiment of a nature at war with itself, effecting the separation of materials that are of a contrary essence, or bringing together elements of the same origin, which it assembles with predilection, which it coordinates with harmony, and from which, finally, it forms these marvelous aggregates, its most admirable machines, *the organized living beings*: composites in which the proper agreement of constitutive elements engenders the capacities and freedoms of a thousand partial and concurrent actions."[9]

The men would soon depart, across the Mediterranean, militarily defeated. If Napoleon saw the possibilities of his life as dividing early on, between the way of arms and the way of the sciences, then ironically, though he had chosen arms, the lasting legacy of the French adventure in Egypt would be the birth of the scientific study of that ancient country and its monuments: statues of Sekhmet and of Nakhthorheb, the Rosetta Stone, obelisks large and small, and the wealth of robbed graves would now make their way back to Europe. Much of the plunder would end up in the hands of the British, not least in the holdings of the British Museum, but its initial discovery and collection were largely directed and executed by French science. Parisian salons would soon feature "mummy parties," at which the hosts slowly unwrapped the embalmed bodies of once-great Egyptians for their titillated guests.

But it was not only Egyptology, the study of the material traces of the attainments of ancient Egyptian civilization, that was stimulated by Napoleon's Egyptian campaign, even if this was the dimension of it that was most important for the broad phenomenon of Egyptomania that

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7 Ibid., 4.

8 Ibid., 4–5.

9 Ibid., 5.

spread through France in the first half of the nineteenth century. The fishes of the Nile were also comprehensively surveyed and collected. The ichneumon, or Egyptian mongoose, was rigorously described. Countless specimens of Nilotic flora and fauna were brought back, cataloged, and, eventually, counted. And straddling the boundary between the civil and natural histories of Egypt were the mummified animals, the sacred beasts of the temples that had been given the same treatment in death as the pharaohs: the Apis bull, the Dorcas gazelle, the cat, the falcon, the ibis: once marvelous aggregates, with capacities and freedoms issuing from the thousand partial and concurrent actions of their living bodies, now shriveled and dried after millennia wrapped in cloth clinging to the discolored bones of otherwise-perfect animal skeletons.

These animals had reemerged from the distant past and had been received by the practitioners of the new science of details. The information they conveyed from the era of their flourishing was that ancient Egypt, too, was a world of details. And while Newton was given credit for uniting the world spatially by laying out the laws for the description of bodies everywhere, the details of Egyptian animal anatomy seemed, at least at first, to provide a unifying bridge between temporally separated regions, connecting different eras through the fixity of animal forms: the same curved beak of the ibis tracing the shape of the crescent moon, the same great sternum, the same number of cervical vertebrae, the same blunt pygostyle.

Across the centuries, the details of nature's marvelous aggregates, the organized living beings, had remained the same. A world of details is not a world of flux, and the science that surveys the variety of things must not lose sight of the unity underlying them.

THE IBIS

Over the decade following the Egyptian campaign there appeared in France several treatises on the natural history of the ibis. These were works of "natural history" in a dual sense: they described the particular features of a species, seeking especially the relevant differentiae to distinguish it from similar kinds, and they sought to place it in relation to the numerous references to birds of the same name found in historical, and particularly in ancient, sources. This was a common and well-established approach to zoological writing. Thus, Edward Tyson divides his 1699 *Orang-Outang, sive Homo Sylvestris* into two halves, the first featuring a precise anatomical study of a chimpanzee, the second attempting an exhaustive philological investigation of all ancient references to satyrs, forest men, and like creatures, in the aim of determining which of these were in fact descriptions, however embellished or filtered through false beliefs, of actually existing species of ape.[10]

Similarly, in 1805 Jules-César Savigny published *Histoire naturelle et mythologique de l'ibis* (Natural and mythological history of the ibis), seeking both to describe the bird in accordance with the methods of modern science and to compare this description with both Greek and earlier Egyptian representations of it. Savigny expends no small effort in the task of disambiguation, determining which is the true Egyptian ibis and which are only false identifications of similar species: thus, what Fredrik Hasselquist describes is only a sort of heron;[11] the bird said by Herodotus and other ancient sources to be the great enemy and eater of serpents was

10 Edward Tyson, *Orang-Outang, sive Homo Sylvestris; Or, the Anatomy of a Pygmie, Compared with That of a Monkey, an Ape, and a Man* (London: Thomas Bennett, 1699).

11 See Fredrik Hasselquist, *Voyages and Travels in the Levant; In the Years 1749, 50, 51, 52. Containing Observations in Natural History, Physick, Agriculture, and Commerce* (London: L. Davis and C. Reymers, 1766).

almost certainly no ibis but a stork. Savigny credits the Scottish traveler James Bruce, author of the 1790 *Travels to Discover the Source of the Nile*, with having first identified the white ibis as the true species represented in ancient Egyptian monuments. While passing through lower Ethiopia, Savigny reports, Bruce observed a great flock of birds that reminded him of Egyptian representations of Thoth. Later, "having compared one of these birds with embalmed ibises, he recognized that the beak, the skull, the tarsus, and the leg were perfectly the same as to form and proportion."[12]

Savigny's concern, like that of Bruce before him, is taxonomy, not phylogeny. They are both interested in establishing the identity of a modern species with the one venerated by the Egyptians, not the relationship of ancestry between a past species and a present one, or even the morphological variation within a single species over the course of centuries. We will be returning to the difficult question concerning the relationship between these two projects: classification within a fixed and timeless grid, on the one hand, and the charting of lines of descent, on the other. For now, let us only note that the significance of the ibis for the colleagues of Geoffroy Saint-Hilaire at the Muséum d'histoire naturelle in Paris was markedly different than for Savigny, for his part a member of the Institut d'Égypte.

