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Jean-Baptiste Lamarck

From Myth to History

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Since the 1860s, biologists have repeatedly referred to Lamarck as one of the founding fathers of modern evolutionary doctrines, a claim hotly denied by most of their colleagues. Lamarck's name has often been evoked to contrast his insistence on acquired individual variations with the mainstream interpretation of the Darwinian doctrine, which stresses the constant presence within a population of repertoires of variation that are subjected to the action of selection. As a consequence, reference to Lamarck has often been made with polemical intent, and has rarely been based on firsthand acquaintance with his works and the biological, philosophical, and even political debates of which he was part.

Although, as his taxonomical work abundantly proved, he was prepared to follow the path of specialization, accuracy, and rigor that many of his colleagues advocated, Lamarck insisted throughout his life that specialization constituted a betrayal of the Newtonian ideal of searching for the handful of ultimate principles on which all nature rested. Thus, he opposed Lavoisier and his school's claim to have proven the existence of a few score primary chemical elements, and agreed with Buffon that the Linnaean system of classification was introducing artificial partitions into the endless repertoires of variation that living nature offered to the philosophical observer.

As a rather typical eighteenth-century materialist, Lamarck believed that the universe and the Earth were as eternal as matter. For him, two principles were the basis of all natural phenomena: Newtonian attraction and life. During the first half of his career Lamarck did not lose hope that one day even life could be shown to be the result of strict physicochemical causes. In the very early years of the nineteenth century, Lamarck matured the conviction that this was indeed the case, though the demonstration he provided did not meet with universal acceptance. Until 1800, Lamarck believed that whereas universal attraction guaranteed that basic forms of matter derived from the four primary elements (earth, water, air, fire) coalesced into planetary and stellar bodies, only life could be responsible for the building of complex compounds. As he repeatedly pointed out, organic chemistry was much more complex than inorganic.

Since only life was an active principle capable of generating complex structures, spontaneous generation was unthinkable, and species had always existed as

they are today. Lamarck called living organisms “true chemical laboratories” constantly fabricating complex chemical and mineral substances. The very existence of the planet Earth depended on the ability of living things to cumulate mountains of shells and thick layers of coal or petroleum OK, thereby providing a continuous supply of material that filled in after the constant, relentless work of destruction that natural elements (rain, wind, ice, tides) were carrying out at the surface of the Earth. Eternal cycles of life and death provided material for the building of mountains destined to be leveled by erosion. Furthermore, and more important within the economy of Lamarck’s philosophy of nature, once life stopped keeping together the particles making up compounds (the flesh, blood, and bones of organisms), the particles PARTICLES inexorably returned to their elemental state. So, without life there would be no complex chemical compounds and mineral substances: there would be no Earth. Without life, the Earth would be a spheroid of inert material elements surrounded by water.

The Revolutionary decade 1789–1799 opened up new opportunities for Lamarck, though he soon discovered that the ruling class of the old Academy of Sciences proved remarkably resilient in the long term. They still surrounded Lamarck’s philosophical speculations with icy silence and ostentatious and at times offensive disregard. At the same time, substantial sections of the reading public showed increasing interest in his proposals, something that was also helped by the fact that after 1800 Lamarck gave up his open attacks on the new chemistry, and concentrated on his taxonomical work and yearly meteorological publications (1799–1810). The latter proved very successful with the reading public, though they deeply

irritated Georges Cuvier and Pierre-Simon Laplace, and this led to the famous rebuke from Napoleon himself in 1809. Lamarck never abandoned his physicochemical convictions and, after some initial reluctance, followed fashion by joining in the popular debates on the origin and transformations of the Earth and of life.

In the long run, although not to his liking, being given the chair of the zoology of invertebrates in the newly established Muséum d'Histoire Naturelle (June 1793) provided Lamarck with unexpected advantages and philosophical rewards. Initially he limited himself to giving the required forty-hours-per-year course, mainly relying on the anatomical investigations of his younger rival Cuvier, who had moved to Paris in 1795. Until 1799 Lamarck stubbornly pursued his attempt to gain a reputation as a philosophical chemist, against the opposition of prominent colleagues at the Academy of Sciences. His eternalism and his philosophy of nature were also challenged by increasingly popular geological and evolutionary doctrines put forward by naturalists who, although they are ignored by historians, enjoyed European reputations during the very last years of the eighteenth and the first decade of the nineteenth centuries. Lamarck embarked upon a critical assessment of current “directionalist” cosmologies and life histories, which were centered on descriptions of the beginning of the Earth either by fire or by water; of the appearance of life due to the spontaneous generation of simple organisms or prototypes of all major animal and plant orders; and of the slow progress toward the appearance of man. Lamarck’s original answer to trends he considered unfavorable to his theoretical stands matured during the years 1799–1802, and culminated in 1802 with the publication, in January, of his *Hydrogéologie* and, in July, of the *Recherches sur l’organisation des corps vivans*, which was the first draft,

