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# SPECIES TRANSFORMATION AND SOCIAL REFORM: THE POLITICS AND BIOPOLITICS OF JEAN-BAPTISTE LAMARCK'S EVOLUTIONARY THEORY

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SPECIES TRANSFORMATION AND SOCIAL REFORM: THE POLITICS AND BIOPOLITICS OF JEAN-BAPTISTE LAMARCK'S EVOLUTIONARY THEORY

A DISSERTATION APPROVED FOR THE DEPARTMENT OF HISTORY OF SCIENCE, TECHNOLOGY, AND MEDICINE

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**Abstract**

Jean-Baptiste Lamarck (1744–1829) is well known as a pre-Darwinian proponent of evolution. But much of what has been written on Lamarck, on his 'Lamarckian' belief in the inheritance of acquired characters, and on his conception of the role of the will in biological development mischaracterizes his views. Indeed, surprisingly little in-depth analysis has been published regarding his views on human physiology and development. Further, since Robert M. Young's signal 1969 essay on Malthus and the evolutionists, Darwin scholars have sought to place Darwin's work in its social and political context; however, this has yet to be done adequately for Lamarck. In this dissertation I seek to address this gap. I examine Lamarck's comments on human intelligence, physiology, and moral agency, and place them in the context of prevailing debates in France about the physiology of mind and morals and the future of the nation. I show how Lamarckian ideas about biological melioration—particularly in relation to social and political reform—served as both an aspirational standard and as rhetorical fodder for physicians, hygienists, and public health reformers throughout the nineteenth century who adapted evolutionary ideas into justifications for the primacy of medical authority in societal reform and regeneration. Even amongst those who were not prepared to embrace the idea that evolution was the mechanism of speciation, it was widely accepted that living organisms displayed a remarkable level of plasticity in their physiology and morphology, and that altering them physically could have far-reaching effects on functioning, social behavior, and overall wellbeing. This conviction was at the root of what would, over the course of the nineteenth century, give rise to various efforts to create a reformed and regenerated France by improving its people, including through hygienic reform, medical interventions, and the management of various pathologies that were believed to be hereditary, including 'degeneration.' In short, Lamarckian biology played a major role in what Michel Foucault termed *biopolitics*, including in its eugenic aspects. Thus, I argue that Lamarckian biology should be evaluated not just as a pre-Darwinian evolutionary theory, but as a contribution to ongoing debates about the importance and possibility of effecting political change via medico-biological management and alteration of the human body and species.

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## Introduction

Where historians have paid attention to the French naturalist Jean-Baptiste Lamarck (1744–1829) it has generally been to note his 'transformist' or evolutionary views. However, given that the study of the history of evolutionary ideas has focused largely, and perhaps disproportionately, upon the life and works of Charles Darwin (1809–1882), it will come as no surprise that the majority of scholars who have written about Lamarck have done so more in order to contextualize Darwin than to consider Lamarck in his own right. Thus, while the mechanism of natural selection has been claimed as fundamentally 'Darwinian,' the mechanism of the inheritance of acquired characters has been defined as 'Lamarckian,' despite the fact that Darwin appealed to both mechanisms in his explanation of the formation of new species. It is significant that this distinction between what was thought properly 'Darwinian' versus 'Lamarckian' was originally drawn in the 1960s, when biologists were concerned to highlight Darwin's contribution to, and agreement with, how they then understood evolutionary biology.[1] Those aspects of Darwin's theory that were deemed to have been correct were identified as 'Darwinian,' while ideas that were not then en vogue in biology were designated 'Lamarckian,'

[1] See e.g. Peter Bowler, *The non-Darwinian revolution: Reinterpreting a historical myth* (Baltimore: The Johns Hopkins University Press, 1988); Robert J. Richards, *The meaning of evolution: The morphological construction and ideological reconstruction of Darwin's theory* (Chicago: University of Chicago Press, 1992); Piers J. Hale, "Rejecting the myth of the non-Darwinian revolution." *Victorian Review* 41 (2015), 13–18.

as if they had played no real role in Darwin's thinking.[2] Indeed, this is still how Lamarckian evolution is presented in a number of current biology textbooks.[3]

To Darwin and his contemporaries, however, Lamarck and 'Lamarckism' were associated with something quite different. Indeed, in the 1844 letter to his friend and colleague, the botanist Joseph Dalton Hooker, in which he first confessed his belief in transformism, Darwin made it quite clear where he stood vis-à-vis the Frenchman:

> Heaven forfend me from Lamarck nonsense of a 'tendency to progression' 'adaptations from the slow willing of animals' &c, — but the conclusions I am led to are not widely different from his — though the means of change are wholly so.[4]

Thus, for Darwin and clearly for Hooker too, Lamarck was associated not so much with the inheritance of acquired characters as with a dated and unscientific belief in an inherent progressive development and a ludicrous conception of organisms somehow willing their own evolution. Darwin not only accepted Cuvier's and Lyell's mischaracterisations of Lamarck's conception of species change, but also missed, or refused to acknowledge, the social and political debates to which Lamarck's work was a contribution. With few exceptions, Darwin scholars

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[2] This is in contrast to much of the literature on Lamarck from the early twentieth century, a time when biologists and historians embraced the argument that evolutionary theory required aspects beyond the mechanisms then considered 'Darwinian.' Many of these scholars were proponents of an expanded, 'Neo-Lamarckian' version of Lamarck's arguments, or at least attested to the increased popularity of Lamarckism and Neo-Lamarckism during this period, particularly in the US. For example, see Alpheus Spring Packard, *Lamarck, the founder of evolution: His life and work* (New York: Longmans Green & Co, 1901), 332–367; Marcel Landrieu, *Lamarck, le fondateur du transformisme* (Paris: Société zoologique de France, 1909a); William Morton Wheeler & Thomas Barbour (eds.), *The Lamarck manuscripts at Harvard* (Cambridge: Harvard University Press, 1933), "Introduction" and xiii–xxxi; Erik Nordenskiöld, *The history of biology: A survey* (New York: Tudor Publishing Company, 1936), 316–330; Louis Trenchard More, *The dogma of evolution* (New Jersey: Princeton University Press, 1925), 163–184.

[3] See e.g. Mary Ann Clark et. al., *Biology 2e* (OpenStax, 2018), 492.

[4] Letter to Joseph Dalton Hooker, 11 January [1844], Darwin Correspondence Project, "Letter no. 729," accessed accessed 1 June 2021, https://www.darwinproject.ac.uk/letter/DCP-LETT-729.xml. Also published in *The Correspondence of Charles Darwin*, Vol. 3.

have followed Darwin on Lamarck, treating the Frenchman as no more than an early, and erroneous, contributor to the developing science of evolutionary biology. Where Lamarck's other interests have been noted, his physico-chemical theories have often been considered an embarrassing detraction from his more serious biological work, especially given his repeated attempts to refute Lavoisierian chemistry,[5] and although his discussion of human physiology has sparked some interest in the extent to which he contributed to nineteenth-century debates about mind and psychology, historians of evolution including Robert J. Richards and Robert M. Young have noted that his ideas were often spread indirectly, via students or critics.[6]

For Lamarck, though, *biologie* was bound up inextricably with his interest in social change and moral agency. Natural and social transformation had produced moral agency in humans and endowed them with free will, and thus the ability to change their own environments and to develop their mental and moral capacities. This meant that humans were not just the products of natural historical chance—rather, they had the agency to continually re-form and re-create their societies and themselves.

Further—and although Darwin does not mention this in his letter to Hooker—as Adrian Desmond has pointed out, Lamarckism in Britain was also associated with radical and Francophile revolutionary politics, and thus Darwin had reason beyond a claim to originality to

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[5] See e.g. Leslie J. Burlingame, "Lamarck's chemistry: The chemical revolution rejected." In: Woolf, Harry (ed.), *The analytic spirit: Essays in the history of science in honor of Henry Guerlac* (Ithaca: Cornell University Press, 1981), 64–81.

[6] See e.g. Robert J. Richards, "The influence of sensationalist tradition on early theories of the evolution of behavior." *Journal of the History of Ideas* 40 (1979), 85–105; idem., "The emergence of evolutionary biology of behaviour in the early nineteenth century." *The British Journal for the History of Science* 15 (1982), 241–280; Robert M. Young, "The role of psychology in the nineteenth-century evolutionary debate." In: Henle, Mary et. al (eds.), *Historical conceptions of psychology* (New York: Springer, 1973), 180–204; Bernard Baertschi, "Diderot, Cabanis and Lamarck on psycho-physical causality." *History and Philosophy of the Life Sciences* 27 (2005), 451–463.

want to put some distance between his own ideas and those of Lamarck.[7] Among Darwin scholars, therefore, Lamarck has too often been seen as merely one of Darwin's forerunners; insofar as he explicated an early version of evolutionary theory, he was on the right track, but was led astray by his speculations.[8] In the process, though, he did at least smooth the way somewhat for the greater man to come.[9] This conception of Lamarck as a 'forerunner' to Darwin had also been invoked in the early twentieth century by some French historians, often using the notion of a precursor to argue that Lamarck's theory was unjustly ignored prior to Darwin's.[10] Though this 'precursor myth' has drawn criticism from historians such as Madeline Barthélemy-Madaule, it is a perhaps predictable element of a historiography that has generally devoted more attention to Darwin than to other evolutionists.[11]

In this dissertation, however, I want to consider Lamarck in his own right and in his own context, rather than in Darwin's. In this endeavor I draw from a different scholarly literature, which includes those comparatively few scholars who have made Lamarck their focus. Goulven Laurent and Pietro Corsi, for instance, have each given much-needed attention to the ways in which Lamarck's transformist theory was propagated and discussed in Europe long before

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[7] Desmond, *The politics of evolution: Morphology, medicine, and reform in radical London* (Chicago: University of Chicago Press, 1989); see also Hale, *Political descent: Malthus, mutualism, and the politics of evolution in Victorian England* (Chicago: University of Chicago Press, 2014).

[8] See e.g. Richard Burkhardt, *The Spirit of System: Lamarck and evolutionary biology*. Cambridge, MA: Harvard University Press (1977); idem., "Lamarck, evolution, and the politics of science." *Journal of the History of Biology* 3 (1970), 275–298; Andrés Galera, "The impact of Lamarck's theory of evolution before Darwin's theory." *Journal of the History of Biology* 50 (2017), 53–70.

[9] See Bentley Glass, Owsei Temkin, and William L. Straus, Jr. (eds.), *Forerunners of Darwin 1745–1859* (Baltimore: Johns Hopkins Press, 1968 [1959]).

[10] See e.g. Louis de Nussac, "Lamarck et le muséum d'histoire naturelle." *Aesculape* 12 (1912), 64–68.

[11] Barthélemy-Madaule, *Lamarck, the mythical precursor: A study of the relations between science and ideology* (Cambridge, MA: MIT Press, 1982).

Charles Darwin had even put pen to paper, thus helping to shift historical focus away from Lamarck as a mere forerunner or precursor to Darwin.[12] Laurent has shown that Lamarck's work as an invertebrate zoologist was influential among a number of French paleontologists, and although Lamarck himself made efforts to perpetuate the myth of the solitary 'martyr to science,' Corsi has shown that his belief in species transformation was not wholly anomalous among his intellectual peers, and that he worked largely within the mainstream of contemporaneous French science. Indeed, by the second half of the nineteenth century, Lamarckian and neo-Lamarckian ideas were so widespread among French biologists that, according to Yvette Conry, they made it impossible for 'Darwinism' proper to be accepted in France until the twentieth century, despite the widespread scientific acceptance of other evolutionary or transformist theories.[13]

For all its strengths in this direction, though, the literature that has focused on Lamarck has neither thoroughly nor adequately addressed either his investigations into human organization and the physiology of mind or their significance. In particular, and in contrast to Darwin and his contemporaries, these scholars have often sought to minimize the role of desire and the will in Lamarck's writing. For example, in his seminal 1977 study of the origin and development of Lamarck's theory, Richard Burkhardt correctly pointed out that Lamarck only ascribed will to a select few, highly complex organisms, and as a result concluded that it "could play no major role in the general process of organic change," a view with which Lamarck's

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[12] Corsi, *The Age of Lamarck: Evolutionary theories in France, 1790–1830* (Berkeley: University of California Press, 1988); idem., "Before Darwin: Transformist concepts in European natural history." *Journal of the History of Biology* 38 (2005), 67–83; idem., "The revolutions of evolution: Geoffroy and Lamarck, 1825–1840." *Bulletin du Musée d'Anthropologie Préhistorique de Monaco* 51 (2011), 113–134; Laurent, "Paléontologie(s) et évolution au début du XIXe siècle: Cuvier et Lamarck." *Asclepio* 52 (2000), 133–222.

[13] Conry, *L'introduction du Darwinisme en France au XIXe siècle* (Paris: Librairie philosophique J. Vrin, 1974).

biographer Ludmilla Jordanova concurred.[14] Robert J. Richards similarly argued that Lamarck's explanation of organic change was dependent on needs and habits, and not the will at all, stating categorically that "Will, as he understood it and in its usual meaning, simply had no immediate role in evolution."[15] Although Corsi did acknowledge the will in Lamarck's work, he characterized Lamarck's consideration of the 'will' as "simply the phenomenal expression of a complex process of nervous fluid dynamics," thus minimising any role for agency and desire in his conception of transformism.[16] Such arguments have generally been deployed against the notion that Lamarck considered species transmutation writ large to be a consciously directed process, with the will merely the antiquated insertion of a psychic element into the fledgling biological sciences.[17]

What I want to do here, though, is to move beyond this backlash against the ridicule that Darwin (and, as we shall see, the eminent comparative anatomist Georges Cuvier [1769–1832] and the geologist Charles Lyell [1797–1875]) heaped upon Lamarck and his ideas, to note that Lamarck did in fact believe that the role of the will was of particular importance. It is not sufficient to merely consider Lamarck's transformism in its own right: we must do so in the right context, and for this we need to focus on his conception of human origins and development. Furthermore, we need to recognize that in tackling this subject, Lamarck sought to make a

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[14] Burkhardt, *Spirit of System* (1977), 175; Jordanova, *Lamarck* (Oxford: Oxford University Press, 1984), 55.

[15] Richards, "The meaning of evolution" (1982), 267

[16] Corsi, "Before Darwin" (2005), 70

[17] See e.g. J. Walter Wilson, "Biology attains maturity in the nineteenth century." In: Clagett, Marshall (ed.), *Critical problems in the history of science* (Madison, W.I.: University of Wisconsin Press, 1969), 401–418.

contribution not just to evolutionary biology per se, but also to prevailing debates in France about social reform, biological transformation, and the future development of the French nation.

In this context, the notions of progressive development and of the will were not mere asides, but central concepts in a debate of national importance. In Lamarck's system the will was a crucial link between his natural historical account of species and his concerns with humans in society. It appeared in his writing not because he was a lone voice carrying on a tradition of unscientific eighteenth-century vitalist conjecture, but because he was intensely interested in the ongoing debates about the possibility of guiding human progress and French national policy. Lamarck's understanding of human physiology allowed him to identify what he believed to be the natural historical origin—and the manner of development of—moral agency, an approach that he used to stress the particular insights a naturalist might have into debates about national policy and human progress that had occupied French political commentators since at least the mid-eighteenth century.