The preoccupations at the Muséum are best expressed in the 1802 "Rapport des professeurs du Muséum, sur les collections d'histoire naturelle rapportées d'Égypte, par É. Geoffroy" (Report of the professors of the Museum on the natural history collections brought from Egypt by É. Geoffroy) authored by Bernard Germain de Lacépède but signed also by Georges Cuvier and Jean-Baptiste Lamarck. For these men, the collection brought back by Geoffroy has as a whole "this particularity, that one could say that it includes animals from all the ages." This wide span of specimens, Lacépède writes, will help to shine light on the matter of "whether species change their form in the course of time." Seeking the answer to this question, he continues, is "apparently futile," but it is nevertheless "essential to the history of the globe, and consequently to a thousand other questions that are also not unconnected to the weightiest objects of human veneration."[13]

It is taken to be a happy consequence of Egyptian idolatry that they left their mummified animals to posterity. Lacépède explains, with a mixture of gratefulness and disdain, that the ancient Egyptians had inadvertently created, "in their sacred caves, nearly complete cabinets of zoology." They are for him "bizarre men," who embalmed their "brute animals" out of "stupid adoration," but the issue of their actions is the same as if they had methodically set about studying, preserving, and representing the order of nature.[14] Thus, Citizen Geoffroy does not so much pillage and destroy what the Egyptians had left behind, as he continues the systematic investigation of the natural-history collection they had inadvertently amassed. "He thrust himself into all the old caverns," Lacépède tells us, "searched through countless heaps of cadavers, and he has brought back to you not only the men of ancient Egypt, as so many other voyagers have

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12 Jules-César Savigny, *Histoire naturelle et mythologique de l'ibis* (Paris: Allais, 1805), 12; James Bruce, *Travels to Discover the Source of the Nile, In the Years 1768, 1769, 1770, 1771, 1772, and 1773*, 5 vols. (Edinburgh and London: J. Kuthven, 1790), 5:35.

13 Bernard Germain de Lacépède, "Rapport des professeurs du Muséum, sur les collections d'histoire naturelle rapportées d'Égypte, par É. Geoffroy," in *Annales du Muséum national d'histoire naturelle*, vol. 1 (Paris and Strasbourg: Frères Levrault, 1802), 234–41.

14 Ibid., 235.

done, but also their gods, from the Apis or Mnevis bull, etc., to the crocodile, the ichneumon, the monkey, and the ibis.[15]

Although what we see today in the collection of the Galerie d'anatomie comparée at the Muséum national d'histoire naturelle are only the clean skeletal remains of at least some of these animals, when they arrived from Egypt the bandages contained not only each animal's "tiniest bones" but also "its tiniest hairs," and each was still "perfectly recognizable: such an animal as had its own priests and altars two or three thousand years ago in Thebes or in Memphis." But Lacépède is not concerned with the representations of these idolaters. For him, the most significant lesson that may be drawn "from this part of Citizen Geoffroy's collection" is this: "that these animals are perfectly similar to those of today."[16]

Lacépède is also interested, like Savigny, in the determination of species and in the opportunity precise anatomical study affords of establishing the exact identity of the species that had been of interest to the ancients, rather than relying on the guesses and approximations of modern naturalists such as Belon, Perrault, Gmelin, or Hasselquist. Since the skeleton of the ancient ibis is readily inspectable in the Muséum's anatomical collection, "missing none of its parts, revealing to us with certainty that the modern naturalists have been mistaken in the determination of this species," it is now possible to "vindicate the descriptions that the ancients gave of it."[17]

Figure 1. Mummified sacred ibis, brought back from Egypt by Étienne Geoffroy Saint-Hilaire in 1801, at the Galerie d'anatomie comparée of the Muséum national d'histoire naturelle, Paris.

Figure 2. Illustration of the skeleton photographed in figure 1. From Georges Cuvier's "Mémoire sur l'ibis des anciens Égyptiens" (1804).

15 Ibid., 236.
16 Ibid.
17 Ibid., 236–37.

The joint project of determining taxonomic position and of resolving the natural-philosophical question of morphological change over time would continue in Cuvier's "Mémoire sur l'ibis des anciens Égyptiens" (Dissertation on the ibis of the ancient Egyptians) of 1804. The author, at the time Geoffroy's close friend and collaborator at the Muséum, would also appreciate, like Savigny, the relevance of Egyptological learning, of ancient representations of the ibis, for piecing together the complete natural history of the species.

Cuvier beams with pride that Geoffroy's ibis skeleton "has been placed in the anatomical galleries of the museum, of which it is one of the most beautiful ornaments."[18] He praises Geoffroy's diligence at bringing back several specimens, from both Saccara and Thebes, and speculates that those from the latter site are better preserved as a result of their greater religious significance there. Cuvier repeats the common motif, found in Savigny, in Athanasius Kircher,[19] in Plutarch, and in Plato, according to which the ibis had been for the Egyptians a symbol or manifestation of the same divinity that would become in Greece Hermes, and Mercury for the Romans. This is the bird, Cuvier writes, "into which Mercury was really transformed when he sought to traverse the earth and to teach the sciences and the arts to men."[20]

What is the source of this strange allusion? Cuvier would certainly have been aware of the version of this story offered by Socrates in Plato's *Phaedrus*. There we learn that "at the Egyptian city of Naucratis, there was a famous old god, whose name was Theuth [i.e., Thoth]; the bird which is called the Ibis is sacred to him, and he was the inventor of many arts, such as arithmetic and calculation and geometry and astronomy and draughts and dice, but his great discovery was the use of letters."[21] Socrates goes on to relate that it was the god Thamus who ruled all of Egypt, from his capital at Thebes. Theuth came to him there and presented to him all his inventions. Thamus was impressed by most of them, but when it came to letters, the divine ruler expressed his worry that Theuth might be too proud of his invention, like a parent of his child, in order to see what possible ill effects would come of it. Thamus worries that writing will in the end only cause people to depend on external aids to knowledge rather than acquiring true knowledge. "They will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing."[22]

It is certainly too late to turn back the reliance of knowledge upon writing by the time Geoffroy brings the ibis, god of writing, back from Egypt. It is in writing that the bird's anatomy, habits, and habitat will be described, along with those of numerous other species and noteworthy facts about their country of origin. Modern natural history takes the form of reports; biodiversity becomes scientific fact when it is surveyed and published in *mémoires*. The final stage of the production of such texts is the precise anatomical study, with skeletal measurements and exact description of the parts of the animal. But this stage is preceded by prospecting, a vast natural-historical endeavor that is dependent on, yet not a mere epiphenomenon of, the commercial and geopolitical interests of the society that produces and supports the natural historian.