so to speak, of his better-known 1809 *Philosophie zoologique*. In 1801 he had published his *Système des animaux sans vertèbres*, a work containing his first ambitious taxonomical proposals, which circulated widely in Europe and the Americas.

In his *Hydrogeology*, Lamarck announced the project for a “terrestrial physics” grounded on three main disciplines: meteorology, the fluid dynamics responsible for all the phenomena of the atmosphere; hydrogeology, the fluid dynamics constantly and eternally shaping the surface of the Earth; and biology, the dynamics of the fluids present within living organisms and responsible for all their structural articulations and transformations. After 1800, “life” lost the status of “a principle for ever unknown to man,” and was seen by Lamarck as the product of physical laws regulating the behavior of fluids constantly flowing within (blood, nervous fluids, lymph) and through living organisms (caloric, electricity, or magnetism). Spontaneous generations were now possible, since a tenuous membrane could accidentally surround a molecule of a gas or of a fluid subjected to expansions or contractions due to external thermal conditions. Spontaneous generations occurred every day, whenever local circumstances allowed, and were destined to live the space of a few moments and be forever invisible to man. Lamarck defined spontaneous generations as “inductions”: a necessity of scientific reasoning and of his theory of life, a theoretical conclusion rather than a datum of observation. He never tired of repeating that even the simplest animal or plant forms known to naturalists were true animals or true plants, not spontaneous generations.

Exceptionally, a few spontaneous generations had been able to nourish and reproduce themselves, thereby giving rise to simple forms of life up to the structural level of radiates. More complex structures, showing serial segments and eventually bilateral symmetry, developed out of spontaneous generations occurring within already existing, simple organisms. Lamarck never believed in a single hierarchically articulated life plan, but in at least one plan for plants and at least two for animals. Moreover, higher levels of organization were not reached because of an innate tendency toward complexity, but were always due to the action of “extraordinary sets of circumstances.” Thus, for instance, infusorians never developed into vertebrates, a fate reserved to parasitic wormlike forms that must necessarily have appeared later in the history of life. Simple spontaneous generations occurring in lukewarm marshy waters never ascended as far as wormlike parasites produced within already existing organisms.

Although known as the first and major theorizer on the principle of the inheritance of acquired characteristics, Lamarck never expressed himself in such terms, and clearly—and rightly—considered himself as one of the many naturalists convinced that the development of an organ during the lifetime of an organism, or the appearance of however slight behavioral propensities (“habits”), could be passed on to the next generation if a mating occurred between individuals that had experienced the same change. Yet, characters were not acquired or transmitted: only biological processes were. To Lamarck, organic fluid dynamics naturally gained strength within the parts more exposed to changing environmental circumstances, thereby contributing to their reinforcement and extremely gradual modification; equally,

decreasing levels of stimulation would decrease the flow of nutritional, nervous, or other fluids to the relevant parts. Thus, it was not “characters” that were acquired during the lifetime of the organism, but only a higher or lower degree of organic fluid flow or, in general, a small difference in fluid distribution patterns. The subtle fluid contained in the sperm of animals undergoing sexual reproduction—a fluid akin to electricity or caloric, a specification of the very active element “fire”—was equally affected, and would organize the eggs of the next generation accordingly, thereby “transmitting” the slightly modified pattern of fluid distribution. Species, that is, the groups of individuals capable of reproducing among themselves, remained stable in stable conditions: taxonomy, in other words, was not a useless exercise; it did suggest filiations and provided the only reliable evidence of the changes and developments that life had undergone. Lamarck never relied on paleontological data, convinced as he was that all fossils, with a few exceptions (essentially the remains of animals destroyed by man), were still alive somewhere on Earth or at the bottom of the seas. For Lamarck, as for a number of his followers, the beautiful fossil ammonites found embedded in rocks were still thriving in the oceans. He also refused to accept contemporary claims that the phases of development of the embryos displayed strong analogies with the history of life on Earth, and expressed his opposition to the doctrine of the unity of plan put forward by Étienne Geoffroy Saint-Hilaire and others, since he did not believe that all animals were built from the same basic functional and structural elements (*Philosophie zoologique* 1809, I:375).