These concerns shaped not only Lamarck's own writing, but the reception of his work in France throughout the nineteenth century; indeed, whereas Lamarck himself generally presented his ideas as objective scientific insights, later commentators on his physiological and evolutionary theories would sometimes reference them in more explicitly political terms. These commentators included not just the British radicals whom Adrian Desmond has discussed, but also French pedagogues, politicians, and various reformers, who grounded arguments about public health, human races, and political reform on Lamarckian physiological ideas. Furthermore, even those who did not read or cite Lamarck directly were often influenced by the

same broad intellectual milieu he belonged to, characterised by concerns about physiological malleability and the relationships between living bodies and the environments they inhabited.

Whereas the Darwin-centric historiography has tended to consider Lamarck primarily in his capacity as an evolutionary biologist, another critical context in which French commentators took up his ideas was public health and hygienic reform. Lamarckian evolutionary ideas served to bridge a gap between the physiological changes an organism might acquire over the course of its individual life, and those that might be seen to characterise a whole population or species over time. If, as Lamarck suggested, an organism's physiology was modified by its own habitual responses to its environmental surroundings, then altering the environmental factors in the right way could make people happier, healthier, or better adapted to the demands of their lives—and if those changes could indeed be inherited, then proper management of the environment would also mean altering the human species, or at least a local subset of it.

This linkage was not one that Lamarck made uniquely—indeed, as I will show, he was greatly influenced on the topic by the moderate liberal 'Idéologues' of the Directory and early Restoration—but his status as a prominent naturalist at the Jardin du Roi/Muséum national d'Histoire naturelle (MNHN) meant that his name retained a certain intellectual status, even after his death, in discussions about heredity, health, and the possibility of biologically altering both human and non-human animals. By the Third Republic, such concerns coalesced into a loose family of 'neo-Lamarckian' positions that emphasized malleability and the heritability of acquired alterations as an evolutionary alternative to the British and German Darwinists' insistence on the primacy of 'natural selection.' Neo-Lamarckian and other Lamarckian positions arose from a thicket of both political and biological concerns in France, and should be

understood not just as contributions to an evolutionary debate but also as responses to national concerns about how to secure a large, healthy, and therefore economically productive population.

Thus, I begin in Chapter 1 by contextualising Lamarck's biological work, particularly his transformist theory. Focusing on France in the latter half of the eighteenth century, I first introduce national and scientific debates about degeneration and regeneration, social reform, and human perfectibility. Then I show how these concerns shaped the aims and parameters of scientific inquiry for many savants working in the natural historical tradition, and how 'applied' sciences like agronomy or meteorology could be conceived as technical interventions allowing for scientific management and improvement of human bodies. Lamarck was far from the only savant to propose means of biologically improving the body; indeed, much of his own argumentation on the subject drew from influences like his mentor and patron the comte du Buffon (1707–1788) and the physician–politician P.J.G. Cabanis (1757–1808). For Buffon, Cabanis, and other reformers, savants, and politicians, the idea that selective breeding or environmental-sanitarian interventions could actually alter the physiology suggested that naturalists had a critical role to play in any efforts to improve or enrich the nascent French nation.

Lamarck's arguments about the role of willed, habitual action in the process of species transformation formed part of his answer to such concerns. Evolutionary theory at the time was not simply a topic for debate among naturalists, but one that was broadly understood to have serious implications for anyone interested in the reformation and regeneration of the natural world and human society. Thus, understanding the prevailing debates in France about the national future and the nature of the human organism informs a reading of Lamarck as not just a

pre-Darwinian evolutionist, but as a contributor to complex politico-scientific debates. In particular, and foreshadowing the concerns that will animate Chapters 4 and 5, Lamarck's evolutionary and physiological arguments spoke to Enlightenment French investigations into human phenotypical traits, the origins of ostensibly biologically distinct 'races,' and the possibility that rational intervention could reduce or reverse various forms of degeneration in the population.

Next, in Chapter 2 I examine Lamarck's own life and works in order to assess the nature and strength of his political convictions, and the relationship between these convictions and his scientific activities. Because of the relative scarcity of biographical details and archival material pertaining to Lamarck himself, I also examine a handful of contemporaneous commentaries that provide some insight into both his scientific legacy and the politics connoted by invoking his name in the century or so following his death. I argue that Lamarck was likely a moderate republican, sympathetic to Enlightenment liberal and humanist ideals but either too cautious or too uninterested—or both—to take an active role in politics himself.

In this chapter I also summarize some of the major contributions to the historical literature on Lamarck from the late nineteenth and early twentieth centuries, a period when certain commentators sought to 'revive' Lamarckian transformism as an alternative (and, often, specifically a French one) to Darwinism. As I show in this chapter, the notion of a revival or recovery of Lamarck from the dustbin of history was largely a post hoc narrative invention; though Lamarck's ideas did not attract the renown that Darwin's would 50 years later, Lamarck was hardly a forgotten or neglected savant, either during his lifetime or after. Building on the previous chapter and foreshadowing ssome of the concerns raised in Chapters 4 and 5, I show

how Lamarck's transformist arguments were informed by the liberal political milieu he worked within, and would in turn be invoked long after his death in other scientific and political debates —often, but not always, in support of similarly liberal and materialist positions, which abounded in medicine and public health during the long nineteenth century.

Having explored this intellectual and social context, in Chapter 3 I examine Lamarck's transformist theory as he himself expressed it. Although many of the later figures I discuss in Chapters 4 and 5 had not necessarily read Lamarck's work directly, understanding his arguments in his own words is still valuable for scholars interested in his legacy and the reception of his theories throughout the nineteenth century. Furthermore, a close reading of the primary sources allows me to challenge popular notions of Lamarck as an overly speculative theorist, under-appreciated by the time of his death due to his unsound, Enlightenment-inflected scientific methodology. This caricature, drawn particularly starkly by Lamarck's colleague and rival Georges Cuvier, the English geologist Charles Lyell, and eventually also his mentee Charles Darwin, depended in part on a facile reading of Lamarck's position on the role of the will in the evolutionary process. Thus, I summarize his actual remarks on the topic in order to correct the Cuvierian line of critique that has portrayed Lamarckian transformism as an absurd voluntary process, and examine some of the astute political maneuvering that shaped the scientific reception of Lamarck's work even during his own lifetime. Additionally, in this chapter I demonstrate the theoretical links between Lamarck's physiological arguments and the 'sensationalist' ideas of Cabanis and his liberal, Idéologue brethren, and I analyse some contemporaneous reactions to these and other elements of the transformist theory.

In Chapter 4, I examine Lamarck's work in the medical context during the first half of the nineteenth century. After introducing Lamarck's personal experience studying and practicing medicine, I examine some critical changes to the social and political status of the discipline. The nineteenth century broadly saw physicians gain considerable economic status and epistemological authority, eventually even managing to actualise some of Cabanis's ambitious early-century propositions for a medical presence in the political process. Simultaneously, a number of methodological debates characterised medical practice and writing during the first half of the century. For one thing, physicians and philosophes argued over whether the epistemological foundations of medicine ought to embrace strict empiricism, a looser eclectic attitude, or something else entirely—a debate that I shall show was coterminous with, and in some ways the medical analogue to, the sorts of naturalists' arguments that gave rise to the notion that Lamarck was overly speculative or a 'systemiser.'

These methodological concerns were also intertwined with a nascent trend in medicine toward anthropological and population thinking—efforts to locate society itself as an object of scientific knowledge, including by mathematical methods like vital statistics, medical topographies, and statistically defined notions of 'normality.' Situating Lamarck's legacy in this context, I argue that his evolutionarily inflected conceptions of desirable physiological modifications became foundational principles for some medical writers, particularly those who suggested altering the body by habitual actions like gymnastic exercise—or by management of the social and natural environment. Transformist and 'environmentalist' ideas about physiology remained pervasive in medicine long after Lamarck's death, and became foundational for both

clinical physicians and for other reformers and savants who were concerned about human health and the possibility of improving the body.

Finally, in Chapter 5 I turn to the latter half of the nineteenth century and to the longer legacy of Lamarck's transformism. Building on what Michel Foucault termed *biopolitics*, I argue that Lamarckian ideas about the malleability of the physiology, the indirect effects of environmental factors on living bodies, and the importance of habitual actions as a mediating factor in this process all served as critical scientific justifications for state and medical interventions into urban planning, public health, architecture, personal hygiene, reproductive health, and more. I evaluate these efforts under the broader umbrella of social hygiene, which at the time encompassed a wide range of attitudes and practices aimed at various forms of social and personal health and wellness—including efforts to stave off supposed racial and biological degeneration. Nineteenth-century social hygiene thus represents one of the quintessential case studies in Foucauldian biopolitics as an assertion of state control over bodies qua biology— a new type of sovereignty wherein the state took an explicit interest in the alteration and management of living bodies at the population level. Especially as France industrialised, the size, health, and strength of the population had a direct bearing on the nation's ability to produce and reproduce capital; thus, the scientific ideology of Lamarckian transformism was often complementary to the economic logic that demanded careful study, management, and reform of virtually any aspect of daily life.

Evaluating Lamarck's legacy in the context of biopolitics and the social hygiene movement thus clarifies the relationship between science and capitalism generally, and between evolutionary biology, scientific conceptions of race, and state economic interests in nineteenth-

century France. Both the medical treatises I discuss in Chapter 4 and the active politicians of Chapter 5 perceived in Lamarckism a promise that, with proper scientific management, the physiological malleability of living tissue could be harnessed to create more beautiful, healthy, and economically productive human beings. That is, the propagation of Lamarckian ideas in the decades following his death occurred in the context of broader biopolitical and hygienic concerns about how to create, manage, and maintain a fit population and workforce.

Nowhere was this ideological linkage more apparent than in colonial expansion, as French colonial administrators argued it was part of their *mission civilisatrice* to install French sanitation, architecture, education, and so forth in the ostensibly degraded, insalubrious colonial conditions. Lamarckian environmentalist ideas certainly did not create the economic incentives for French colonialism—but, in a political context characterised by the latter, the former became a convenient scientific justification for it. Thus, after examining manifestations of biopolitical concerns in several public health treatises, in this chapter I also discuss the role of Lamarckian and neo-Lamarckian ideas in scientific justifications for racism and discourses of racialisation. Then I trace the presence of such discourses in French colonial administration and criminology. Lamarckism—both in Lamarck's own words and in later citations of his name—was invoked in service of a variety of political positions, including as a potent justification for liberal imperialism and racism. What unified these political aims with the body of Lamarckian scientific ideology was the biopolitical view that human bodies constituted a source of value—a biological stock that the state had interests in protecting, cultivating, and exploiting.

In this dissertation, I have relied mainly on textual sources, including Lamarck's own works as well as hygienic, medical, and scientific treatises published primarily in Paris during

the long nineteenth century. This is a necessarily limited body of evidence: for example, even popular writing is under-represented, relative to scientific writing intended for a specialist audience. On a more fundamental level, relying on published and preserved texts means that the sources analysed in this dissertation almost always originate from European (even more specifically, Parisian) men with academic credentials and membership in élite professional societies. In other words, what I present here is not a comprehensive view of the legacy of Lamarckism in the nineteenth century, even in France alone. This topic demands further investigation, particularly in regards to the scientific ideology of colonial administration and the way savants in the Lamarckian tradition conceptualised gender and women's rights.

However, what I aim to show in this dissertation is fundamentally that evaluating Lamarck's work and arguments in a broader context than just the history of evolutionism reveals engagements with wider debates about the future of the nation and the importance of cultivating a robust and well-adapted population. Lamarck's assertion that bodies were fundamentally malleable was nothing new, but his defense of the idea that a process of gradual physiological change could account for speciation had powerful corollaries for French political and social reformers of all stripes. As France sought to compete economically with its imperial neighbors—and industrialisation only increased the need for colonial production and resource extraction—state and medical authorities became ever more concerned about both the health and the sheer size of the population. Scientific and medical authority over the body was never a simple matter of individual flourishing, but increasingly represented an economic priority in France. Lamarckian ideas about the malleability of these bodies, and their relationships to their social

and physical environments, constituted a loose body of scientific doctrines by which such bio-capital might be enhanced and used.

## Chapter 1: The French context

My aim in this chapter is to contextualise Lamarck's biological work, particularly his transformist theory, as a response to pressing social and political issues of his day, and to examine how contemporaneous reactions to the idea of species transformation were also shaped by such political and scientific context. Previous scholarship on the politics of Lamarck's theories has turned up some fascinating links to radical and republican politics, particularly throughout the nineteenth century. Adrian Desmond's landmark *The Politics of Evolution* (1989) explored the invocation of Lamarckism by working-class British radicals in the early and mid-nineteenth century, though Desmond pointed out that there were important distinctions between Lamarck's actual ideas and the "cannibalized fragments" of them that these radicals repurposed in pauper presses to support their calls for democracy and anti-clericalism.[18] Similarly, Richard Burkhardt noted that Lamarck was associated posthumously with radical materialist theories of nature and life, though Burkhardt argued that Lamarck himself did not attach "ideas of social reform" to his own scientific work.[19] Burkhardt and Desmond were each correct to point out that nineteenth-century 'Lamarckians' often had little in common with Lamarck himself, and Lamarck certainly was not anticipating British republican politics when he developed his transformist theory.

However, the focus on what Lamarck's name meant in the British context has cost historians of science a fuller understanding of his place in relation to the social and political issues of his own time and place. This gap has been only partially addressed in literature focused

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[18] Desmond, *The Politics of Evolution* (1989), 4

[19] Burkhardt, *The Spirit of System* (1977), 38

on Lamarck. For instance, in *The Age of Lamarck* (1988), Pietro Corsi noted that some French naturalists in the early nineteenth century argued that their studies of the nervous system and the intellectual faculties uniquely qualified them to offer "positive" speculations on social and political questions.[20] Lamarck was among these naturalists: for instance, he claimed in his last major work, the *Système analytique des connaissances positives de l'homme* (1820) that his physiological knowledge formed the basis of a natural history of human society. Corsi also noted that Lamarck made several references to the Idéologues Anthelme Richerand (1779–1840) and Pierre-Jean-Georges Cabanis (1757–1808) from 1809 onward.[21] However, Corsi focused on the palaeontological, geological, and anatomical debates that occupied Lamarck's contemporaries throughout Europe, and in this latter context Lamarck's name was chiefly associated with transformism and his work as a botanist and invertebrate zoologist.

In this chapter I focus instead on French national concerns about degeneration and regeneration, social reform, and human perfectibility. These discussions took on particular importance during the Revolutionary period, but were part of the French intellectual landscape throughout Lamarck's life and career. In this chapter I first introduce the discourses about degeneration and regeneration that shaped French politics and natural history in the eighteenth and nineteenth centuries, and then I discuss some applications of these theories—as well as proposed solutions—in areas like public health, agriculture, botany, and meteorology. As this much makes clear, the schemata of degeneration and regeneration were so ubiquitous in public and scientific discourses of the late eighteenth and early nineteenth centuries that they formed

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[20] Corsi, *The Age of Lamarck* (1988), 187–188

[21] Ibid. 205

virtually inescapable, overarching ideas for those savants whose work dealt with living beings and the natural world. 'Applied' sciences like agronomy or meteorology could be configured as ways to improve and control the potentially unruly bodies of the masses; additionally, progress in science was considered an important aspect of progress and reform on a national level, thus leading to a broader social and political process of regeneration and renewal.