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18 Georges Cuvier, "Mémoire sur l'ibis des anciens Égyptiens," in *Annales du Muséum d'histoire naturelle* (Paris: Levrault, Schoell, 1804), 121–22.

19 Athanasius Kircher, *Obeliscus Pamphilius. Hoc est, interpretatio nova & hucusque intentata obelisci hieroglyphici* (Rome: Typis Ludovici Grignani, 1650), 324.

20 Cuvier, "Mémoire sur l'ibis des anciens Égyptiens," 116–17.

21 Plato, *Phaedrus* 274b–275a.

22 Ibid., 275a.

Bruce, and later Geoffroy, succeed in distinguishing the true Egyptian ibis from various impostors and approximations, but their natural-historical projects are made possible in the first place by the modern political project of surveying the details of a given region as a way of coming to know it better and, in coming to know it, gaining a sort of mastery, and thus of control, over it.[23] The accumulation of details was not an undertaking that was separate from Napoleon's military campaign but, rather, one wing of a broad project of domination through mastery. One of the consequences of such surveying, of the production of reports issuing from surveys, is the proliferation of fine-grained distinctions. The beak of the ibis curves like the crescent moon and must be distinguished from that of the *Tantalus ibis* of Linnaeus, from the long-billed curlew. Precise tables are composed to establish the relation of the dimensions of the ibis of Thebes to those of the curlew and of the ibis of Saccara. And whatever the natural-philosophical commitments of the researchers, the fine tabulation of differences from one species to the next, from one river delta to the next, invariably opens up the possibility of thinking about different populations of an animal, with slightly differing morphological features, as having kinship with one another not in a fixed and timeless blueprint of the natural order but in a genealogy of shared ancestry.

In the early nineteenth century, in France, then, we witness the confluence of three general tendencies in scientific and philosophical reflection on animals and on our relation to them. There is, first of all, the increasing precision and rigor of anatomical study and the increasing comprehensiveness of the survey: the fulfillment, in important respects, of Napoleon's call to pay attention to the "world of details." Second, there is the looming specter of genealogical affinity between morphologically close kinds. The report drafted by Lacépède was signed by Lamarck and was meant as a summary of Geoffroy's accomplishments. Though it purports to strengthen the antievolutionary position, Lamarck and Geoffroy would become perhaps the most influential evolutionary thinkers in France in the pre-Darwinian period. There is, finally, the problematic relationship to "mythology" and to "philology": to the information that has been passed down to modern science from "ignorant" and "superstitious" ancients and that seems to have some sort of bearing on natural history, even though it sets out from a radically different understanding of what it is that animals and humans are and what the relationship between them is. Nowhere do these three factors come together more pointedly than in the history of the ibis: once an animal-god in the form of Thoth the ibis-headed scribe, now an icon of Egypt's specificity, a perfectly described node in the crystalline order of nature and a proof, or at least a purported proof, of the fixed and eternal character of this order.

THE CROCODILE

It was for his contributions to the natural history, not of the ibis, but of the crocodile that Geoffroy most hoped to be remembered. His *Recherches sur de grands sauriens trouvés à l'état fossile vers les confins maritimes de la Basse-Normandie* (Researches on the great saurians found in a fossil state near the maritime borders of Lower Normandy) of 1831 is marked by an evident frustration at not having been sufficiently praised for the important work he had done in the study of crocodiles since the time of his expedition to Egypt more than thirty years earlier. He reports that the Muséum is planning to produce "an entire natural history of crocodiles," and he asks bitterly, "But

23 For a compelling account of this process, see D. Graham Burnett, *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado* (Chicago: University of Chicago Press, 2000).

to complete such an undertaking: wouldn't that more naturally fall to me?"[24] He complains that his first study of this animal, the "Description des crocodiles de l'Égypte," "went nearly unnoticed" when he brought it out in the *Description de l'Égypte* of 1809: a particular shame, since this work represented the synthesis of an extensive investigation not only of the crocodile's behavior and of its "most extraordinary organization" but also of the role that it had played in the political life of the ancient Egyptians, "exhibiting habits the spirit of which was introduced into their civil and religious law."[25]

In the decade following his return from Egypt, Geoffroy had found in Cuvier a close collaborator and friend, each supporting and promoting the other's work. By the time of the *Recherches sur de grands sauriens*, Geoffroy had come to hold a position, due in large part to the influence of his other great colleague, Lamarck, that was considerably more open to the possibility of evolution than that of the staunch species-fixist Cuvier. But the chilling of their relations seems also to have been the result as much of perceived professional slights as it was of theoretical disagreements. Geoffroy sees Cuvier as upstaging him, as taking credit for advances in the natural

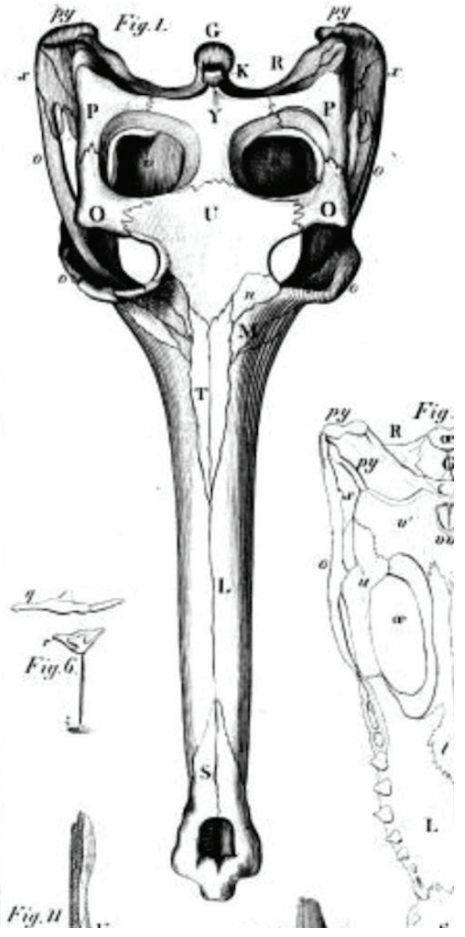

FIGURE 3. The skull of a "teleosaurus," from Étienne Geoffroy Saint-Hilaire, *Recherches sur de grands sauriens trouvés à l'état fossile vers les confins maritimes de la Basse-Normandie* (1831).