Lamarck is not an easy author to read: he rarely quoted contemporary naturalists and never gave his sources, even when they were colleagues who shared

many of his convictions. Unlike Darwin, he almost never gave voice to the difficulties he was experiencing or the issues that were still in need of clarification. Thus, for instance, he never addressed the temporal dimension of the tree of life in explicit and sustained terms, as several of his contemporaries were doing. As noted earlier, his Earth needed all the life it could sustain, and not just a multitude of spontaneous generations striving to survive, in order to be an Earth. Moreover, where could a beginning in the eternal succession of astronomical and geological cycles be located? The fact that Lamarck classified fossil invertebrates together with the living ones reflected his deep uneasiness with the idea of a history of life on Earth, a history his theory of life and his taxonomical work strongly posited, but his view of an eternal universe and of an Earth of indefinite age found difficult to accommodate. As he had declared in 1794 (*Recherches sur les causes des principaux faits physiques*, 1:11), there could be no science of beginnings, and naturalists should rely only on what they see in the present. As was the case with spontaneous generations, the history of life on Earth could be deduced from the trees of life but could not be described in detailed historical terms. It is certainly significant that Lamarck never expressed himself with sufficient clarity on this point.

Equally difficult to understand is Lamarck's concept of "the power of life," usually taken to indicate a force inherent in life, pushing toward higher and higher levels of organic complexity. There is no doubt that Lamarck toyed with several concepts that were not always reconcilable with one another. In the 1802 *Recherches*, Lamarck appeared to indicate that the more complex life becomes, the more the biological fluid dynamics increases its efficacy and its ability to further specialize

organs and functions. In other words, the longer life lasts, the more complex it will become. In one, albeit only one, case in the *Philosophie zoologique* (1809, 1:133) he also stated that if marine animals developed within absolutely stable conditions, they would display a perfect gradation of forms. Yet, talking of the transition from respiration through gills to respiration through lungs, he emphatically declared that this required a particularly important set of environmental circumstances: he did not, in other words, refer to the fact that sooner or later the “power of life” would have taken care of the transition—a point several contemporaries stressed, at times against Lamarck (*Philosophie zoologique* 1809, 1:108). Indeed, to a naturalist such as Antoine-Jacques-Louis Jourdan (the translator of Gottfried Reinhold Treviranus, Karl Friedrich Burdach, and Johann Friedrich Meckel into French), Lamarck had a good explanation for species production and perhaps the production of new genera, but could not explain major structural advances. Only the analogy between fetal development and the development of organic complexity throughout the animal series could do this—a view voiced in almost all the natural history publications of the 1800s, the 1810s, and the 1820s, and one that Lamarck never commented upon nor even mentioned. Finally, in the *Histoire naturelle des animaux sans vertèbres*, in which Lamarck formulated the law often associated with his name, that of a “power of life” pushing toward complexity (*Histoire naturelle* 1815–1822, 1:133, 181–182), he also stated that human beings have a tendency to see “tendency” when they contemplate the cumulative effect of the endless repetition of the same, simple physicochemical laws, and he explicitly used the growth in complexity of the animal

series as a telling example (*Histoire naturelle* 1815–1822, 1:184) of the way in which a “physical necessity” was mistaken for a “finality.”

In spite of the scholarly effort bestowed on Lamarck since the 1970s, OKthe well-entrenched myths surrounding his life and career are difficult to overcome. This is surprising, since his theories and contributions to evolutionary thought are constantly referred to (and often misrepresented) in textbooks, histories of biology, and current debates. It could be argued that the stereotypes of Lamarck have been of service to evolutionary debates for so long that the point has been reached where there is little interest in what he really said, the difficulties he faced, and the contradictions he never resolved, or in his actual role in the scientific and cultural scene of his time.

[Figure 2.1 [about here](#)]

One further difficulty is the almost inevitable anachronistic bias that still characterizes much of the history of science in all its methodological articulations. Ever since it has been assumed that a second scientific revolution stormed the physical and natural sciences of the last decade of the eighteenth century and the early years of the nineteenth, introducing—slowly but securely—increasing levels of professionalization based on higher levels of epistemological sophistication and institutional control, Lamarck’s alleged uneasy fit with the requirements of the new scientific age has oriented the reading of his work. In fact, it is only by ignoring most of the natural history practitioners and publications of the time that we can support the

view of a Lamarck barely tolerated by his contemporaries, the easy target of the “justified” strictures by Cuvier and his associates.