Next, this chapter examines debates about human biology, perfectibility, and physiology. As we shall see, Lamarck's theory of species transformation was far from the first time that naturalists or physicians had suggested human bodies might be perfected over time through the application of scientific means. Indeed, Lamarck's direct intellectual influences, such as Buffon and Cabanis, had proposed means of biologically improving human bodies that ranged from encouraging public health and hygiene amongst the urban poor to selective human 'breeding' efforts patterned on studies of stock breeding and plant acclimatisation. Furthermore, Lamarck's suggestion that humans could be descended from, or related to, non-human primates recalled decades of debate over whether these animals represented a degenerated—or on the other hand uncorrupted—form of man, a provocative question for those who sought to enact social and political reform guided by the insights of natural history. These reformers sought both to alter and perfect individual bodies, and to enact systematic political reforms that would address broader social conditions in France.

Lamarck's belief in the possibility of willed biological change was part of his answer to these natural historical, political, and medical endeavors to socially and physiologically improve the human species. Species transformation was thus part of his complex investigation into the reformation and regeneration of both the natural world and human society. It is not sufficient

merely to consider Lamarck's transformism in its own right: we must do so in the right context, and for this we need to focus on his conception of human origins and development. Furthermore, we need to recognize that in tackling this subject, Lamarck sought not to make a contribution to evolutionary biology, *per se*, but to prevailing debates in France about the physiology of mind and morals, and the future development of the French nation. Lamarck's understanding of human physiology allowed him to identify what he believed to be the natural historical origin—and the manner of development of—moral agency, an approach that he used to stress the particular insights a naturalist might have into debates about national policy and human progress that had occupied French political commentators since at least the mid-eighteenth century.

**Degeneration and regeneration**

In order to properly contextualise Lamarck's work, it is necessary first to summarise some of the major debates occupying French naturalists and statesmen in the late eighteenth century. In particular, I want to focus here on the schema of degeneration and its inverse, regeneration—ideas that formed a conceptual framework for naturalists and reformers to discuss biological, moral, and political threats to France, as well as their hopes for progress. As this much suggests, degeneration and regeneration carried a variety of meanings, and were sometimes defined imprecisely or broadly; nevertheless, these broad conceptions of social and biological progress and regress shaped ideas about the significance of debates in natural history and the life sciences throughout Lamarck's career. Contextualising his work against the backdrop of eighteenth- and early nineteenth-century degeneration theory makes clear the political stakes of his theories of biological malleability and species transformation.

During the latter half of the eighteenth century, naturalists, political economists, and physicians perceived degeneration as a broad social problem, one that involved both medical and moral failures that threatened to weaken France. Physicians often claimed epistemological authority over these problems, but critical insights also came from naturalists' studies of stock breeding, inheritance, and climatic factors in biological change and development. Reformists conceived of degeneration as a developmental process worsening over time, and believed that countering it required the active construction of a regenerated, healthy nation. Efforts to secure political reform and national progress tied natural history to civic and economic history, and suggested that the medical and moral management of the French people were part of the same broader project of nation building. Indeed, degeneration's counterpart, 'regeneration,' had primarily been a religious term for baptism and resurrection during the early eighteenth century.[22] While it had been occasionally deployed in medicine during this period to describe the repair of injured or damaged body parts, it was not until mid-century when philosophes, including and especially those interested in natural history, widely secularised the term.

Thus, it was largely during the 1750s that French political literature began to circulate more widely the claim that France was a degenerated, corrupted nation.[23] Socially engaged physicians argued that this degeneration was both physical and moral—a function of unhealthy lifestyles, upper-class luxury and libertinism, and the abandonment of civic virtue. During this period, political commentators also understood degeneration as an economic and historical

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[22] Alyssa Goldstein Sepinwall, "Exporting the Revolution." In: Popkin, Jeremy D. & Richard H. Popkin (eds.), *The Abbé Grégoire and His World* (Dordrecht: Springer, 2000), 45.

[23] Sean Quinlan, *The Great Nation in Decline: Sex, Modernity, and Health Crises in Revolutionary France c. 1750–1850* (Hampshire & Burlington: Ashgate Publishing, 2007), 20; William Max Nelson, *The Time of Enlightenment: Constructing the Future in France, 1750 to Year One* (Toronto: University of Toronto Press, 2021), 25.

problem, resulting especially from what many perceived as an emphasis on commerce and luxury trades at the expense of French agriculture. Political economists argued that reinvigorating agriculture would not only strengthen the nation's moral fiber, but also provide a more stable foundation for national prosperity than the 'unreal' wealth of commerce.[24]

Indeed, as John Shovlin has demonstrated, agriculture was critical to the broader eighteenth-century debates about wealth, luxury, and national strength. Whereas finance and trade (which were often conflated until the 1770s) were considered to create "unreal" wealth and idleness, agriculture provided a more grounded economy and a balance between the pursuit of wealth and virtue.[25] While most political commentators accepted the belief that wealth was of the utmost importance for a state's power, the prevailing anti-luxury rhetoric made it difficult to explicitly defend the expansion of trade or finance; agriculture, on the other hand, suggested a way for France to pursue wealth, grow its population, and cultivate virtue at the same time. By the 1789 revolution, much of the anti-luxury and anti-commerce rhetoric had become attached to a critique of the aristocracy, which was connected to high finance both by marriage and by social class. But, as Shovlin pointed out, in the 1750s and 60s the link between agriculture and virtue did not yet broadly imply a problem with the aristocracy; if anything, it was the urban bourgeoisie who were more likely to be portrayed as a threat to national welfare, with many minor provincial nobles even deploying this language themselves against financiers and the royal court.[26]

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[24] Quinlan, *The Great Nation in Decline* (2007), 5

[25] Shovlin, John. *The Political Economy of Virtue: Luxury, Patriotism, and the Origins of the French Revolution* (Ithaca: Cornell University Press, 2006), 6.

[26] Ibid. 10

By the 1770s, medical crusaders had begun to claim expert knowledge of this national problem of degeneration. For example, between 1776 and 1778, the liberal statesman Anne-Robert Turgot (1727–1781) and the comparative anatomist Félix Vicq d'Azyr (1748–1794) formed the Société Royale de Médecine, tasked by the royal government with investigating all matters pertaining to public health in the hopes of regenerating French society.[27] The Société gave physicians the social legitimacy to radically expand their national health program, partly by rhetorically linking population decline, nervous disease, and moral and sexual hygiene to the physical degeneracy they warned was spreading throughout the population. In this formulation, degeneracy was no longer confined to the luxury classes, but was portrayed as a biological and moral threat spreading throughout the population and festering particularly among the urban poor.

This is not to say that all notions of degeneration as an affliction of the wealthy had been abandoned. By the 1770s and 1780s, those Shovlin called "middling elites"—primarily minor, provincial nobles—frequently connected their attacks on luxury and commerce to critiques of the aristocracy and feudal values, and these critics of Old Regime social and economic inequality introduced "a patriot discourse calling for the regeneration of the nation."[28] However, such patriotism rested on the idea that it was a return to pastoral agriculture, rather than an urban working environment, that would radically transform human beings by altering the physical environments they lived and worked in. Notions of degeneracy applied to the wealthy largely by construing the urban poor as a kind of biological worst-case outcome; whereas an aristocrat or

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[27] Quinlan, *The Great Nation in Decline* (2007), 53–4.

[28] Ibid. 8–9

bourgeois might risk being deemed degenerate in an effort to bring them back into line, urban poverty in itself already represented a social threat that the scientific establishment described in medico-biological terms under the schema of degeneration.

These discourses also had the effect of positioning naturalists as expert technicians in the project of national regeneration. Medical crusaders like Turgot, d'Azyr, and the Société shared some of the provincial nobles' anxieties about the conditions of the urban working classes, and such physicians and medical societies tended to emphasize constructions of degeneration as a disease, biological process, or hygienic lapse that could be ameliorated through expert medical intervention. Provincial nobles, on the other hand, had their own reasons to proffer the ideal of the rural agricultural estate as the solution to social unrest and individual degeneracy. Nevertheless, these discourses consistently converged in their shared conviction that it was the urban poor who were most degenerated, with a perpetual risk of worsening the condition and of inducing a general social fall into ill health.

Other medical crusaders, such as the alienist Philippe Pinel (1745–1826), did continue to associate degeneration with the idleness and sloth of the very wealthy, including both the urban bourgeoisie and, in more revolutionary formulations, the aristocracy. However, it is critical to bear in mind that these formulations still tended to present the poor as already degenerated, representing a state of degradation into which cossetted nobles might be at risk of falling. In the 1780s–90s, the belief that physicians could diagnose social ills in addition to treating individual patients spawned a particular genre of medical journalism, to which Pinel was a notable contributor and which presented the nation's rising political tensions as both a result of the poor moral character of the very wealthy, and as a cause of further physical and moral sickness in the

population. In these formulations, the Revolution itself often appeared as a curative event: for example, in 1789, then in his fifth year as editor of the weekly *Gazette du santé*, Pinel published a November issue that claimed that nervous maladies had all but disappeared in Paris since the beginning of the Revolution, "doubtless because the indolent and apathetic sloth of the rich gave way to reborn caring and to agitations capable of engaging the activity of the soul ... Politics has thus come to the rescue of medicine."[29] Pinel's claim was indicative of the close relationship he saw between political developments and bodily health, and the general tendency in this period for discourses of progress and regress to marry elements of political critique, medical diagnosis, and expert naturalist claims. Additionally, it suggested that nervous maladies had disappeared precisely because the urban population had become free to behave more salubriously in the new political episteme; thus, it did not represent a departure from the notion of the working poor as degenerated, but instead a convergence of political and medical prescription in order to reverse this condition of degradation. As we shall see below, Lamarck's concerns with the condition of the human species, inherited pathologies, and biological melioration by management of the environmental conditions were all quite continuous with the discourses of degeneration and regeneration summarised here.

**Climate and medicine**

The relationship between the natural world and human health was mediated by several different concerns. On a basic level, air and soil quality affected agricultural yields, which in turn factored into the French food supply and the state's ability to provide for its population's

[29] Quoted in Nina Rattner Gelbart, "The French Revolution as Medical Event: The Journalistic Gaze." *History of European Idea*s 10, no. 4 (1989), 419.

alimentary needs, a critical part of what historian E. P. Thompson termed the 'moral economy.' Alimentary chemistry became increasingly important to medical science over the latter half of the eighteenth century, part of an effort to ensure both France's physical and political health through scientific intervention in dietetics and food provisioning.[30] One major figure in this endeavour to claim greater prestige and epistemological authority for alimentary chemistry was Antoine-Augustin Parmentier (1737–1813), who is best remembered today for his chemical study of foodstuffs—particularly starch—and his push to promote potatoes as a staple food in an effort to save France from repeat subsistence crises and the difficulties both old and new regime faced in providing sufficient wheaten bread to the people.[31] Like Lamarck, Parmentier was a savant whose appeals to the medical utility of his work bolstered his career; that he considered Lamarck's own work relevant to agriculture, medicine, and economy indicates that Lamarck's contemporaries did view him as a contributor to medical science and debates over the national political future.

In addition, climatic and environmental factors were widely believed to have direct effects on human physiology and therefore health, which meant that knowledge of the weather and meteorological conditions was a medical matter as well as a concern for naturalists. For naturalists of Lamarck's intellectual milieu, this relationship between the natural world and human physiology was a matter of simple Newtonian physics: just as, for example, the moon controlled the tides, so must other celestial bodies exert an effect on human bodies, transmitted

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[30] See E. C. Spary, *Feeding France: New Sciences of Food, 1760–1815* (Cambridge, UK: Cambridge University Press, 2014), Ch. 2.

[31] Ibid. 86–8

through a fine, highly elastic ethereal medium that obeyed basic laws of mechanics.[32] Although climatic medical theories had ramifications for all humans, women and those experiencing insanity or alienation were considered particularly sensitive to the perturbations of the environment, elevating the importance of medical expertise over these populations. Lamarck himself claimed, in an unpublished lecture (dated between 1798 and 1806) on the phrenologist Franz-Joseph Gall, that suicide specifically could be "endemic or particular to certain climates … or to certain seasons or atmospheric states" in addition to being a hereditary mental malady; he went on to detail his own recommended treatments for sensitive women and men expressing suicidality.[33] Lamarck's efforts to stake out a naturalist's authority in the nascent field of *aliénisme* did not go entirely unnoticed: for example, the pioneering Savoyard psychiatrist Joseph D'Aquin (1732–1815) cited Lamarck's work as evidence that the moon played a role in insanity in the second edition of his *Philosophie de la folie*, and the physician J.-R. Jacquelin-

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[32] Lamarck's physico-mechanical explanation of the relationship between atmospheric conditions and physiology appeared throughout his commentary in his almanacs; he contributed a more succinct summary of the argument to the 6 October, 1803 issue of the *Journal du département de la Haute-Vienne* (Année II, no. 2, 13–15); see also Paul Rabinow, *French Modern: Norms and Forms of the Social Environment* (Chicago: University of Chicago Press, 1995), 133–5. Though Lamarck presented this explanation as a simple application of fashionable Newtonian mechanics to climatic medicine, the connection was contested, and many observers saw the idea of deriving medical judgments from the motion of the moon and stars as little more than astrology by a new name. The liberal philosopher and politician the comte de Volney (1757–1820) provided an account of this controversy in his *Tableau du climat et du sol des États-Unis d'Amérique* (1803), in which he presented Lamarck's position as an attempt to defend a rigorous materialism, though he reserved judgment on whether Lamarck was right or whether his meteorological predictions were accurate (270–1). Lamarck certainly also had defenders on this issue: for example, in 1800 the Belgian naturalist and republican politician Laurent-François Dethier's *Souvenirs patriotiques* included in a footnote both withering criticism of a famed eighteenth-century astrological household almanac, which he derided as a "vulgar oracle," and praise for Lamarck's meteorological almanac instead (3–4). See Chapter 2 for further discussion of some of the political and interpersonal factors at play in this debate.

[33] Printed in Wheeler Barbour (eds.), *The Lamarck manuscripts at Harvard* (1933), 33–7.

Dubuisson cited Lamarck in 1816 in an argument that the moon could affect periodic mania and other mental diseases, particularly in people who were especially sensitive, old, or weak.[34]

In light of such concerns, it should not be surprising that at least some medical journals took seriously the idea that Lamarck's yearly weather almanacs were publications of interest to their readers: for example, *Le Conservateur de la santé*, a journal of hygiene and prophylactic medicine, included a short extract from Lamarck's almanac of year X in its October 22, 1802 issue, in an article on the relationship between meteorology and human health. As Lamarck explained in the quote, his almanacs could rectify a lacuna in the practice of medicine, giving physicians access to reliable and systematic meteorological observations and predictions that were relevant to patients' health.[35] The journal included Lamarck's words within a longer section discussing the relationship between meteorology and medicine; the idea that naturalist knowledge like Lamarck's could have medical value was neither outlandish nor unique to Lamarck's own rhetoric.