24 Étienne Geoffroy Saint-Hilaire, *Recherches sur de grands sauriens trouvés à l'état fossile vers les confins maritimes de la Basse-Normandie* (Paris: Firmin-Didot frères, 1831), 5.

25 Ibid., 6.

history of the crocodile that only he, Geoffroy, is in a position to make. In the 1831 work he does acknowledge that in the classification of the animal, before Cuvier there had been "nothing but incertitude, false allegations, and sterile discussions."[26] In the study of the osseous anatomy of the crocodile ear, in particular, "the two of us set out from the same point: we both recognize that the cranial parts are analogically the same in all animals." But this is where their agreement ends. "[W]e both would believe ourselves to be expressing the true relations [between these parts] by means of our different nomenclatures! It must be admitted: in certain points we have perceived and appreciated these relations very differently."[27] Geoffroy claims that he would have been delighted to accept the views of his "illustrious peer," but that the truth is more important, and that here respect of the truth means deducing the names of the parts of the crocodile rigorously from analogy to other animals. It is only by never losing sight of this analogy that what is truly special about crocodile anatomy can be properly understood.

Long tradition had placed crocodiles in the broad folk category of "lizards": essentially any egg-laying, quadrupedal but otherwise serpentlike animal. This folk designation had made its way into Linnaeus's system, who "contented himself with combinations of the highest relations" in his works of classification and designated the species in question as the *Lacerta crocodilus*.[28] Cuvier in turn had identified a distinct group or family and further divided it into three distinct genera: crocodiles, gavials, and caimans. Geoffroy is pleased with this result and sees it as an example of the way taxonomic systems can undergo new splits and fissures as anatomical description becomes more precise: "Wishing only to extend and to perfect zoological classifications," he writes, "we learned with certainty that under the clothing and the apparent conformation of a lizard, there were found all the elements, well defined, of a new family of oviparous quadrupeds." But Geoffroy had not needed the precisifications achieved by his colleagues at the Muséum. He had already come to the same conclusions while in Egypt: "It was at this moment in my zoological career that I acquired, perhaps more than any other naturalist, an exquisite sentiment, a deep knowledge of the truly marvelous forms and the natural affinities of crocodiles and of their consequent right to stand alone in our classical subdivisions."[29]

Part of Geoffroy's claim to authority is that he has relied not only on his own observations but also on the expertise of Egyptologists concerning ancient representations of the crocodile. In his 1809 "Description des crocodiles de l'Égypte" he draws extensively on the work of the pathbreaking French Egyptologist and discoverer of the Rosetta Stone Jean-François Champollion.[30] Among this hieroglyphologist's many discoveries were a number of papyruses that seemed to offer an account of the meaning of the original Egyptian name for the crocodile: "it is composed of the preposition 'in,' expressed by *m*, and of the word *sah*, *soh*, which may be translated by *egg*."[31] Geoffroy speculates that "they must have wished to call to mind the no doubt very extraordinary contrast between this great animal and the tiny body from which it comes,

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26 Ibid., 4.

27 Ibid., 100–101.

28 Ibid., 5.

29 Ibid., 6.

30 See esp. Jean-François Champollion, *Égypte sous les pharaons, ou recherches sur la géographie, la religion, la langue, les écritures et l'histoire de l'Égypte avant l'invasion de Cambyse* (Paris: De Bure frères, 1814).

31 Étienne Geoffroy Saint-Hilaire, "Description des crocodiles de l'Égypte," in *Description de l'Égypte, ou Recueil des observations et des recherches qui ont été faites en Égypte pendant l'expedition de l'Armée française*, vol. 1 (Paris: L'Imprimérie impériale, 1809), 211.

from an egg that is barely bigger than that of a chicken."[32] This idea took an exaggerated form in Egyptian crocodile lore and caused the ancients "to believe and to say that crocodiles were born from an imperceptible point and, like flies, from the corruption of flesh."[33] This comment may be more significant than it first appears. In Herodotus and Aristotle we find exemplary instances of a common Greek idea according to which the Nile is ideally suited, with just the right mixture of heat and slime, for spontaneous generation. Sixteenth-century libertines such as Lucilio Vanini would take up this motif from ancient sources and argue in turn that there is no upper boundary to the size or degree of perfection of the animals that might be spontaneously produced out of that river.[34] This possibility became such a commonplace as to show up in Shakespeare's *Antony and Cleopatra*, where Lepidus declares, "Your serpent of Egypt is bred now of your mud by the operation of your sun: so is your crocodile."[35] If Geoffroy is correct, it may be that the source of this image is even older than its appearance in Greek authors and that it was indeed held indigenously by Egyptians themselves. This is significant, in turn, since at bottom theories of spontaneous generation are, precisely, theories about the possibility of self-organization in nature: when Vanini, for example, ventures the possibility that oxen are born directly out of the earth, he is seeking, however crudely, to open up the possibility of a naturalistic account of biological origins. Evolutionary theory, too, after all, tells us that animals are born out of the earth, even if there are vastly more steps in the process and many hundreds of millions of additional years required.

Geoffroy does not believe crocodiles are spontaneously generated, and he does not himself use spontaneous generation as evidence in favor of nature's capacity for self-organization. But by the time of the 1831 text he is working under the assumption of the possibility of the evolution of species over time, that the diversity of natural forms is a consequence of the capacity of self-organizing systems to respond and adapt to environmental exigencies. For him, here, the guiding philosophical principle is the rational force of elective affinity in nature. This is not strictly a Lamarckian understanding of evolution, according to which traits acquired through forms of behavior can change the conformation of an animal body, a change that can then, in turn, be passed on to subsequent generations. For Geoffroy, the causal chain is precisely the reverse: "[W]e are compelled to say this repeatedly," Geoffroy announces, "habits are what is ordained by the conditions of organization: they are nuanced under the spring of the smallest modifications of the organism."[36] Traits do not change as a result of changes of behavior, but rather, behavior changes as a result of environmentally induced modifications of traits.