Systematic perusal of scientific and general culture periodicals, or of the scores of dictionaries, encyclopedias, and medical textbooks France exported throughout the world during the first three decades of the nineteenth century, reveals the complexity of contemporary scientific debates and the popularity of Lamarck. His *Histoire naturelle des animaux sans vertèbres* (1815–1822, 7 vols.) became a classic text for zoologists and, more important, for the growing population of practitioners of geology, a discipline that enjoyed enormous popularity throughout Europe during the first half of the nineteenth century. From the late 1810s, commentators sympathetic to Lamarck attempted to graft elements of his transformist doctrines onto theoretical systems not necessarily favorable to the philosophy of nature propounded by the French naturalist. Thus, for instance, in France, England, Germany, and Italy, comparative anatomists influenced by German authors such as Friedrich Tiedemann and Johann Friedrich Meckel, enlisted the Lamarckian mechanism of individual change to explain the production of varieties and of species within a given genus, although they relied on embryological considerations to explain the development of more complex anatomical and functional structures. In France, authors very sympathetic to Lamarck, such as Jean-Baptiste Bory de Saint-Vincent and Geoffroy Saint-Hilaire, selectively translated elements of the theories put forward by their colleague into the evolutionary or developmental views of life they had independently elaborated.

By the time of his death on December 18, 1829, Lamarck enjoyed in France and elsewhere a considerable scientific and political reputation. His courage and determination, the fact that he had become blind in June 1819, and his relative personal isolation due to his age and ill health all contributed to the creation of the myth of the naturalist–philosopher who pursued his research against all odds and in spite of the opposition from the powerful Cuvier. Indeed, the growing opposition to Cuvier, a leading political figure in the reactionary Restoration establishment of the 1820s, expressed itself in aggressive rhetorical contrapositions between the heroic Lamarck and the opportunistic Cuvier. It became common for the press to call Lamarck “the French Linnaeus” or “the Nestor” of French natural history, and to portray Cuvier as someone who had achieved power thanks to science, only to turn against his colleagues and oppose the advancement of research. Historians and commentators have failed to appreciate the fact that the myth of the poor, isolated, and blind Lamarck was created and diffused by his supporters at the height of his success with the reading public and the intellectual elites: there is no doubt that during the 1820s, Lamarck reached the peak of his popularity in France and in the rest of Europe. As Geoffroy Saint-Hilaire remarked at the funeral of his colleague, ill health had plagued the last years of Lamarck’s life, but the naturalist found consolation in the respect and admiration which surrounded him. Cuvier’s more famous and better-known commemoration of Lamarck caused uproar and indignation, and was presented to the Academy of Sciences only in 1832. It is unfortunate that it is usually read as being a reliable portrait of Lamarck’s supposed failure to attract any meaningful attention.

During the 1820s, in Edinburgh and London, Brussels and Turin, Naples and Boston, Lamarck's works received considerable attention, and provoked anxiety in moderate and conservative intellectual and scientific circles. It is significant that Charles Lyell felt compelled to devote eleven chapters of the second volume of his *Principles of Geology* (1832) to subjecting Lamarck to a respectful albeit thorough criticism, in order to distance himself from any suspicion that his geological doctrines could be construed as providing indirect support for transformism. Many of Lamarck's colleagues in the British Isles were indeed worried that the sympathy with which his doctrines met in radical circles would turn into an aggressive, materialist, and antiestablishment rallying point, as had been the case in France during the 1820s. Yet, it would be wrong to conclude that Lamarck's ideas found supporters only among radical antiestablishment doctors, journalists, and popular writers. Throughout Europe, even theologically minded naturalists and commentators started to explore ways to incorporate transformism (appropriately modified and expurgated of its materialistic overtones) into a renewed Christian apologetics capable of enrolling contemporary science in its ranks. This was due not only to Lamarck but also to a host of authors who endorsed a variety of explanations for the succession of life on the surface of the Earth and throughout its history. Indeed, it is deeply reductive to see pre-Darwinian natural sciences, and the debates they aroused, as locked into a confrontation between a majority of creationists (or in any case upholders of the fixity of species) and an absolute minority of authors, essentially Lamarck, whose views are represented as exemplifying the nefarious power of materialistic and atheistic prejudice. In fact, the perception of Lamarck as an isolated figure who never managed

to attract the attention of his contemporaries is not supported by a thorough engagement with the complex scientific, intellectual, and political articulations of French and other European societies of the first half of the nineteenth century.