Both natural history and medicine during Lamarck's lifetime had important ramifications for the physical and moral reform that savants believed France so badly needed. As medicine became more attuned to the social body and not just the individual one, many doctors turned to public health and hygiene, and linked their medical missions to wider proposals for social and political reform. Naturalists also laid claim to the management of the physical environment and the climate, and applying the insights of natural history to French agriculture was one of the

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[34] D'Aquin, Joseph. *La philosophie de la folie, où l'on prouve que cette maladie doit plutôt être traitée par les secours moraux que par les secours physiques ; et que ceux qui en sont atteints, éprouvent d'une manière non équivoque l'influence de la lune* (Chambéry: P. Cléa, 1804), 217; Jacquelin-Dubuisson, J.R. *Des vésanies, ou Maladies mentales* (Paris: Chez l'auteur, 1816), 192.

[35] "Des rapports de la Météorologie avec la santé des hommes." *Le Conservateur de la santé* 4.24 (30 Vendémiaire an. 11), 188

primary ways they did so. Lamarck was not only one of these naturalists, he was also deeply influenced by the push for social reform from within medical ranks, particularly the sensationalist-inflected proposals of Cabanis. Lamarck's transformism synthesised ideas about inheritance, the importance of the environment, and the intimate *rapports* between the physical and the moral to carve out the naturalist's place in the ongoing endeavour to reform and regenerate France.

**The role of the naturalist**

By the Revolution, regeneration had become an explicitly political concept, "referring to improvement, a freeing from corruption, or societal renewal."[36] It implied both moral and physical normative judgments, and while naturalists tended to emphasise the importance of managing people's environments and the natural world, social reformers considered factors like education, medical care, proper governance, and (in the colonies) the abolition of slavery to be crucial in the quest for regeneration.[37] The word 'regeneration' would fall out of favor with the Bourbons, but perceptions persisted of a need for social renewal or revival, and fears of degeneration became more widespread throughout the nineteenth century, alongside hereditarian medical theories.[38]

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[36] Sepinwall, "Exporting the Revolution" (2000), 45

[37] Ibid., 46; Quinlan, *The Great Nation in Decline* (2007), 109, 115–120

[38] Sepinwall, "Exporting the Revolution" (2000), 46; Robert A. Nye, *Crime, Madness, and Politics in Modern France* (New Jersey: Princeton University Press, 1984); Daniel Pick, *Faces of Degeneration: A European Disorder, c. 1848–1918* (Cambridge: Cambridge University Press, 1989); Quinlan, *The Great Nation in Decline* (2007).

Like physicians, naturalists learned how to deploy their work to appeal to those concerned about France's future. In 1790, as republican political sentiment threatened the existence of the Jardin du Roi, the officers of the Jardin, including Lamarck, signed[39] an address to the Assemblée Nationale regarding the future of the Jardin, arguing that it was a "monument … to the glory of the national sciences," and venerating the recently deceased Comte de Buffon (1707–1788), the longtime indendant, as having "prepared minds so well for the great ideas of liberty and regeneration."[40] (Translations of French-language sources are my own; works read in English translation are cited as such.) The naturalists' second address echoed the political economic debates even more clearly, describing the education of the public in natural science and agriculture as "the most solid foundation of national prosperity" and a means of "fertilizing [French] commerce."[41] Countering degeneration thus required intervening at all levels of society, and naturalists argued that they could put their scientific expertise to work in order to do so.

Although Lamarck's work was not primarily focused on agricultural reform, in this political and intellectual context, his investigations as a naturalist were already understood to have use for those who were explicitly writing about agriculture. For example, a 1781 treatise on practical agriculture, rural and domestic economy, and veterinary medicine by the abbé François Rozier (1734–1793), a colleague of alimentary chemist Antoine-Augustin Parmentier, had credited Lamarck along with 18 other naturalists on the cover as men whose "practical knowledge … in all branches of agriculture and rural and domestic economy" had contributed to

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[39] The project was not actually read until 1793.

[40] Ernest-Théodore Hamy, "Les derniers jours du Jardin du Roi." In: idem., *Centenaire de la fondation du Muséum d'Histoire naturelle, 10 juin 1793–10 juin 1893: Volume commémoratif publié par les professeurs du Muséum* (Paris: Imprimerie Nationale, 1893), 97.

[41] Ibid. 105–106

the text.[42] Though Lamarck was not named elsewhere in the text, his inclusion on the cover indicates both that his reputation and status as a Jardin naturalist lent authority and credence to his name, and that other learned men considered his work germane to studies of agriculture and agricultural reform. The Rozier text was not the first time Lamarck's name appeared in connection with agricultural reform: for example, a farmers' almanac presented for Year III (1794–5) to the Convention Nationale by Gilbert Romme (1750–95), the politician who had designed the revolutionary calendar, similarly credited Lamarck on the cover along with a handful of other illustrious savants.[43] This particular almanac was presented with lofty promises about the utility of natural science, particularly agriculture, to the Republic: for example, its announcement in the *Journal des hommes libres*, a long-running Jacobin newspaper, described it as being "for use by the republic's schools; by G. Romme, representative of the people."[44] Certainly this was a rhetorical claim meant to promote sales of the almanac as well as to curry favor with the then-ruling Jacobins; nevertheless, it is significant that Lamarck's name was connected with such rhetoric. Though he did not participate directly in politics, his work as a naturalist was inherently political as well as politicised, and was located as part of the larger, ongoing effort to reform and regenerate France.

Lamarck himself also saw such political linkage used to his advantage on the covers of his meteorological almanacs (1799–1810), which claimed to be useful to "doctors, farmers, and

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[42] François Rozier, *Cours complet d'agriculture pratique, d'économie rurale et domestique, et de médecine vétérinaire* (Paris: F Buisson, 1781 [1809]).

[43] Gilbert Romme, *Annuaire du cultivateur, pour la troisième année de la République, présenté le 30 Pluviôse de l'An II.e à la Convention Nationale* (Auxerre: L. Fournier, An III.e).

[44] "Annonce." *Journal des hommes libres de tous les pays, ou le Républicain*. 13 février 1795, 602. Rue de l'Université, no. 146. On the *Journal*, see Max Fajn, "Le « Journal des hommes libres de tous les pays » (2 novembre 1792–14 septembre 1800)." *Annales historiques de la Révolution française* 47.220 (1975), 273–288.

sailors;" again, though he did not overtly align his own work with a particular political party or platform, he was working in a social and political context in which a study of the natural world that had utility for farmers had inherent political valences as well. Interestingly, one review of his Year X (1801–2) almanac did pick out a tacit politics from the work, pointing out that the almanac "cannot be addressed to ordinary farmers; to understand it, and to make use of it, knowledge is needed which they lack; but it is specially intended for that class of enlightened men" who lived in the countryside or took an interest in agricultural management from afar.[45] This reviewer thus saw in Lamarck's almanac a guide for educated, literate, and wealthy property owners to make agricultural and meterological observations, which could in turn become useful to France and French agriculture specifically; the almanacs certainly could have been useful in a larger movement for agricultural reform, but Lamarck wrote and arranged them with the assumption that the knowledge contained would be capitalised on within a system that divided labour between the humble, rural farmer and the educated landowner. That these almanacs had an implied political content did not mean it was a revolutionary one; reforming agriculture and regenerating France were not inherently radical proposals.

The politicisation of agriculture as a means of enriching national wealth was a powerful driving force that encouraged natural historical work to address degeneration in the 1790s: in particular, naturalists frequently made use of the terms 'degeneration' and 'regeneration' in connection with theories of heredity and acclimatisation. As part of the attempt to manage environmental and climatic factors, savants in the eighteenth and nineteenth centuries appealed to "applied" forms of natural history, including—but not exclusively in—efforts to reform

[45] C. Tessier, "Extraits d'ouvrages: Annuaire météorologique pour l'An X." In: *Annales de l'Agriculture françoise*, rédigées par C. Tessier. Tome IX. Paris: Librairie de Madame Huzard (An X), 408–9.

French agriculture.[46] Agriculture's profound moral and social significance meant that many zoologists and botanists were interested in how profitable and morally beneficial manipulations of the natural world could be guided by their specialist knowledge of plant and animal breeding and of the management of factors like weather, climate, temperature, soil nutrients, and so forth. Rousseauvian writers in particular argued that France needed "massive moral reform" and suggested that it could come about via a knowledge of natural history applied to agriculture.[47] One such application was the acclimatization of foreign species to the French environment, a project that was of particular interest to botanists at the Jardin/Muséum. Working alongside Buffon, André Thouin (1747–1824), the longtime head gardener, established extensive correspondence networks beginning in the early 1770s that enabled the importation of exotic plants whose favorable characteristics might enrich French natural wealth.[48]

Lamarck's relationship to Thouin was a close one for many decades: in addition to their professional relationship through the Jardin, Thouin served as godfather to his namesake, Lamarck's son André (1781–1817), and was later one of the four naturalists who witnessed Lamarck's will in 1822 ("Testament de Jean-Baptiste-Pierre-Antoine de Lamarck").[49] Lamarck and Thouin also shared intellectual interests relating to their botanical investigations: for

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[46] See e.g. Emma Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago: University of Chicago Press, 2000), 123–127; Michael A. Osborne, "Acclimatizing the World: A History of the Paradigmatic Colonial Science." *Osiris* 15 (2000), 135–136; Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago: University of Chicago Press, 2002); Meghan K. Roberts, *Sentimental Savants: Philosophical Families in Enlightenment France* (Chicago: University of Chicago Press, 2016), Ch. 5.

[47] Spary, *Utopia's Garden* (2000), 125

[48] Ibid. 123

[49] The other witnesses were the botanist René Desfontaines (1750–1833), Geoffroy, and the entomologist Pierre André Latreille (1762–1833).

example, both had longstanding interests in the effects of air and soil quality on the moral and physical condition of society. Just before the Revolution, Thouin presented several papers on the topic at the Société Royale d'Agriculture in Paris; in one, Jean-Augustin-Victor Yvart (1763–1831), *fermier* to the archbishop of Paris and a correspondent of the Société, argued that planting trees would improve overall health by purifying both the air and the soil, and another paper linked the immorality of France's *seigneurs* with their habit of residing in Paris rather than on their lands.[50] Several decades later, writing to Thomas Jefferson (1743–1826), Thouin inquired about "the moral and physical effects produced by the donation of objects of rural economy and agricultural instruction that you made to the Savage peoples" encountered on voyages Jefferson had ordered to the South Sea.[51] Together, such papers and correspondence indicate the degree to which Thouin, like his contemporaries, saw agricultural reform and management of the climatic conditions as contributing to human health and biological betterment.

Similar concerns motivated Lamarck's meteorological almanacs, which bore covers claiming to be for use by farmers in addition to doctors and mariners.[52] The connection to agriculture was clear enough: if farmers knew what weather conditions to expect, they could use that knowledge to maximize the productivity of their land. As one commentator wrote in 1814, quoting a didactic poem first published in 1774 to explain the agronomic significance of Lamarck and several other meteorologists, "The sky becomes a book where the astonished

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[50] Spary, *Utopia's Garden* (2000), 141

[51] "Letter to Thomas Jefferson from André Thouin." 16 June 1808. Paris. *Founders Online*, National Archives, Papers of Thomas Jefferson. https://founders.archives.gov/?q=Project%3A%22Jefferson%20Papers%22thouin&s=1511311111&r=69. Accessed August 2021.

[52] See e.g. Lamarck, *Annuaire météorologique de l'an XI* (1803), cover

earth / Reads in fiery letters the story of the year."[53] Lamarck's zoological interests, too, drew on his understanding of the relationship between an organism and its environment—an understanding clearly informed by studies of plant cultivation and acclimatisation. For example, a 1796 letter from the Muséum d'Histoire Naturelle to an American naturalist, signed by Lamarck in his capacity as director of the Muséum, noted that "It would be interesting to know what degeneration [the] transplantation [of French animals to America] has produced on their economy."[54] In this passage, Lamarck did not necessarily mean to invoke the specter of degeneracy with a negative value judgment: it is likely that, following Buffon, he was using the word "degeneration" in a technical sense to refer to any variation from organic type. Still, the underlying concern motivating his question was his interest in the effect that a change of location or environment might have on an organism's physiology—an idea that had important ramifications for all manner of social and political prognosticating, and made the naturalist's specialist knowledge valuable to those who sought to guide the nation's future.

Thus, even though Lamarck's 1793 appointment as professor of invertebrate zoology at the Muséum formally shifted his professional concerns away from botany and into zoology, it is clear that his botanical interests and training continued to shape his interest in heredity, the relationship between organisms and their environments, and ultimately his theory of species transformation. Concerns about the effects of environmental and climatic factors on both an organism's and a society's health led to calls for agricultural reform and climatic management as

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[53] Pierre Fulcrand de Rosset, "L'Agriculture," quoted in: Claude Roucher-Deratte, *La restauration des jeux ruraux, scène pastorale en trois églogues* (Montpellier: L'Imprimerie de Jean-Germain Tournel, 1814), 32.

[54] Reproduced in Bashford Dean, "A Reference to the Origin of Species in an Early Letter Signed by Both Lamarck and Geoffroy," in *Science* 19.490 (1904), 799.

means to both physical and moral health and reform. Lamarck's transformist theory incorporated many of these ideas: he recognized that biological change and transformation could take hold on a species or social level, not just within an individual organism. His belief in the role of the will and self-direction in species evolution was part of this broader attunement toward questions of social betterment and transformation, and the botanical and agricultural interests he shared with Thouin were no less shaped by such concerns.

**Botany and acclimatisation**

Both Thouin's career, and Lamarck's ongoing interest in botany, should be contextualised in light of a larger shift in the cultural and scientific significance of botany and botanising. In the seventeenth century, botany had been largely subsumed under the study of medicine, with botanical gardens providing materia medica; in the eighteenth century, writings on rural economy began to discuss plants as natural resources that formed part of the foundation of the political economy.[55] The classification and cultivation of non-indigenous plants was increasingly portrayed as an endeavor that could contribute to national wealth; plants and plant-derived substances like coffee or chocolate were valuable simultaneously as prized consumer luxuries and as potential sources of profit for the state.[56] However, growing such plants in France required specialist botanical knowledge, along with correspondance and trade networks to obtain specimens, seeds, and advice. Thus, botanists like Thouin became important participants in a

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[55] E. C. Spary, "'Peaches Which the Patriarchs Lacked': Natural History, Natural Resources, and the Natural Economy in France." *History of Political Economy* Annual Supplement to Volume 35 (2003), 15

[56] On Thouin, commercial botany, and botanical gardens, see Sarah Easterby-Smith, *Cultivating Commerce: Cultures of Botany in Britain and France, 1760–1815* (Cambridge, UK: Cambridge University Press, 2018). See especially Ch. 1.

broader set of economic debates in which exotic plants were not just curiosities, but potentially valuable natural resources for the nation. Settling non-indigenous plants in French botanical gardens required a naturalist's expertise, and both this knowledge and the plants themselves took on new importance for those who wanted to economically and morally revitalise France.