Geoffroy is fairly critical of the ancient authors who wrote on the behavior of animals, picking Aelian out for particular criticism but not sparing Aristotle or Herodotus either, who took behavior as far too significant an indicator of a species' true nature, and who therefore took the primary task of natural history to be a sort of profile of a character type with a certain range of typical behaviors. In this vein, natural history was often indistinguishable from folklore, with Aelian and Aesop in important respects engaged in one and the same endeavor.

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32 Ibid.

33 Ibid.

34 See Lucilio Vanini, *Iulii Caesaris Vanini Neapolitani Theologi, Philosophi, & Iuris utriusque Doctoris, de admirandis naturae reginae deaeque mortalium arcanis* (Paris: A. Perier, 1616), esp. dialogue 37, "De prima hominis generatione," 232–33.

35 William Shakespeare, *Antony and Cleopatra*, act 2, scene 7, lines 26–27.

36 Geoffroy, "Description des crocodiles de l'Égypte," 223.

For Geoffroy, it is the philosophical principle of rationally governed elective affinity that drives evolution. This is in the end an account of "adaptation" somewhat akin to the Darwinian account, to the extent that the organism responds to its environment, which in turn brings about changes in its morphology. But Geoffroy is a universe away from Darwin to the extent that it is not the mechanisms of sexual selection or, for that matter, any mechanism at all that is doing the responding but rather the rational, internally striving motion of the living particles that make up the animal body. That the crocodile should be studied with respect to its phylogeny, and not just to its taxonomy, had become increasingly clear to Geoffroy in the years since returning from Egypt, as a number of "saurian" fossil remains had been found in Europe: in the caves near Maastricht, in Upper Normandy, at Montmartre. Geoffroy identifies the fossils excavated near Caen as being "intermediate" between the ichthyosaur and the true crocodile. He calls them "teleosaurus" and is at times careful to frame his account of their appearance in a way that does not decidedly come down in favor of lines of descent: the teleosaurus "appears" when the ichthyosaur "disappears." Meanwhile, adaptation, when it is explicitly held to occur, typically does so only within a single species (rather than involving true speciation), when the members of a species "change a little bit in order to accept the conditions that had previously been different for them in our current environment [*notre actuel monde ambiant*]."[37] This is how adaptation happens for Geoffroy: when species may be thought to have "ceded to the action of the ambient world [*elles auraient cédé à l'action du monde ambiant*]."[38] This ceding is not a loss, not a defeat, but rather a further perfecting of a rational system in constant communication with the rest of the living world around it.

In a remarkable passage of a text of 1835 entitled Études progressives d'un naturaliste pendant les années 1834 et 1835 (Progressive studies of a naturalist during the years 1834 and 1835), Geoffroy identifies the formation of the crocodile in response to the action of its environment as a singularly perfect accomplishment of living nature. "Crocodilians definitely show very well that they are a perfectly harmonious assemblage of simple materials," he explains, "fixed in their essence and originally endowed with their reason of affinities (like attracting like)."[39] This reason is what is ultimately responsible for the uniformity of all of nature. "And here is the unique source where Nature deploys all of its power," Geoffroy continues, "all the luxuriance of its magnificence, in nuancing each thing, in planting the seeds of the charm of *variety*, and in so doing deriving infinite pleasure."[40] He concludes this passage by explicitly invoking a philosopher who in fact lurks in the background of much of Geoffroy's theoretical reflection on vital organization: "Thus, we are constantly led back to the great idea of the luminous and eminently philosophical a priori of Leibniz: all order of the universe is accomplished by the simultaneity of action of two contrary essences, *unity* and *variety*: principles that are in perpetual battle, the cause of the animation of all that exists, the incomprehensible dualism, under the empire of which matter is thrown about and will remain agitated without end."[41]

A passage of the "Description des crocodiles de l'Égypte" of 1809 provides an interesting point of comparison here. In this earlier text Geoffroy is concerned to account for ancient

37 Geoffroy, *Recherches sur de grands sauriens*, 46.

38 Ibid., 59.

39 Geoffroy, Études progressives, 111.

40 Ibid.

41 Ibid.

Egyptian divinization of the crocodile, being careful to distance himself from their view while also, perhaps inadvertently, using language surprisingly similar to that he uses in accounting for his own view:

> From the most distant times, when the habits of animals appeared to have the character of a divine manifestation, and, furnishing the pious motives for the subjection and government of peoples, they were carefully studied and collected, the crocodile was sought out, honored, and consequently well observed by the intelligent and superior classes of society.... This occurred in Egypt in an age of which we measure the antiquity back before historical time. And in truth this object of fear and horror garnered from that time on the homages of a servile form of adoration. It was easy to persuade a nation that was profoundly penetrated by the religious spirit that Divinity was, so to speak, disseminated and manifested everywhere there were found the phenomena of life. Thus, the crocodile was counted and ranked among the sacred animals: the priests cared for it, raised it, and fed it in their temples.[42]

The precise vocabulary in which Geoffroy expresses the Egyptian representation of crocodiles is somewhat distinct from the vocabulary he uses to articulate his own theory, but there are important parallels. For Geoffroy as for the Egyptians, the crocodile is a supreme manifestation of the first principle that determines the organization of living beings. For the Egyptians, this is, precisely, the principle of divinity; for Geoffroy, it is the principle of elective affinity, which reigns supreme in nature and which produces the "most admirable machines." Here it is significant that Leibniz, whom, as we have just seen in the passage cited from the Études progressives, Geoffroy credits as the source of his own theory, describes these machines as nothing other than "divine machines."[43] Leibniz, to the extent that he saw morphology as entirely irrelevant to the determination of kind membership, also took characteristic actions, rather than physical traits, as that in virtue of which a creature can be said to be the sort of creature that it is—thus, a squirrel is a "jumping machine," a spider is a "web-weaving machine," and so on.[44] There is in this connection something rather antiquated, indeed Aesopian, about Leibniz's thinking about animals, even though his purpose is very different from that of the writers of ancient animal tales, namely, to ground essence in action rather than in the physical conformation of the body. For Geoffroy, the action of animals is grounded in instinct, not character or mores as we understand these in human beings.[45] What a given animal's instincts are, moreover, flows from the morphology of its body. Despite this difference, Leibniz and Geoffroy agree that the animal body is the most exquisite and admirable structure in nature, though Geoffroy abandons any explicit invocation of its divinity.