The real point historians need to investigate further is why, of the many alternative and at times opposed views of the changes life can undergo that were put forward during the first half of the nineteenth century in several European countries and in the United States, it was the views of Lamarck that continued to attract the attention of commentators throughout the nineteenth and twentieth centuries. The fact that today only a handful of scholars know even the name of naturalists and commentators such as Bory de Saint-Vincent and Jean-Baptiste-Julien d’Omalius d’Halloy, Frédéric Gérard and Pierre Boitard, Achille-Pierre Requin and Sir Richard Vyvyan, or any of the few score colleagues whom Darwin (rightly, and at times wrongly) acknowledged had preceded him in believing in evolution, defies easy explanations: explanations have to be found case by case, different in different contexts, countries, and periods. Thus, as hinted earlier, in France in the 1820s the debate about Lamarck’s ideas was part of a wider philosophical, scientific, and political debate involving the right-wing policies of the Restoration, the personal and scientific rivalry between Cuvier and Geoffroy Saint-Hilaire, and the wide coverage of the history and transformation of life found in large-circulation medical, natural history, and general culture periodicals and encyclopedias. After 1830, the public debate in France appeared to wane, although encyclopedias and dictionaries, including leading Catholic ones, continued to summarize, and at times distort, Lamarck’s views from the 1830s to the 1850s. The reception and discussion of

Lamarck's ideas in large-circulation dictionaries and encyclopedias has never been surveyed, though several leading naturalists, including Geoffroy Saint-Hilaire's son Isidore, took an active part in the debate. It is significant—to limit our remarks to a single eminent case—that the famous English writer Charles Kingsley became interested in evolution through reading the *Encyclopédie nouvelle*, edited from 1836 to 1843 by prominent French Saint-Simonians, in which the ideas of Lamarck were subjected to spiritualistic interpretations with which the French naturalist would have deeply disagreed. In the United States and Germany, awareness of evolutionary-like theories, and of Lamarck, remained high, with a few favorable pronouncements. In the British Isles, as already noted, the scientific authority of Lamarck refuted the commonly held view among conservative naturalists and commentators that only illiterate radicals could maintain such a theory, and some respected and far from radical naturalists came to believe that although the details of Lamarck's solutions might be wrong, the basic idea deserved attention and further research. Yet, even in the British Isles, where the discussion of transformism was probably the most popular and ideologically the most meaningful, the pre-Darwinian scene was highly diversified. Indeed, one of the most popular evolutionary books of the 1840s, Robert Chambers's anonymously published *Vestiges of the Natural History of Creation*, dismissed Lamarck and had little in common with the transformist tradition represented by the French naturalist.

It could be argued that the reputation Lamarck gained during the 1820s ensured that his name became representative of views that were often very different from the ones he had elaborated. As would be the case with "Darwinian" during the

second half of the nineteenth century and in the twentieth, the term, and at times the epithet, “Lamarckian” came to indicate a large spectrum of doctrines having in common the recognition that life had a history and was subject to change, and the plurality of mechanisms put forward to account for this. Throughout the period and until today, the term “Lamarckism” also, and more specifically, has described the evolutionary role of individual variations that emerged during the life of an organism in response to environmental stress. “Lamarckian” elements were also appropriated by a variety of philosophical, teleological, and at times theologically oriented views of evolution, which insisted on concepts such as the power of life or the tendency for inexorable, predetermined growth. Religious, national, political, and broad philosophical considerations have played important parts in defining the role of Lamarck in the history of evolutionary debates since the nineteenth century. Yet, the Lamarckism of current and past mythical reconstructions of the history of evolution bears little or only occasional resemblance to what the French naturalist thought, taught, and wrote.

Further Reading

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Corsi P. Biologie. In P. Corsi et al. Lamarck, Philosophe de la nature. Paris: Presses Universitaires de France; 2006: 37–64.

Corsi P. For all the texts of Lamarck quoted: <<http://www.lamarck.cnrs.fr/?lang=en>>.

For the complete prosopographic list of the 973 pupils attending Lamarck's lectures from 1795 through 1823, see

<<http://www.lamarck.cnrs.fr/auditeurs/index.php?lang=en>>.

Figure 2.1

Jean-Baptiste de Monet de Lamarck. Lithograph by L. Boilly (1821).

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