Furthermore, botanical gardens served as sites at which naturalists could observe and demonstrate the effects of culture on nature, a function Lamarck noted in the *Encyclopédie méthodique* (1783).[57] The acclimatization of plants in botanical gardens, including at the Jardin under Thouin's supervision, held a polyvalent moral significance: many naturalists hoped to revitalise agriculture and to introduce potentially profitable species into France, but botanical observations could also yield valuable knowledge about the effects of culture on living organisms in general.[58] Indeed, by the late 1780s, the word "acclimate" was associated not only with the cultivation of exotic plants and animals, but also with debates over the proper method of colonial settlement of humans.[59] In other words, the importation of plants served multiple purposes. Discourses on acclimatisation were simultaneously wielded as discourses of colonisation: if an exotic plant could adapt to Paris, then, the logic went, so should a pale European be able to settle in a tropical colony—a critical linkage for France, which was having trouble maintaining a settled European population in many of its colonial holdings. Naturalist knowledge about how to accustom an organism to different climates therefore had profound significance throughout the late eighteenth and nineteenth centuries for those who wanted to strengthen France's empire and to effectively extract natural resources and labour-power from its

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[57] Lamarck, "Jardin de botanique." In: *Encyclopédie méthodique* T. 3 (1783), 211–215.

[58] Spary, *Utopia's Garden* (2000), 118–120

[59] Osborne, "Acclimatizing the World" (2000), 137

colonial holdings. Those who sought to connect the idea of acclimatisation to colonial settlement appealed to both neo-Hippocratic medical doctrines and, later, to Lamarck's writings on the relationship between an organism, its needs and habits, and its environment.[60] Botany in the eighteenth and nineteenth centuries was not just economically valuable in the metropole, but also as a tool of colonial expansion, and as a means of most effectively capitalising on the resources extracted from colonial territories and foreign correspondants.

In their 2011 book *The Colonial Machine: French Science and Overseas Expansion in the Old Regime*, James McClellan and François Regourd discussed such a dialectic of scientific and political power in Old Regime France—what they called the "colonial machine." This was a state use of scientific and expert knowledge in order to provide glory to the King and the court, and to provide economic benefits for the state in support of mercantilist policies and the economy generally.[61] The colonial machine included non-expert powers on one side—mainly governmental, commercial, and religious authorities. On the other side was a set of (largely royal) scientific, medical, and technical institutions and experts. In addition, trading companies and Catholic missions and missionaries played important roles in the colonial machine. By the eve of the Revolution, the French state possessed a massive bureaucracy devoted to overseas expansion and colonial development—a bureaucracy both dependent on, and fruitful for, working naturalists.[62]

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[60] Ibid.

[61] James McClellan III and François Regourd, *The Colonial Machine: French Science and Overseas Expansion in the Old Regime* (Brepols: 2011), 24.

[62] Ibid. 43

One major hub in the colonial machine was the Jardin du Roi, which by the late eighteenth century had become a premier world center for botanical research. Botanical gardens served multiple purposes in the colonial machine: some, like the Jardin, were 'scientific,' serving as places to train botanists, chemists, and even anatomists and physicians. Others were 'industrial,' used for acclimatising exotic plants and propagating more of them. Additionally, and sometimes simultaneously, the French state was interested in prospecting many of the botanicals and remedies native to its colonial territories. Londa Schiebinger thus characterised botanists in the long eighteenth century as "agents of empire," insofar as they collected and catalogued precious plants in new territories, worked to find domestic or colonial substitutes for luxury imports, and had technical expertise in transporting and acclimatising valuable plants in European territories globally.[63] As McClellan and Regourd pointed out, medicinal uses of botanical agents were very much in line with this imperialist outlook, as medical knowledge was put to use curing various ailments of European settlers and trying to ensure a healthy white population in French colonies.[64]

Although Lamarck himself did not conduct much travel (save for escorting Buffon's son on a scientific tour of Europe in the early 1780s), he was certainly aware of the potential for botanical knowledge to be enhanced by contact with foreign correspondants as well as expeditions abroad: in addition to working in close proximity to Thouin (and therefore also Thouin's global correspondance network) at the Jardin/Muséum, he also made at least a few minor contributions to travelogues himself in his capacity as a botanist. For example, he was

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[63] Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge, M.A.: Harvard University Press, 2004), 11.

[64] McClellan and Regourd, *The Colonial Machine* (2011), 287

credited as providing notes on natural history for the German naturalist Peter Simon Pallas (1741–1811)'s 1794 travels in Russia and northern Asia; Lamarck also provided a preface on botany for the eighth volume of this travelogue, in which he noted that he "regret[ted] only that Pallas did not have at the start of his journey a bit more experience with botany" as he would likely have returned with more useful botanical observations if he had.[65] Lamarck received similar acknowledgments as a naturalist on the covers of the Swedish naturalist Carl Peter Thunberg (1743–1828)'s *Voyages de C. P. Thunberg au Japon, par le Cap de Bonne-Espérance, les isles de la Sonde, &c* (1796) and the French orientalist and astronomer Jean Jacques Emmanuel Sédillot's *Notice des recherches asiatiques* (1807). Furthermore, the minutes of an 1816 session of the Académie royale des Sciences note that the Minister of the Interior had invited the Académie to draw up instructions for a marine officer Freycinet who was soon to leave on a "voyage of discovery" in the southern hemisphere; Lamarck was one of seven naturalists the Académie nominated for this task.[66] Thus, as both a naturalist and a botanist, Lamarck put his expert knowledge to state use, and was called upon to do so; his interest in plant classification and cultivation, and later in the relationship between organisms, their environments, and organic change and development must be understood in this context. Framing his career in this light clarifies what was at stake as he developed his ideas of species transformation in the first decade of the nineteenth century.

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[65] Lamarck, "Preface." In Peter Simon Pallas, *Voyages du professeur Pallas, dans plusieurs provinces de l'empire de Russie et dans l'Asie septentrionale*, Vol. 8 (Paris: Chez Maradan, 1794), ii.

[66] Printed in Joseph Louis Gay-Lussac and François Arago (eds.), *Annales de chimie et de physique*, Vol. 3 (Paris: Chez Crochard, 1816), 200–201.

**Meliorating man**

Ideas about degeneration and regeneration were particularly germane to conversations about human origins and the possibility of species transmutation. The idea that organisms' forms could change over time was not new, especially given the wealth of information gathered from plant and animal breeders who were interested in inducing such changes on purpose. But, where humans were concerned, such ideas raised a host of moral and social anxieties, particularly in response to naturalists who noted the anatomical similarities between humans and apes, which suggested that apes might be 'degenerated' humans or the product of interbreeding between humans and simians.[67] One of the most influential figures in this tradition was Lamarck's mentor the Comte de Buffon (1707–1788), who was the intendant at the Jardin du Roi from 1739 until his death, and who believed that degeneration or alteration from type could occur as a direct result of changes in the climatic and environmental factors that an organism was exposed to. Buffon himself believed there was an unbridgeable ontological distinction between humans and non-human primates, but he wrote extensively about degeneration within the human species as a function of the climate, airs, and other environmental factors—a fundamental commitment to an idea of biological malleability that ultimately also underlay Lamarck's more radical arguments for true species transmutation. Buffon's natural history of humanity assumed that white Europeans living in temperate climates[68] were the phenotypic and aesthetic norm, with climate,

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[67] John H. Zammito, *The Gestation of German Biology: Philosophy and Physiology from Stahl to Schelling* (Chicago: University of Chicago Press, 2018), 193.

[68] Buffon believed that extremes of both hot and cold were harmful, and that the highest forms of civilization and culture came from temperate zones. Climatic conditions thus affected all aspects of the human organization, from skin color (he believed that heat caused it to darken, though this was not necessarily a simple linear relationship, as the example of native American populations showed) to the intellectual faculties.

diet, and social mores eventually resulting in degeneration into other "races," all of which thus shared a common developmental origin and shaded into one another by degrees, yet could acquire significant phenotypic diversity and differentiation.[69]

As William Max Nelson has argued, the significance of Buffon's work was not just in continuing to direct attention toward the climate-focused Hippocratic medical tradition: "Buffon radicalized the understanding of human malleability by pushing beyond basic climate theory and showing that human intervention through selective breeding could accelerate, retard, or even reverse the influence of climate."[70] For example, in the article "De la dégénération des animaux" in his *Histoire naturelle*, Buffon argued that despite phenotypic differences in skin, hair, size, and facial features between humans living in different climates, the "interior form" had not changed, and a person who returned to their "native country" would in time resume their "original features," "initial size," and "natural color" after generations of exposure to the climate. However, he added, "the mixing [*mélange*] of races would also bring this about, and much more quickly."[71] He went on to propose that, in order to study the effect of the climate on human skin color, it would be necessary to conduct an experiment such as transporting several black Senegalese to Denmark, then comparing the effect of climate alone to the changes in skin color that might be obtained by racial intermixing; he predicted that the latter method could "wash out [*laver*]" dark skin within three generations, whereas climatic influence alone might take

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[69] See David Allen Harvey, *The French Enlightenment and Its Others: The Mandarin, the Savage, and the Invention of the Human Sciences* (New York: Palgrave Macmillan, 2012), 138–146.

[70] William Max Nelson, "Making Men: Enlightenment Ideas of Racial Engineering." *The American Historical Review* 15.5 (Dec. 2010), 1371.

[71] Buffon, "De la dégénération des animaux." *Œuvres complète de Buffon avec la nomenclature Linnéene et la classification de Cuvier*, T. IV (Paris: Garnier Frères, 1853 [1749–1789]), 111.

centuries to produce the same effect.[72] After his remarks on human races and phenotypes, Buffon returned to discussing non-human animals, particularly experiments on sheep breeding. This passage thus indicates the extent to which discussions about human biological malleability borrowed from studies of animal breeding and natural history, as well as how the schema of degeneration blended elements of racial and anthropological investigations of human populations, ideas about biological malleability, and even the transformist theories that Lamarck eventually espoused. As Nelson has argued, eighteenth-century natural history was characterized not just by a growing belief in the changeability of the natural world, but by the idea that such change could be directed by human rational intervention.[73]

As Sean Quinlan has pointed out, such Enlightenment confidence in man's ability to direct the natural world, conjoined with biomedical discourses on the role of heredity in human health, gave rise in the early years of the Napoleonic Consulate to a number of self-help manuals that promised to teach readers how to ensure "gifted, healthy, and beautiful children," particularly boys.[74] These texts often traded on salacious discussions of sexual techniques and 'monstrosities,' but also offered utopic visions of a nation transformed socially, politically, and biologically through cultivation of its citizens' bodies; one such grandiose proposal was Dr. Louis Robert's *Essai sur la méganthropogénésie* (1801), which suggested systematically breeding France's brightest, most beautiful young people, creating a nation of *grands-hommes* who would be classically beautiful, enjoy good health, and receive a rigorous education before

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[72] Ibid.

[73] See Nelson, *The Time of Enlightenment* (2021). See esp. Ch. 4.

[74] Sean Quinlan, "Heredity, reproduction, and perfectibility in revolutionary and Napoleonic France, 1789–1815." *Endeavour* 34.4 (2010), 147.

eventually wedding one another.[75] Though Robert's proposal, like other such utopian projects, engaged superficially (at best) with medically accepted theories, his engagement with ideas of melioration on hereditarian terms was part of the appeal for the reading public; this is indicative of the extent to which ideas about inheritance and biological malleability were already assimilated into larger social and political conversations by the time Lamarck started publishing on species transformism in 1802. Indeed, the *Essai* mentioned Lamarck himself by name once, in a footnote about the relative contributions of males and females in reproduction and heredity.[76]

This note alone suggests at most a superficial engagement with Lamarck's ideas, and the *Essai* was generally derided by reviewers; Robert's writing seems to have served his own professional and pecuniary interests more than, or instead of, making a scientifically reputable contribution to contemporaneous medicine or natural history. However, it is still significant for scholars of Lamarck and his transformist theories that the French reading public was, by the early nineteenth century, accustomed to contextualizing theories of inheritance and biological malleability in light of such overtly politicized ideas of human melioration. By the publication of *Philosophie zoologique* in 1809, the idea that humans could play some conscious role in directing their own (or another species') biological development would not have appeared unprecedented or outlandish, either to naturalists familiar with Buffonian ideas, or to a reading public who had been exposed to promises about what selective breeding and hereditarian science could offer the French nation.

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[75] On Robert and his *Essai*, see Ibid., 147-149

[76] Louis-Joseph-Marie Robert, *Essai sur la mégalanthropogénésie, ou l'art de faire des enfants d'esprit, qui deviennent des grands hommes* (Paris: Debray, 1801), 21.

**Intelligence, civilisation, and society**

Ideas about biological degeneration (or regression) and regeneration (or progress) often bore contested relationships with constructions of the 'natural' and the 'artificial,' or nature and culture. Buffon had tended to counterpose human intervention with the natural: for example, he referred to the domestication of other species alternately as a form of degeneration, or, sometimes contradicting himself, as a way of embellishing or perfecting the natural world.[77] While he studied the human species as a historicised object of natural inquiry, he also took care to distinguish between humans and non-human animals, emphasizing that even humanoid apes were "no mediating link between the humans and the animal orders of nature," despite any observed anatomical resemblances.[78]

On the contrary, the philosopher and political theorist Jean-Jacques Rousseau (1712–1778)'s influential "Discourse on Inequality," a submission to a 1754 prize competition held by the Academy of Dijon, had suggested that human history had begun with 'natural man' and progressed toward Europeans. Simultaneously, though, Rousseau was sympathetic to Buffon's claim that domestication represented human meddling in nature, and the "Discourse" rested on the assumption that the most 'natural' condition of humanity was also a normative moral standard.[79] Rousseau took issue with the presumption that European society was the closest thing to humanity's natural state, but not with the related belief that nature and 'natural man' had important lessons for those who hoped to reform and regenerate civilized France.

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[77] Spary, *Utopia's Garden* (2000), 109

[78] Quoted in Zammito, *The Gestation of German Biology* (2018), 194

[79] Francis Moran III, "Between Primates and Primitives: Natural man as the missing link in Rousseau's Second Discourse." *Journal of the History of Ideas* 54.1 (1993), 57.

At stake here were questions about the best social, political, and biological conditions for the human species, and how to preserve the health of both the social and individual body. Was European civil society a crowning achievement for humanity, or was it making people sicker and weaker? Was 'natural' man a noble being who could thrive in an enlightened city like Paris, or a primitive beast whose basest instincts needed to be curbed and controlled by prudent governance? Furthermore, the growing interest in intelligence as a biological and heritable trait with a natural and developmental history raised the possibility that social inequalities could arise and calcify if some people had biological advantages over others—not just in terms of physical strength, but also via the development and cultivation of the mental faculties.