According to Plutarch, writing around the turn of the second century CE, the precise reason the Egyptians had taken the crocodile to be divine was, very much in contrast with Thoth, the ibis-headed scribe god, that the crocodile "is the only creature without a tongue" and is thus "a living

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42 Geoffroy, "Description des crocodiles de l'Égypte," 185.

43 On the full significance of this phrase for Leibniz's philosophy, see Justin E. H. Smith, *Divine Machines: Leibniz and the Sciences of Life* (Princeton, NJ: Princeton University Press, 2011).

44 G. W. Leibniz, "The Human Body, Like That of Any Animal, Is a Sort of Machine," appendix 3 in Smith, *Divine Machines*, 292.

45 Geoffroy, "Description des crocodiles de l'Égypte," 205.

representation of God" to the extent that "the Divine Word has no need of a voice."[46] The first animal I have considered in this essay thus represents writing, recording, documenting, systematizing, and also, ultimately, the loss of wisdom that comes with these practices; the second represents silent wisdom and thus also divinity. For the Greek Plutarch, the grounds for the Egyptian ascription of divinity to the crocodile seem to lack any rational basis and to be rooted in superstition. Yet he is not prepared to dismiss the idea of at least the indirect divinity of animals: "It is not that we should honour these, but that through these we should honour the Divine, since they are the clearer mirrors of the Divine by their nature also, so that we should regard them as the instrument or device of the God who orders all things.... The Divine is not engendered in colours or in forms or in polished surfaces, but whatsoever things have no share in life, things whose nature does not allow them to share therein, have a portion of less honour than that of the dead."[47]

Much the same rationale had been given for the study of zoology by Aristotle some centuries earlier, who in his *On the Parts of Animals* invoked his own predecessor Heraclitus on the ubiquity of the gods: "[W]e should not be childishly disgusted at the examination of the less valuable animals. For in all natural things there is something marvelous. Even as Heraclitus is said to have spoken to those strangers who wished to meet him but stopped as they were approaching when they saw him warming himself at the oven—he bade them to enter without fear, 'For there are gods here too'—so too one should approach research about each of the animals without disgust, since in every one there is something natural and good."[48]

Aristotle does not quite mean that wherever there is a sea anemone, there is a god. Nor does Leibniz, when he speaks of divine machines, exactly mean that a squirrel or a bat is in itself divine. But they do wish by their invocation of divinity to position the study of animals at the center of natural-philosophical inquiry as the study, so to speak, of nature's highest attainments. Whether these attainments result from a creative cause external to nature or rather from internal laws and forces guiding the development of beings within nature is relatively unimportant for the rhetorical purposes at hand. Aristotle, Plutarch, and Leibniz are typical of the history of natural-philosophical thinking about the living world prior to the emergence of biology as an independent field, to the extent that they share with supposedly more archaic religions a tendency to exalt animals as nature's most excellent or perfect forms, even as they reject the more literal dimensions of the theriomorphic pantheon.

Geoffroy, writing at the very historical moment at which modern biology is taking shape as a field, both consciously lines up with Leibniz's philosophical theory of organized beings and also rediscovers, while holding at some distance, the full wealth and significance of Egyptian representations of the natural world. For Geoffroy, the new field of Egyptology, as he writes in the 1809 "Description des crocodiles de l'Égypte," has furnished "the materials for a new species of history, which make the past speak again in the present, by bringing the past itself back, making it perceptible as much for the eyes of the body as for those of the mind."[49] This new field for him is of a pair with the emerging field of biology: it is the two together, rather than either one separately, that yield, for example, the fullest, richest account of just what sort of creature a crocodile is.

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46 Plutarch, *On Isis and Osiris* 75, in *Moralia* 5, trans. Frank Cole Babbit (Cambridge, MA: Harvard University Press, 1936), 174.

47 Ibid., 180.

48 Aristotle, *On the Parts of Animals* 1.5.645a.

49 Geoffroy, "Description des crocodiles de l'Égypte," 209.

MONSTERS AND ANCESTORS

But what sort of creature *is* a crocodile? Is it a representative of a fixed and eternal kind, as Aristotle thought? Or is it a mere moment in the ever-transforming history of something that in earlier stages had a very different set of traits, as evolutionary theory will teach us? Even if Geoffroy could now establish with certainty that there was no significant change in crocodile anatomy from the time of the ancient Egyptians to the eighteenth century, recent discoveries of saurian remains around Europe had called into question the idea that a comparison between animals of just a few thousand years ago and of today was really adequate for the true scale of "biological time."

In any consideration of evolutionary theories prior to Darwin, it is crucial to explicitly clarify what is understood by "evolution." Very many naturalists believed in the possibility of broad morphological change, but very few believed that this change could ever result in true speciation. The sort of morphological change that was admitted was often, however, extreme enough to plainly count as the transformation of one species into another by the standards of later evolutionary biology. Thus, for example, Leibniz is ready to acknowledge that marine mammals are descended from land animals, but if this is the case, it may well be, for him, that whales are simply very unusual cows, responding in a rational way to a new set of environmental circumstances. This may seem a violation of Ockham's razor, but it follows from a different understanding of the ontology of species. Crucial for Leibniz is that no morphological feature can ever in itself be determinative of species membership. What it is to *be* a whale is not simply to satisfy a checklist of possessing a certain set of necessary properties. Rather, these properties themselves flow, in normal cases, from the prior fact that the creature in question *is*, essentially, a whale.[50] This order of explanation is particularly important to Leibniz's anthropology: he is firmly committed to the principle *inter hominem et non-hominem tertium non datur* (there can be no intermediary being between human and nonhuman); to be a human being is an all-or-nothing affair. This excludes the possibility touted by empiricists such as John Locke of liminal ape-men or cat-rats, and it also serves to secure full humanity for human "monsters," that is, children with birth defects that impede the development of those capacities, particularly language, that are ordinarily identified as the differentiae of the human species.[51]

Geoffroy does not follow Leibniz in this matter, but nor does he appreciate the width of the divide between them. Geoffroy sees monsters as the basis of a theory of what would later be called "evolution by saltation," whereas it is a basic principle of Leibniz's philosophy that *Natura non movit per saltum* (Nature does not make leaps). For Geoffroy, teratology will become the key to understanding the diversity of natural forms. In his mature theory, he comes to see monsters as the central engine of speciation, producing more or less random mutations, which are then transmitted to subsequent generations and over time bring about reproductively isolated, morphologically distinct populations. Monstrosity, then, provides an insight into the development of organized beings in general. Not only is it not a rupture in the ordinary functioning of nature, but it is in fact the channel by which nature's capacity for rational self-organization is realized. Thus, though Leibniz denies the possibility of speciation through mutation, and Geoffroy

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50 See G. W. Leibniz, *Nouveaux essais sur l'entendement humain*, esp. bk. 3, in *Die philosophischen Schriften von G. W. Leibniz*, ed. C. I. Gerhardt (Berlin: Weidmannsche Buchhandlung, 1849–60), vol. 5.

51 See John Locke, *Essay concerning Human Understanding*, ed. Peter H. Nidditch (Oxford: Clarendon Press, 1975), esp. 451–452.

affirms it, the French naturalist continues to believe that monstrosity provides a vivid illustration of the reality of what he himself sees as the basic Leibnizian principle governing nature: "the attraction of like for like as a universal dictate for all cases of the elective affinity of things."[52]

In the Études progressives of 1835, Geoffroy reveals that there were two stages of his career at which he fully grasped the significance of this principle: "in 1801 and in 1827. The first time, in the last days of my sojourn in Egypt, and, recently, during my research on monstrosity."[53] The first insight occurs around the time Geoffroy is sitting in the garden of the Ezbekieh Palace, learning from Napoleon about the "world of details." The second occurs when he is preoccupied with classifying and ordering into species and genera the various sorts of birth defect that in previous eras had been seen not as indications of the order of nature but as ruptures in that order. At both moments, crocodiles are never far from his mind.

Already by 1825 Geoffroy has come to understand the evolution of crocodilians as a sort of *longue durée* parallel to the regular and frequent generation of the monsters studied by teratology. The teratologist studies in the present what the evolutionist studies in the distant past. In "Recherches sur l'organisation des gavials" of that year he explicitly identifies "pathology," or the appearance of abnormal traits, as the driving force behind the evolution of crocodiles from their teleosaurus ancestors. "[T]he crocodiles of the present era," he explains, "cannot descend by an uninterrupted succession from the antediluvian species that are found in a fossil state on our territory." Their differences, he continues, "which are great enough to be able to be placed according to our rules in the class of generic distinction, indicate only a greater degree of the intervening modificatory action in the observed variation." This "modificatory action" (*action modificatrice*) is nothing other than pathology, the production of abnormalities that turn out to be well suited to environmental circumstances: "The characteristics by which the skull of the Teleosaurus is distinguished from that of the crocodiles, however important they are at the organic level, are nonetheless the most susceptible to undergoing a *pathological* influence (if I may employ this term while removing from its meaning any idea of pain or of illness)."[54]

For Leibniz, the fixity of species had been an indispensable instance of his commitment to the basic metaphysical principle of variety in unity. This same commitment led him to reject the relevance of monstrosity, or severe morphological deviation from the norm, as irrelevant in determining the sort of thing a given animal is: again, every animal either is or is not a member of a given species, and the determination of this question will not be made by an inventory of its traits. Geoffroy rejects Leibniz's species fixism but remains no less committed than his German predecessor to the principle of unity within diversity. But *what* is it exactly that remains a unity? What remains constant and unchanging, if not the species?

One part of the answer to these questions is that Geoffroy temporalizes the principle of unity within diversity that Leibniz had tended to conceptualize spatially as an order of coexistence of diverse kinds rather than as a diachronic succession of newly appearing kinds. For Leibniz, the proper study of natural diversity was the survey: the massive, geographically dispersed, and collective effort to collect comprehensive data about the variety of local inflections of a given regional or global phenomenon. Leibniz's most comprehensive efforts to implement

52 Geoffroy, Études progressives, 147.

53 Ibid., 148.

54 Étienne Geoffroy Saint-Hilaire, "Recherches sur l'organisation des gavials," in *Mémoires du Muséum d'histoire naturelle, par les professeurs de cet établissement*, vol. 12 (Paris: A. Belin, 1825), 152–53.

this sort of research were made in his late-life proposals for the advancement of natural history and philosophy in the Russian Empire. In correspondence with Peter the Great and his councillors, the philosopher developed schemes for exhaustive surveys of the botanical, zoological, and linguistic diversity of this empire that spanned two continents. He proposed the establishment of research stations across the Arctic coast of Russia to measure, chart, and eventually to forecast magnetic variation. Leibniz adopts here a method of what might be called "empiricist rationalism": using scientific methods and accumulating empirical data to discern the hidden order behind the apparently chaotic abundance of details, to the existence of which he is committed on a priori grounds.[55]

Leibniz's first proposals to a sovereign leader for the consolidation of power through military expansion and scientific mastery of the entire region under his domination were not nearly as closely heeded as those made to Peter the Great in the early eighteenth century. Some decades earlier, in 1671, the young philosopher and aspiring diplomat had sought to impress Louis XIV with a plan to invade Egypt. The French king paid little attention, but it may be that the seed of an idea was planted at that moment that would eventually come to fruition during the reign of Napoleon. At that early stage Leibniz's empiricist-rationalist vision of the method for collecting data that reveal the variety in unity was not nearly so developed, and in some respects the scientific wing of Napoleon's eventual Egyptian campaign is more "Leibnizian" than what would have been carried out had Louis XIV taken Leibniz's advice in 1671. In any case, Geoffroy's work in Egypt, both in his own understanding and in fact, is very much a continuation of the Leibnizian research program. It is, however, expanded and deepened in important ways. It is no longer *just* the survey but rather the survey coupled with genealogy. It is not simply history as a study of *res singulares*, as it had been for Leibniz, but also history as a fundamentally past-oriented and diachronic endeavor.