Lamarck drew from both Buffon and Rousseau in his discussions of human intelligence and social inequality.[80] Like Buffon, Lamarck saw organic beings and the natural world as malleable and subject to continuous change, and he shared Buffon's belief in the possibility of biological renewal and regeneration. But his natural history of humanity also incorporated the Rousseauvian view that humans could be conceived as 'perfected' apes, rather than apes as

[80] See Jacques Roger, "Lamarck et Jean-Jacques Rousseau." *Gesnerus* 42 (1985), 369–381; Burkhardt, *The Spirit of System* (1977), 145

degenerated humans,[81] and Lamarck also built on Rousseau's argument that social inequality was a result of civilisation rather than being an inescapable part of humanity's natural existence. According to Rousseau, social inequality arose along with the ability to reason, which he believed had developed in tandem with civil society. Thus, he had written (somewhat vaguely) of the "progress through the successive developments of the human mind" as a "conjectural" history of inequality.[82]

Lamarck's account of civilisation and social inequality departed from a similar starting point, though his writing had a more overtly biological emphasis than Buffon's or Rousseau's, pointing to the effects of the ever-increasing divergence in one person's daily needs and habits from those of the next as a material factor in differential development and strengthening of the intellectual faculties.[83] Lamarck's fluid-dynamic model of physiological change meant that he considered intelligence to be the result of both the natural history of the human species, and the

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[81] In his *Zoological Philosophy*, Lamarck provided a "hypothetical" account of how the orang-outang might have acquired the habits and physical traits characteristic of humans, suggesting more sympathy with Rousseau's 'progressive' natural history of humanity than with Buffon's story of degeneration (Paris: Dentu, 1809b, 169–173). It was not necessary, however, to concur with Rousseau's trajectory of human history in order to accept his (and therefore also Lamarck's) belief that 'primitive peoples' enjoyed more natural and harmonious social arrangements than civilized Europeans (see Moran, "Between Primates and Primitives," 1993, 57). But as Zammito (*The Gestation of German Biology*, 2018) pointed out, Buffon's natural history of humanity underlay his argument that it was the rational human soul, not anatomy or physiology, that distinguished humans from apes. Rousseau was less certain that there really *was* a distinction between humans and apes, suggesting that the only way to be sure would be to conduct impractical and distasteful interbreeding experiments (Ibid., 194–195). As I have discussed above, Lamarck remained circumspect on the topic of a human soul or vital principle, but his sympathy with Rousseau's progressive natural history suggests at the very least that he was willing to consider a materialist and even atheist perspective (see also Corsi, *The Age of Lamarck*, 1988, and idem., "Biologie." In: idem. et al (eds.), Lamarck, *philosophe de la nature*. Paris: Presses Universitaires de France, 2006, 37–64).

[82] Jean-Jacques Rousseau, "Discourse on the Origin and Foundations of Inequality Among Men." In: Gourevitch, Victor (ed.), *Rousseau: The* Discourses *and Other Early Political Writings* (Cambridge: Cambridge University Press, 1755 [1997]), 159–160.

[83] Lamarck, *Système analytique des connaissances positives de l'homme* (Paris: J.-B. Baillière, 1820), 280–285; 332–333

circumstances of an individual's life.[84] Furthermore, he argued that while intelligence in itself was not harmful, in civil society people's intellectual faculties developed unequally compared to one another, and this caused great harm to the majority of the population, who became vulnerable to domination and abuse as a result.[85] Lamarck thus shared with Rousseau the conviction that social inequality was not only undesirable, but immoral, and his transformist history of human development was his explanation of how it had arisen.

Thus, Lamarck's investigations into the natural history of man were also responses to an ongoing discussion on the progress or decline of human civilisation. Additionally, at least some of his contemporaries were aware of this context, and of the implications of transformist theory for the metaphysical human soul and any distinctions between, or hierarchy of, humans and animals. For example, writing in 1811 (the remarks were reproduced verbatim in later works), the phrenologist Franz Joseph Gall (1758–1828) and his collaborator Johann Spurzheim argued that

> the opinion of M. Lamarck [that organisms' forms changed as a result of their environments imposing different needs and habits upon them] could only ever be adopted by those sects of philosophers who suppose that the soul steers the formation of the body and engulfs it, and those who hold that species could improve or degenerate ceaselessly, in such a manner that man could fall to the rank of monkeys, or the orangutang could rise to the rank of man.[86]

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[84] Lamarck was not the first or only savant to conceptualise the body in such a way; it was relatively common by the late eighteenth century to imagine physiological functions and changes as the outcomes of complex motions of various vital fluids. See e.g. Christopher Upham Murray Smith, *The Problem of Life* (New York, N.Y.: John Wiley & Sons, 1976).

[85] Lamarck, "Nature." In: *Nouveau dictionnaire d'histoire naturelle*, Vol. 22 (Paris: Déterville, 1818b), 396; idem., *Histoire naturelle des animaux sans vertèbres* (Paris: Déterville, 1815–1822), 301.

[86] Franz Joseph Gall & Johann Spurzheim, *Des Dispositions innées de l'âme et de l'ésprit, du matérialisme, du fatalisme et de la liberté morale, avec des réflexions sur l'éducation et sur la législation criminelle* (Paris: Chez F. Schoell, 1811), 104.

Although the idea of organisms possessing some degree of biological malleability was hardly new, Lamarck's defense of the idea that a species could be created or destroyed—or indeed transmutate from one into another—scanned as more than just an argument for naturalists. It was a position with profound consequences for anyone who sought to understand humanity's place in the natural and metaphysical order.

Lamarck's transformist theory was therefore bound up in his views about existing social ills, which in turn were informed by the contemporary concerns among naturalists and philosophes about degeneration and regeneration. In this context, as Emma Spary has pointed out, many French naturalists considered themselves to be working toward the twin goals of social and moral reform, but historians seeking the origins of modern biology have sometimes focused on the resemblance to later evolutionary and genetic theories rather than on the contemporaneous connections between natural and social transformation, regeneration, and degeneration.[87] Hopes and fears about the future of French society drove not only revolutionary political change, but also interest in public health and hygiene, physiology, and heredity. Naturalists and savants in each of these arenas proposed various solutions to the moral and physical degeneration they saw in France, and Lamarck was no exception.

### *Idéologie* and perfectibility

For the philosopher and mathematician the Marquis de Condorcet (1743–1794), human rationality implied not only the ability to counteract the process of degeneration, but also the

[87] Spary, *Utopia's Garden* (2000), 149–150

possibility of individual perfectibility.[88] Condorcet was the protégé of the physiocrat and finance minister Turgot (of the Société Royale de Médecine; see above), and he shared Turgot's interest in the management and improvement of individual human bodies by medical means. Inspired by naturalists at the Jardin whose studies of hybridisation and acclimatisation suggested that humans could alter organisms on an individual level,[89] as well as by Jean-Marie Daubenton's experiments on sheep breeding, Condorcet proposed improving the human species through the joint intervention of legislators and physicians. Human biological improvement would depend on sanitary reform and proper governance—the domain of the legislators—as well as medical interventions that Condorcet imagined would soon cure or prevent both infectious diseases and inherited disorders.[90] Condorcet believed that systemic physical meliorations would be passed along the next generation of children, preserving any moral and intellectual improvements made to the human species; additionally, giving those children a proper education would perfect such moral and intellectual qualities and, in the process, would modify and perfect the organization even further.[91] This sketch of humanity did not just represent a passive biological change, but a species "freed from all its chains, taken from the influence [*empire*] of chance, as well as from that of the enemies of its progress, and walking with a firm and sure step on the road to truth, virtue, and happiness."[92] Thus, improving the human species was an active process of altering

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[88] Ibid. 127

[89] Botanical gardens served as sites at which naturalists could observe and demonstrate the effects of culture on nature, a function Lamarck noted in the *Encyclopédie méthodique* (1783, 211–215).

[90] On this program, see Quinlan, "Heredity, reproduction, and perfectibility" (2010), 144.

[91] Nicolas de Condorcet, *Esquisse d'un tableau historique des progrès de l'ésprit humaine. Ouvrage posthume de Condorcet* (Gènes: Yves Gravier Libraire, 1798), 358.

[92] Ibid.

the organisation, making individual biological melioration the foundation upon which social progress rested.

Similar ideas were developed further by Condorcet's friend, the philosopher and medical reformer Cabanis, whom Lamarck cited extensively in his own work.[93] Cabanis, too, was interested in studies of stock breeding, and inheritance also played an important role in his thought on human society.[94] Indeed, the idea that human reproduction might benefit from rational and scientific management by naturalists and medical authorities was not a new one. For instance, Buffon had practiced "marriage broking" of the peasants at his estate in Montbard, hypothesizing that such 'cross-breeding,' even within a single canton, could reverse the degenerative effects of nature.[95] Furthermore, marriage itself had become increasingly medicalised throughout the latter half of the eighteenth century, and Cabanis and Condorcet were far from alone in their belief that various forms of selective 'breeding' could be promising for the regeneration of the French population.[96]

Thus, hereditarian theories did not always rhetorically center the threat of degeneration. For example, the early-Napoleonic self-help treatises that Sean Quinlan has discussed relied on both the appeal of reading about biological 'monstrosities' and deformities, and the promise that

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[93] On the influence of Cabanis on Lamarck, see also Robert J. Richards, "The Influence of Sensationalist Tradition on Early Theories of the Evolution of Human Behavior." *Journal of the History of Ideas* 40.1 (1979), 85–105; idem., "The Emergence of Evolutionary Biology of Behaviour in the Early Nineteenth Century." *The British Journal for the History of Science* 15.3 (1982), pp. 241–280; and Baertschi, "Diderot, Cabanis and Lamarck" (2005), 451–463.

[94] Richards, "The Emergence of Evolutionary Biology" (1982), 249

[95] Spary, *Utopia's Garden* (2000), 130

[96] See e.g. Michael Winston, "Medicine, Marriage, and Human Degeneration in the French Enlightenment." *Eighteenth-Century Studies* 38.2 (2005), 263–281; William Max Nelson, "Colonizing France: Revolutionary Regeneration and the First French Empire." In: Desan, Suzanne, Lynn Hunt, & William Max Nelson (eds.), *The French Revolution in Global Perspective* (Ithaca, N.Y.: Cornell University Press, 2013), 81.

they could teach prospective parents how to ensure their future children's biological well-being and social success. Even during the Terror, Condorcet had written of his hopes for the human race to reach perfection via proper scientific and medical management of the physical environment.[97] Like Buffon, Condorcet generally emphasized the potential *positive* outcomes for society of properly managed inheritance and hygienic medicine, as opposed to the growing tendency later in the nineteenth century to focus on the threat of inherited pathologies. But lurking behind even Condorcet's utopian dreams was the implication that the health of an entire society might be threatened if the wrong characteristics took hold of the species by acquisition and inheritance. The hope that humans could direct their own species development was always accompanied by the fear of what might happen if they failed to do so.

For his part, Lamarck was certainly aware that the acquisition of new characteristics could represent something of a double-edged sword. For example, in *Philosophie zoologique*, his formulation of the 'use-disuse principle' was immediately preceded by observations about the kinds of circumstances and habits that could lead to a shortened digestive tract, reduced stomach capacity, and malnutrition.[98] This discussion specifically included studies reported by the surgeon Jacques-René Tenon (1724–1816) on the effects of alcoholism, a malady that throughout the nineteenth century fell under the schema of 'social deviance' and implied a threat of degeneration.[99] Even the most overtly biological forms of degeneration, such as those suggested by stock breeding experiments, raised moral concerns for the nation; and on the flip side, moral

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[97] Quinlan, "Heredity, reproduction, and perfectibility" (2010), 144; Richards, "The Emergence of Evolutionary Biology" (1982), 247–248

[98] Lamarck, *Philosophie zoologique*, Vol. 1 (1809b), 247–249

[99] See Robert A. Nye, *Crime, Madness, and Politics in Modern France: The Medical Concept of National Degeneration* (New Jersey: Princeton University Press, 1984).

degeneracy often also implied some physical ailment, whether a pathological lesion or an insalubrious urban or tropical environment.

Cabanis's sensationalist thought drew from John Locke (1632–1704)'s empiricist argument that sensory impressions were the origins of all ideas, and from Destutt de Tracy's (1754–1836) science of *idéologie*, according to which all human ideas could be studied as phenomena of sensibility.[100] Cabanis believed that physiology was altered by factors like climate, diet, daily activities and habits, and even the sights and spectacles people were exposed to.[101] Human physiology, in turn, was the material basis for human thoughts and ideas, and altering the biological matter affected the mental experience. For Cabanis, this all meant that perfecting human society, as much as human biology, depended on careful management of the physical environment and sensory stimuli. As Jessica Riskin has put it, to study the sensory origins of ideas was also to study the sensory origins of virtue and good citizenship.[102] Nor was Cabanis anomalous in his conviction that such a link existed between the physiology and the moral character—that is, between the physical and the mental (referred to broadly as the *moral*). Organisers of the extravagant Revolutionary festivals, for example, frequently invoked empiricist metaphors of the psyche as "soft wax" or "clay" to be "stamp[ed]" or "imprint[ed]" upon.[103]

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[100] Spary, *Utopia's Garden* (2000), 4

[101] The emphasis on sight (and by extension blindness) was shared by many French savants in the eighteenth century, partly as a consequence of Lockean epistemology and the 'Molyneux problem.' On Condillac's and Rousseau's associations of sight with self-development in their writings on educational reform, see Spary, *Utopia's Garden* (2000), 196. On the broader sensationalist tendency to equate blindness with moral solipsism and Cartesianism, see Riskin, *Science in the Age of Sensibility* (2002), Ch. 2; William R. Paulson, *Enlightenment, Romanticism, and the Blind in France* (Princeton, N.J.: Princeton University Press, 1987); and Mark Paterson, *Seeing with the Hands: Blindness, Vision, and Touch after Descartes* (Edinburgh: Edinburgh University Press, 2016).

[102] Riskin, *Science in the Age of Sensibility* (2002), 256

[103] Mona Ozouf, *Festivals and the French Revolution* (Cambridge, M.A.: Harvard University Press, 1988), 203.

Cultivating and perfecting the new nation's citizens demanded management of their social, political, and sensory surroundings; the sensationalist-empiricist epistemology emphasized a conception of humans as products of their environments.

Furthermore, in the sensationalist vein, Cabanis believed that man's physical nature was susceptible to significant modifications, leading him to call on humanity "to foresee, to calculate, to direct this action" (1815, p. 413).[104] As I have said above in regards to Buffon, Cabanis thus configured physiological change and transformation as a process that humans did not only experience passively, but might actually take an active hand in directing. Cabanis believed that man could "at his own hands become a docile instrument" improving his own faculties and cultivating his well-being.[105]The fact that man was "endowed with will" even allowed him to contribute to "a general perfecting" of the natural order.[106] Cabanis thus believed that self-directed physiological change was not only possible, but potentially highly beneficial—an idea that we shall see Lamarck took up several years later. Managing people's physical states, particularly by attention to climate, diet, education, and habits, gave hygienists[107] the ability to improve and direct human physiology, an endeavor Cabanis compared directly to the improvement of plants and animals through selective breeding.[108]

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[104] P.J.G. Cabanis, *Rapports du physique et du moral d l'homme* (Paris: Chez Caille et Ravier, 1815 [1802]), 413. This text was first published in 1802 and consisted largely of memoirs Cabanis had delivered to the Institute in the 1790s.

[105] Ibid.

[106] Ibid. 411

[107] In this usage, the word "hygiene" referred to general efforts to improve the human species, and human living conditions, through management of the social and physical environment; this could mean infectious disease control and cleanliness, but also proper education, nutrition, habits, and the general cultivation of morality. More on social hygiene and the relationship between public health, hygiene, and social reform follows in Chapter 5.