For Geoffroy as for Leibniz, "variety in unity" is the principle that characterizes the variety of kinds of things, but it also characterizes the manner in which individuals are united within a kind and, finally, the manner in which individual beings exist in a composite, organically embodied form. For Leibniz, these individual embodied beings are what are called "corporeal substances," which are understood as the union of the immaterial soul or entelechy with the organic body, which for its part is defined as a "natural machine" or, again, a "divine machine" that remains a machine in its least parts and thus can never be decomposed to the point where it is no longer a machine. It is in other words infinitely complex and thus could not come into or go out of existence by any process of assembly or disassembly and can therefore be brought into existence only by God. It is in this respect that an organic body is for Leibniz a sort of machine, but "more exquisite" or "more divine" than any machine a human being might succeed in creating. The infinitely complex organic body, while consisting of infinitely many parts, is nonetheless a true unity, in Leibniz's view, to the extent that it is unified by the perceptual power of the dominant monad or soul, and its successive states are, in metaphysical rigor, only the temporal, and thus phenomenal, unfolding of what is already contained in the substance eternally. The corporeal substance is thus a paradigm instance of variety in unity for Leibniz, even if the principle of variety in unity extends across the vast range of his philosophical and scientific interests.

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55 On the philosophical significance of Leibniz's scientific projects for the Russian Empire, see Justin E. H. Smith, "Leibniz on Natural History and National History," *History of Science* 50, no. 4 (December 2012): 377–401.

In the 1822 *Discours d'introduction à l'ouvrage "Monstruosités humaines" formant le deuxième tome de la "Philosophie anatomique"* (Introductory discourse for the work *Human Monstrosities*, constituting the second volume of the *Anatomical Philosophy*), Geoffroy will observe of the Leibnizian principle of variety in unity that "to whatever system of organization it is applied, and generally on whatever point one focuses the action, yields identical results. It leads to the reproduction, as a fact acquired a posteriori, of the a priori idea, the mother and the fundamental idea of the philosophy of Leibniz; the idea that this great genius packed into that expression of his, *variety in unity*."[56] In the eighteenth century there was a well-established practice of invoking Leibniz as the thinker who anticipated by a priori reflection the discoveries that would later be made in the empirical life sciences, particularly those that seemed to confirm the existence of some sort of fundamental elements of living beings that each contain the principle of organization of the whole being. A particularly telling moment in this chapter of Leibniz's reception history was the discovery by Abraham Trembley in 1744 of parthenogenesis in freshwater polyps, in which an entire new organism can be obtained by slicing off a small portion of a preexisting organism. Eighteen years later, Charles Bonnet would write about this discovery in his *Considérations sur les corps organisés* that "the metaphysics of this great man [Leibniz] led him to suspect the existence of such a being as the polyp."[57] Similarly, Geoffroy presents his own investigation of organization in living bodies as the a posteriori component of a research program to which Leibniz had already contributed the a priori principles.

Leibniz's principle of variety in unity would be widely seen as providing a philosophical grounding for the emerging empirical life sciences of the eighteenth century, even though he himself saw the ultimate basis of this principle as lying in the metaphysical theory of monads: immaterial unities that lie beyond the scope of empirical science altogether. Most eighteenth-century Leibnizian natural philosophers, including Geoffroy, rejected this ultimate metaphysical ground, largely misreading Leibniz in order to develop their own physical, rather than metaphysical, monadologies. But for all the creative and loose adaptation of Leibniz's philosophy, Geoffroy does appear to remain faithful to the most basic features of his German predecessor's theory of living bodies. Leibniz believes that to study and to come to understand these is the best way to arrive, via observation of nature, at an appreciation of the power, goodness, and wisdom of the creator, while Geoffroy believes that to study and understand them is to gain insight into nature's own power of self-organization over time. For Leibniz, variety in unity is based on transcendent principles, and is eternal; for Geoffroy, this variety in unity is immanent, and historical. For both, however, the principle remains fundamental, and the most perfect expression of it is the animal.

We might suggest, speculatively, that the opening up to evolutionary thinking that occurred in the eighteenth and early nineteenth centuries, as expressed most clearly by Étienne Geoffroy Saint-Hilaire, is in important respects a return to theriomorphism, understood as the doctrine that whatever is best, or perhaps divine, takes the form of an animal, manifests itself as an animal. This doctrine is ancient, archaic even, and it never really went away. It is evident in Aristotle and Plutarch, for example, even though it became more muted and cautious in more recent millennia. In the seventeenth century Leibniz for his part speaks openly of the "divinity" of animals, while there is no acknowledgment or apparent awareness of the space this opens up for accusations

56 Étienne Geoffroy Saint-Hilaire, *Discours d'introduction à l'ouvrage "Monstruosités humaines" formant le deuxième tome de la "Philosophie anatomique"* (Paris: Rignoux, 1822), 24.

57 Charles Bonnet, *Considérations sur les corps organisés* (Amsterdam: Marc-Michel Rey, 1762), 1:218.

of "regression" not only to pan-animism in general (an accusation of course often leveled at his contemporary Spinoza) but also to the forms of religion in the pre- and extra-monotheistic world that would soon come to be characterized as "animistic." Geoffroy identifies Egyptian religion as animistic in this way, denounces it as superstitious, and at the same time adopts Leibniz's model of animals as exquisite machines while dropping the near-synonymous appellation "divine." Geoffroy was more sensitive than Leibniz had been to the historical precedent of the Egyptians, who also took animals to be divine. Indeed, for Geoffroy Egyptian cultural representations of animals native to Egypt were an integral part of the study of these animals. He of course does not return to a religion of theriomorphic divinities, yet he is prepared, as Leibniz was not, to consider the very real possibility, one whose implications we are still working out today, of human-animal kinship: thus, not that animals are a variety of gods, but that humans are a variety of animals. These two possibilities, as we have begun to glimpse here, may have more in common than is generally supposed.

POSTSCRIPTUM FABULOSUM: THE IBIS AND THE CROCODILE

The ibis writes and writes. He writes until he forgets the things he knew and wanted to record in the first place. He loses himself in the recording of details upon details and leaves to the papyrus itself the burden of reflecting (if not reflecting on) the system, the order, and the beauty that holds the details together. The crocodile meanwhile sits silently, luxuriates, is impressed with himself. He feels magnificent, maybe even a bit divine, but cannot say why. A