[108] Cabanis, *Rapports* (1815 [1802]), 404–405

In this sort of theorising, Cabanis thus also drew from hereditarian theories like those espoused by Condorcet and Buffon to explain how reformers might improve upon humans:

> If one considers that the physical states are propagated by generation … that the same is in many ways true of the states of the mind as of the inclinations or of the affections, it will be easily felt to what extent the progress in the science of physical man can contribute to the general perfecting of the human species.[109]

Strictly speaking, the sensationalist-empiricist conception of the human physiology and mind did not allow for truly innate ideas or inclinations: instead, all ideas arose from sensory impressions, a materialist and potentially atheist foundation to the study of human knowledge. However, the idea of inherited tendencies or inclinations threw a wrinkle in this. Cabanis believed that an inherited mental inclination had still ultimately arisen from sensory input some generations prior. Still, if a person was born with certain mental tendencies already entrenched via a hereditary mechanism, then cultivating one's own mental improvement and well-being might not be as simple as Cabanis seemed to suggest in, for example, the passages quoted above. Any process of voluntary self-improvement or species melioration would have to contend with the effects of heredity, which might reinforce deleterious tendencies and not just desireable ones —a tension that, we shall see later, also appeared in Lamarck's transformist theory.

This was not the only point on which Cabanis's influence is clear in Lamarck's work. Lamarck came to believe in species transformation around 1800, and in 1809 published *Philosophie zoologique*, a text in which he cited Cabanis extensively. He was clearly indebted to the discussion in Cabanis's *Rapports* of the relationship between the physical and moral aspects of human nature, and to Cabanis's conviction, following the fundamental tenets of the science of *idéologie*, that human mental phenomena were produced and affected by sensory stimuli and the

[109] Ibid. 67–68

physical environment acting mediately through the mental physiology. As a zoologist by profession and a botanist by training, Lamarck was in a position to provide a general account of physiology and biological change as functions of an organism's habits, environment, and inherited tendencies; it was not until a decade later that he produced a treatise exclusively addressing human knowledge, in which the Idéologue influence can be detected perhaps more overtly. Still, his conception of species transformation and mutability in *Philosophie* was not so much a radically novel proposal as it was an attempt to provide a systematic account of the long-term effects of the sorts of biological changes that savants like Buffon, Condorcet, and Cabanis had already discussed extensively. Very early on in its conception, therefore, Lamarck's transformist theory was already entwined with ideas about voluntary and self-directed biological change in service to social regeneration.

Nor did this link escape the notice of all of Lamarck's readers: for example, a critique printed in 1822 in *La Foudre*, a journal of "historic news on literature, entertainment, arts, and style," criticised the influence of *idéologie* in French pedagogy, as the author perceived it to be spreading materialist and atheist ideas among the youth; the article cited Lamarck's *Philosophie zoologique* as an example of such a dangerous text, on the grounds that Lamarck had claimed in it that all operations of the understanding "are purely physical acts."[110] This was not the only example of such a critique: for example, another had been published a year prior in the anonymous anti-Enlightenment polemic *Coup de l'oeil sur l'esprit du siècle, ou de le dégradation morale de l'homme sous le règne des lumières*.[111] The author of *Coup*, like that of

[110] "De L'Éducation." *La Foudre, journal des nouvelles historiques, de la Littérature, des Spectacles, et des Arts et des Modes* 4.48 (janv. 1822), 6.

[111] *Coup de l'oeil sur l'esprit du siècle, ou de le dégradation morale de l'homme sous le règne des lumières* (Paris: J.-G. Dentu, 1821), 4–5, 35.

the article in *La Foudre*, objected to the materialism of the Idéologues, sweeping their criticism of Lamarck in with jabs at Cabanis, Destutt de Tracy (1754–1836), the eighteenth-century materialist Julien Offray de la Méttrie (1709–1751), Rousseau, and others. The overarching schema linking them all was what the author called the "philosophy of the senses," the conviction that all knowledge came from sense perception—a conviction by which the author claimed that the century's philosophes had "succeeded in degrading man even below beasts."[112] This was specifically a reaction to the idea that humans might not be ontologically or metaphysically distinct from other animals: the *Coup* went on to sarcastically attribute to eighteenth-century philosophes the assertion that "between me and my dog … there is only a difference of habit," and then complained that metaphysics, which had formerly "dealt with what is most noble in the nature of man," no longer existed by that name, and had instead been designated as "only a branch of zoology, which is to say the science of animals."[113] Thus the objection here was that, by considering human ideas and intelligence as material phenomena governed by the same laws as their animal counterparts, Lamarck and his ilk had ultimately destabilised any boundary between humans and other animals—a boundary that would perhaps be threatened by nothing more than a doctrine of actual species transformism.

Indeed, the author went on to take Lamarck to task for asserting that an organism's "habits and needs" could alter its physical form; that man had come to exist in his present state "by an innumerable suite of metamorphoses;" and that not only was a monkey capable of learning a human language, but "then he would be a perfect man."[114] These assertions the author

[112] Ibid. 3

[113] Ibid. 6

[114] Ibid. 22, 21, 5

considered to be not just Lamarck's inventions, but the inevitable result of the materialist and empiricist positions attributed to the other savants criticized throughout these passages; Cabanis's name appeared nine times, for example, including several times in conjunction with Lamarck's. The author's problem with the Idéologues was not simply an epistemological spat, but was grounded in objections to the larger implications of a position that assumed physiology was malleable: a softening of the distinction between man and animal, the idea that organic forms could change over time, and ultimately the transformist suggestion that such forms might be able to mutate into one another over time, representing a process of biological perfecting (or regressing).

As we shall see in Chapter 5, the association between Lamarck's name and those of certain philosophes and Idéologues, particularly Cabanis, remained strong throughout the later nineteenth century. In other words, Lamarck was consistently understood by commentators to be not just a transmutationist, but a proponent of materialist doctrines with notable Idéologue influences. At issue here was not just the biological theory of species transmutation—though this was certainly a contentious idea in itself in certain circles—but the wider implications of sensationalist epistemology and ideas of biological malleability, especially where deliberate human intervention in the operations of nature was concerned. Lamarck's transformism was far from the first or only theory to put forth the idea that humans might perfect, control, or shape the natural world, including their own physiology. Both his own ideas and contemporaneous responses to them thus need to be contextualized in light of prevailing ideas about social and political reform, human perfectibility, and the extent to which humans could, or should, deliberately alter living beings for their own ends.

**Contemporaneous critique: Madame de Genlis**

Although *Philosophie zoologique* presented a longer and more developed explanation of Lamarck's transformist arguments, it was not the first text in which he published these ideas: many of them had appeared seven years earlier in his *Recherches sur l'organisation des corps vivans* (1802). This earlier text was somewhat of a departure for Lamarck, whose teaching post was in invertebrate zoology and whose career had begun as a botanist. Rather than, as his contemporaries may have expected, a work on invertebrate taxonomy and classification, the *Recherches* turned to broader questions about living matter, the malleability of the natural world, and species mutability. Like *Philosophie*, *Recherches* also included remarks on human organisation and intelligence, and Lamarck (albeit circumspectly) presented the idea that, in the right conditions, a particularly intelligent primate could have altered its habits and way of living in such a manner as to come to resemble more closely a human being.[115] Though he did not argue outright in either text that humans were descended from primates, this was clearly the suggestion he intended to make to his readers, and it followed logically from his general position that species were arbitrary taxonomical distinctions rather than true biologically distinct entities, as well as from his remarks on human organization, which suggested that the organization of *l'homme nègre* resembled that of certain apes more than did the organization of *l'homme européen*. Thus, *Recherches sur l'organisation* was the first text in which Lamarck suggested the possibility that the distinction between humans and non-human animals was ultimately a function of contingent biological development, rather than an insurmountable ontological gap.

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[115] Lamarck, *Recherches sur l'organisation des corps vivans* (Paris: Centre de Recherche en Histoire des Sciences et des Techniques, 1802b [2001], 135.

Given the French context I have introduced in this chapter, it should therefore come as no surprise that at least one French commentator reacted to *Recherches sur l'organisation* with a critique that blended biological and political objections, presenting Lamarck's work as socially destabilising and scientifically absurd. This commentator was Félicité de Genlis (1746–1830), who included in her semi-fictionalised memoirs of both 1807 and 1825 a facetious dialogue between "a learned woman" and her doctor that heavily criticised the *Recherches*. Genlis's 'Alcinde' first excitedly explained to her doctor that Lamarck had given the "recipe" for incestuously breeding a cyclops—an ungenerous gloss[116] of a passage in *Recherches* on use and disuse of organs that used the hypothetical of habitually covering one eye to observe its resulting atrophy over the course of many generations—and then went on to praise his ideas of species transformation, which she referred to as "philosophical metempsychosis."[117] Genlis presented the idea of human evolution as not just absurd—"Without a doubt, we know that a hero can descend from a reptile," the doctor replied drily, "and that his grandchildren can become oysters"—but also dangerous.[118] For Alcinde, the idea that humans were "only mammals" severed the spiritual link between God and the human soul, leading eventually to outright atheism; Genlis emphasised

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[116] Lamarck in *Recherches* did present the hypothetical case of a race of children raised with their left eyes habitually covered; he argued that the left eyes would weaken due to habitual disuse, and if these children were bred with one another, after many generations the left eye would be obliterated, and that after an even more immense amount of time, the right eye would be able to shift to the center of the forehead (Lamarck, *Recherches sur l'organisation*, 1802b, 53–54). However, Genlis's gloss suggested that Lamarck thought these changes would occur in only a few generations. Additionally, Lamarck followed this hypothetical with several examples of actually existing animals he thought showed evidence of a similar principle of use-disuse, including birds, anteaters, and the *aspalax*.

[117] Stéphanie-Félicité de Genlis, *Suite de Souvenirs de Félicie L***. Par Mme. de Genlis*. Paris: Chez Maradan (1807), 132; 136.

[118] Ibid. 137

that such a position would mean that princes and rulers, too, were not "images of the divinity" but mere animals.[119]

I will examine Genlis and her politics in more detail in Chapter 3; suffice it to say here that, following what she perceived as the excessive radicalism of the Jacobins, she became increasingly critical of both republicanism and the Enlightenment philosophes more generally. Thus, her critique of Lamarck in 1807 (and again in 1825) associated his transmutationism with Enlightenment promises that the progress of science and medicine would liberate humanity, and aimed to show instead that Lamarck's ideas were plainly absurd, on top of being politically dangerous and a threat to the Catholic faith. Furthermore, although the *Suite de Souvenirs* does not seem to have been widely cited, and thus was probably not widely read, Genlis had several important political connections: she was a longtime correspondent of Napoleon, and tutored Louis Philippe I, who eventually became the king following the July Revolution in 1830. Genlis's opinions on Lamarck therefore may well have found their way to more influential ears (sadly, her correspondence with Napoleon is lost), and, given that her pedagogical 'morality plays' enjoyed some popularity in Britain, her work may well have played a role in the ability of British working-class radicals to associate Lamarck's name with their own politics in the 1820s–40s.[120]

In any case, Genlis's *Souvenirs* confirms that at least a few French commentators perceived Lamarck's transmutationism as socially and politically threatening, in ways that echo the concerns I have discussed throughout this chapter as forming Lamarck's intellectual context.

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[119] Ibid. 136–139

[120] See Desmond, *The Politics of Evolution* (1989)

Though Genlis was self-taught and may not have been aware of all of Lamarck's influences, her critique nevertheless homed in on issues that had long been points of contention for savants like Cabanis, Condorcet, Buffon, and Rousseau: whether humans were biologically distinct from apes, whether the human species was progressing or regressing, whether nature was within human control, and even the possibility of interplay between transformist theories and the organisation of human political society. Additionally, whether or not Genlis and the anonymous author of the *Coup* were aware of one another, both seem to have been drawing from some common source in their critiques of species transformation: for example, both presented the same reductio ad absurdum, suggesting that a transformist doctrine would mean that naturalists such as Lamarck thought it was possible to create "centaurs, fauns, and satyrs."[121] That this specific accusation appeared in both texts, even to the point that the exact mythological creatures were listed in the same order in each text, strongly suggests either a direct link between Genlis and the author of the *Coup*, or some shared intellectual background in which this particular criticism of species transformation had gained approval by some consensus—perhaps both.

By writing about the effects of a person's environment on their organisation, Lamarck placed himself in ongoing conversations about the sorts of biological and social threats France was facing. His conviction that humans could direct and control their own physiology was the foundation of his proposed answer to these threats. Although his account of moral character suggested that any sufficiently intelligent animals might deliberately effect some self-

[121] Genlis, *Suite de Souvenirs de Félicie L**** (1807), 133; *Coup de l'oeil* (1821), p. 21

improvement,[122] the capacity for judgment and complex reasoning set humans apart regarding the extent to which they could capitalise on knowledge of the natural world to ensure and direct their own social progress. In *Philosophie zoologique* he listed, as primary circumstantial factors in organic variation, the climate, temperature, atmosphere, place, manner of living, and daily actions and habits.[123] The implications of such an assertion did not escape all of his contemporaries: as one physician and recent student[124] of Lamarck asked, after quoting Lamarck on the effect that such circumstances could have on the organism's form,

> Is it not education, emigration, etc. that have so modified the form, the habits, and the inclinations of an animal whose original form so closely resembles that of the nasty and nearly intractable wolf? Is it not the avarice and the cruelty of the peasant, as well as the lack of suitability of the climate and food, that have disfigured and stupefied one of the most beautiful and lively quadrupeds of Arabia? Is it not the circumstances of society that have led and are leading to progress in the human spirit, both for good and for bad?[125]

As this passage suggests, Lamarck's comments on the relationship between organic form and the social and environmental conditions had far-reaching consequences for certain of his readers. Although Lamarck himself did not explicitly present such comments as endorsing a particular political reform or position, those who agreed that there was such a link between the

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[122] Lamarck did not believe that all animals were capable of acting voluntarily, as determinations of the will required acts of the intelligence that in turn depended upon specific anatomical features only found in sufficiently complex organisms. Additionally, even organisms like humans that did have the capacity to act voluntarily did not always do so: most of their actions still originated in the sentiment intérieur, not in intelligent determinations. See "Questions zoologiques," printed in Wheeler & Barbour, *The Lamarck Manuscripts at Harvard* (1933), 92–94.

[123] Lamarck, *Zoological Philosophy*, translated by Hugh Elliott (London: Macmillan & Co, Ltd, 1809c), 114

[124] See Corsi & Bange, "Chronologie de la vie de Jean-Baptiste Lamarck." *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed August 2024. https://redi.imss.fi.it/lamarck/chronologie/

[125] Luigi Chiaverini, *Essay d'analyse comparative sur les principaux caractères organiques et physiologiques de l'intelligence et de l'instinct* (Paris: Adrien Égron, 1815), 38.

organism and the environment could see profound political significance to all aspects of social organization, along with the circumstances of the natural environment. Lamarck's position implied the possibility of human intervention into both the natural and social world, reforming and re-shaping it in order to guide changes in animal (including human) physiology. Substantial physiological changes on a species level, such as the appearance of a new organ, could take millennia, but the effects of habituation could start to become apparent within an individual's lifespan. These habitual changes were central to Lamarck's consideration of how human society might benefit from the lessons to be learned from his transmutationist natural history.

In context, the ideas Genlis took issue with in the *Recherches* were not particularly radical, nor even original: Lamarck was far from the first savant to suggest that humans and apes might exist on some kind of biological continuum with one another, for example. His materialism—he did not explicitly endorse atheism in his writing, and may have had genuine Deist leanings—was clearly informed by certain eighteenth-century positions, but also by the writings of Cabanis and other contemporaneous Idéologues. Even the hypothetical breeding experiment that Genlis objected to appears less anomalous given the general prevalence of discourses of acclimatisation, stock breeding, and human biological perfectibility in the French eighteenth and early nineteenth centuries. Indeed, Genlis's physician character mentioned the existence of "learned works" on how to create "beautiful and witty children," a reference to the sorts of early Napoleonic breeding manuals that Sean Quinlan has discussed.[126] Even while remaining skeptical of Alcinde's belief that humans could consciously re-make the natural world, the physician put excessive faith in the promise that progress in science and medicine could

[126] Genlis, *Suite de Souvenirs de Félicie L**** (1807), 133

liberate humanity; Genlis's critique was a fundamentally reactionary one, using Lamarck's *Recherches sur l'organisation* to object not just to a specific biological theory, but to foundational elements of what she identified as French 'Enlightenment' thought.

**Concluding remarks**

On a fundamental level, an examination of degeneracy theory in the French eighteenth and early nineteenth centuries reveals a persistent fixation on the human species as an object of historical study, and the related belief that social reformers could control and shape the species's future according to ideas of national and biological progress. Apsirations to such extensive social reform were hardly unusual. For example, Lynn Hunt has written about the French revolution as a radical re-shaping of society by "intensifying the present," leading to the Terror as an effort to "accelerate the effects of time."[127] As Hunt argues, revolutionaries saw political reform as a means of constructing a new future, and new human beings who would inhabit it. Nor were such efforts wholly unprecedented: William Max Nelson has traced this conception of time and futurity to late Enlightenment ideas about historical and social progress as a means of countering degeneration, both biological and political-economic.[128] The possibility of radically transforming the species or the society implied the threat that such a transformation could be negative, and therefore that certain hygienic or reformist measures were necessary to mitigate the threat. Placing Lamarck's transformist theory in this context makes clear that what was at stake was not just a debate over the origins of species, but convictions about the extent to which human society

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[127] Lynn Hunt, *Measuring Time, Making History* (Budapest & New York: CEU Press, 2008), 70.

[128] Nelson, *The Time of Enlightenment* (2021), 18.

could be altered through management of the natural world, including induced changes to both human and non-human physiology.

That humans were endowed with intelligence indicated, for Lamarck, the possibility for conscious self-betterment, as cultivating the right habits and environment would favorably mould their organisation. Over time, the human species as a whole could make itself more intelligent, happier, and more sociable. But this was only one possible future, and Lamarck thought it would be difficult for those in civilisation, with its strict division of labour and dull, repetitive lifestyles, to achieve this end. While he was aware that there were many other theorists who had advanced ideas about how best to improve society on a moral basis, he, like Cabanis, was of the opinion that they proceeded in ignorance if they did not take note of the insights to be derived from his natural history. Correctly understood, the two approaches necessarily complemented one another. "As the objects I am going to consider have been considered as the exclusive domain of the *moralist*," he wrote in *Histoire*, "the obvious part belonging to the *naturalist* has not been sufficiently recognized."[129] The naturalist's contribution was critical for ensuring social harmony, cooperation, and social progress. Without a proper physiological understanding of the origins of human actions and tendencies, it would be virtually impossible to direct one's own conduct, or that of others, in a manner favorable to the improvement of society.

Nor was Cabanis's idea that one could augment the faculties and better the human body unique to him: it harkened back to influences as diverse as Condorcet's belief that medically supervised 'selective breeding' could yield more perfect offspring, or the reform-minded medical journalism of Pinel and others in the pre-Revolutionary years. The underlying link was the idea

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[129] Lamarck, *Histoire naturelle* (1815–1822), 281

that better people and better citizens came about as a result of careful management of the physiology, a task for which Lamarck argued that the naturalist's work was the necessary foundation for the physician's. Lamarck's writings about the effect that an organism's environment or habits could have on its physiology were also highly reminiscent of Cabanis's conception of man as "a docile instrument" with the ability "to foresee, to calculate, to direct" his own physical modifications, leading in the long term to new organs and faculties, greater development of existing faculties, and ultimately "the greater perfecting of happiness."[130] Thus, naturalist and physician expertise were both necessary for ensuring all manner of biological melioration, including far-reaching proposals for political reform and the proper cultivation of humans in society. For Lamarck and Cabanis, as well as their mutual intellectual influences, health and well-being were part and parcel of a broader notion of physical improvement, and humans had the capacity to be agents in bringing about such betterment. This was not just a matter of individual bodily change, but a vision for a whole society that depended on ideas of biological and medical modification and reform.

Understanding the role of voluntary action and self-directed change in Lamarck's system thus demands a contextualist approach. His *biologie* was bound up with his interest in social change, regeneration, and moral agency, and he was far from alone in seeing deep links between the history of nature and the future of society. The capacity to act by will gave humanity immense power over the natural world—including the human species itself. Natural and social transformation produced humans as moral agents endowed with free will, and humans could in turn change their own bodies and environments, continually re-forming and re-creating society.

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[130] Cabanis, *Rapports* (1815 [1802]), 411

Lamarck's developmental account of the intellectual faculties (examined in more depth in Chapter 3) meant that he could discuss human free will as a function of a sufficiently complex organisation—that is, as a natural phenomenon that had a natural history. Certainly it was significant that Lamarck exceeded many of his predecessors' claims about biological malleability to defend the idea of *species* mutability and transformism, and this distinction had consequences in his account of how humans might consciously transform the natural world. However, as this chapter has made clear, the idea that humans could meddle with living beings was far from novel by the time Lamarck began to defend transformism around the turn of the century; even the idea that such biological interventions had political ramifications appeared clear to many savants long before Lamarck's transformist treatises appeared.

Thus, while species transformation was an important part of Lamarck's thought, he was much more than an early evolutionist, insofar as it does not make sense to extract his ideas from the context in which they were articulated in order to present them merely as contributions to a sanitised history of scientific ideas. Lamarck's interest in the role of self-direction in species transformation was part of a broader vision of the *rapports* between the physical and the moral. His interest in human evolution was especially driven by the belief that the biological improvement of the human species was key to the moral and physical regeneration of French society, and this belief was quite continuous with established discourses of inheritance, acclimatisation, disease management, and so forth. Willed biological change was much more than Lamarck's critics portrayed it to be: it could mean political reform, public health and social medicine, environmental management, or reproductive hygiene. In this French context, self-

directed evolution was an important part of Lamarck's answer to widespread anxieties about degeneration and national decline.

Placing Lamarck in context, as I have suggested here, presents us with significant insights. First, it grounds his transmutationism firmly in the political and social debates about regeneration, degeneration and reform. Here I have shown that Lamarck was not merely trying to explicate an evolutionary theory of how species had come to exist in their present forms. Rather, we understand him best by locating him in the context of national concerns about social—and biological—progress and degeneration. Historians have long argued that we can best understand the development of Darwin's ideas as the product of the competitive and individualist ethos of the British Industrial Revolution, and so it should seem reasonable that context should matter too in our consideration of Lamarck. Placing Lamarck in context, we see that he believed that the current state of human society was part of the natural history of the human species, making social commentary a legitimate part of the naturalist's work. Furthermore, social change and reform would be part of the future development of the species, giving humans a genuine ability to direct their own evolution. This aspect of Lamarck's thought drew not only from natural historical debates about species transformation, but also from medicine, physiology, and empiricist epistemology. Thus, and although the reception of Lamarck's ideas among British radicals has not been my concern here, it would seem that they did not, in fact, entirely misappropriate his ideas when they turned to transmutation to support their own radical political agenda.

**Chapter 2: Lamarck: life and politics**

Personal and biographical details on Lamarck are sparse, partially because few of his personal papers survive. Fifteen boxes of manuscript pages held at the Muséum are available to consult online, but predominantly consist of lecture notes or drafts of his published texts; selections from this material were published in 1972 in Max Vachon's *Inédits de Lamarck: d'après les manuscrits conservés à la bibliothèque centrale du muséum national d'histoire naturelle de Paris* (Paris: Masson). Some additional biographical material is held at the Archives nationales, including Lamarck's will and the inventory of his personal library after his death; four letters he exchanged with one of his wives; some genealogy and vital records of the Lamarck family from 1612–1881; and records of petitions and letters Lamarck sent to various governing bodies concerning the organisation of the Muséum and his own remuneration. Consulting a register of Lamarck's students now also held in the Archives, Pietro Corsi has traced the dissemination of his transformist ideas across Europe in the nineteenth century.[131] Scholars have uncovered a few further archival details on Lamarck's life: for example, his biographer Marcel Landrieu around the turn of the 20th century found limited details from his friends' and family members' letters attesting to Lamarck's time studying medicine (see *Lamarck, le fondateur du transformisme* [Paris: Société zoologique de France, 1909a]; discussed further above in Chapters 1 and below in Chapter 4).

The basic facts of Lamarck's life are as follows. He was born in 1744 in Bazentin, Picardie, into an impoverished noble family. His father sent him to be educated as a priest, but he wanted to join the military, and did so at the age of 17 after his father had died. A much-repeated,

[131] See Pietro Corsi, *Lamarck: Genèse et enjeux du transformisme, 1770–1830*, Traduit de l'italien par Diane Ménard (Paris: CNRS, 2001), 334–365.

and likely exaggerated, anecdote relates that he showed exceptional courage on the battlefield.[132] In about 1766 a poorly documented neck problem—possibly some form of cervical lymphadenopathy or an acute injury suffered at camp[133]—forced him to leave the army, and by 1770 he had followed one of his 10 elder siblings to Paris, where he briefly worked in a bank, expressed an interest in music and meteorology, and studied medicine and botany, including on herborisations that Jean-Jacques Rousseau invited him to attend. In a biographical entry in *Illustres médecins et naturalistes des temps modernes*, the physician Isidore Bourdon (1799–1884) cited Lamarck's decision to leave four years of medical classes for botanical studies under Bernard de Jussieu (1699–1777) as evidence that Lamarck's nature was "always fickle," though later biographers generally concur that he had demonstrated a prior interest in botany even during his military career.[134] Bourdon first composed his entry on Lamarck in August of 1820, according to a note at the end of the 1844 reprint, but he lightly updated it for an 1837 volume with information on the end of Lamarck's life. According to Raphaël Bange and Pietro Corsi, Bourdon was himself a student of Lamarck's in 1819 and 1820, likely during the time he was

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[132] See e.g. Packard, *Lamarck, the Founder of Evolution* (1901), 9–10.

[133] In his éloge of Lamarck, Cuvier related that, while his regiment was at Toulon and Monaco, Lamarck was injured accidentally by one of his fellows. According to Cuvier, the injury could not be treated by the first surgeons Lamarck saw, and had become imminently dangerous to him by the time the notable surgeon Jacques-René Tenon (1724–1816) managed to cure it by "a complicated operation" that left Lamarck with permanent scarring. However, Cuvier did not relate the exact nature of the injury, only referring to it as "a serious derangement of the glands in the neck," and the story seems somewhat medically implausible in its details. Additionally, in the éloge Cuvier spared a line to praise Tenon, indicating he may have had reason to relate the anecdote beyond a pure biographer's impulse. See Cuvier, "Éloge de M. de Lamarck." *Memoires de l'Académie Royale des Sciences de l'Institut de France* XIII (1835), i–xxxi.

[134] Isidore Bourdon, *Illustres médecins et naturalistes des temps modernes* (Paris: Comptoir des Imprimeurs-Unis, 1844), 338; see e.g. Packard, *Lamarck, the Founder of Evolution* (1901), 15.

writing the initial biography; however, the text remains thin on personal details and the two men do not seem to have had a particularly close relationship beyond the lecture hall.[135]

Lamarck's early botanical work piqued the interest of Georges-Louis Leclerc, the comte de Buffon (1707–1788), then the intendant at the Jardin du Roi. Buffon became Lamarck's major patron, arranged to have his *Flore Française* (1779) published by the government, and secured him election to the Académie Royale des Sciences, which entitled him to a state pension. In 1781 he accompanied Buffon's son on his Grand Tour, a task which was made challenging by the younger man's temperament ("arrogant and obstinate, ridiculously conceited") but which did at least allow Lamarck the opportunity to observe European and imported plants and minerals previously unfamiliar to him.[136] Until 1793, he held a series of minor posts at the Jardin; in 1793 he and his colleagues proposed a plan for the institution's reformation following the revolutionary dissolution of all prior royal institutions. It was when the Jardin became the newly republican Muséum national d'Histoire naturelle (MNHN) that Lamarck gained the title of invertebrate zoologist ('professor of insects and worms'), which commentators as early as 1818 described primarily as a career move guided by the logistical considerations of which chairs were to be retained, split, or reorganised at the Muséum.[137] In other words, he earned the post more as a mark of the general respect his colleagues afforded him as a naturalist than out of any particular love for or competency in zoology.

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[135] Bange & Corsi, "Chronologie de la vie de Jean-Baptiste Lamarck." *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed August 2024. https://redi.imss.fi.it/lamarck/chronologie/.

[136] Bourdin, *Illustres médecins* (1844), 343–344

[137] See "Lamarck." In: *Biographie des hommes vivants, ou histoire par ordre alphabétique de la vie publique de tous les hommes qui se sont fait remarquer par leurs actions ou leurs écrits*, redigé par une société de gens de lettres et de savants, T. 4 (Paris: Chez L. G. Michaud, 1818), 75.

During the 1790s he published several treatises on physics and chemistry, in which he positioned himself as a critic of the Lavoisierian chemistry, and which were generally ill-received or politely ignored. He also published on the propagation of sound and on the influence of the moon on the earth's atmosphere, attributing both phenomena to the properties and behaviour of ethereal matter.[138] In two works from 1799 he discussed fossils, the earth's geological history, and a proposed new classification system for shells. Additionally, a brief explanation of plant sensibility attributed to Lamarck and reprinted in an English philosophical magazine in 1798 is consistent with his post-1800 explanations of the same phenomenon, wherein he conceived of the organic body as a kind of hydraulic system of vapors and fluids moving constantly through tubes and passages within the solid tissues of the organism's physiology.[139] From 1799 to 1809 he also published annual meteorological almanacs, using the same natural-philosophical axioms present in his physical and chemical treatises to make generalised predictions about the upcoming year's weather. These almanacs may have become a particular point of contention with Napoleon, which I explain further below.

Around the turn of the century, Lamarck began to publicly espouse the idea of species transformation (transmutation) in his lecture courses, then in his published treatises. Today, the most well-known of these—indeed, of all Lamarck's work—is 1809's *Philosophie zoologique*, which presents the most complete version of his remarks on evolution and on the broader process of physiological change, primarily by the effects of environmental influences mediated by the organism's habitual actions. Lamarck offered a yearly lecture course on invertebrate zoology

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[138] On Lamarck's Newtonian conception of ether and milieu, see e.g. Paul Rabinow, *French Moder: Norms and Forms of the Social Environment* (Chicago: University of Chicago Press, 1995), 133–136.

[139] "Sensibility of Plants." *Tilloch Philosophical Magazine* 1.3 (1798), 305–306.

from 1794 until 1820, after which point his worsening blindness became a functional impediment and a colleague took over his teaching duties. Between 1815 and 1822 he published his *Histoire naturelle des animaux sans vertèbres*, at the time a more widely known and respected work than the *Philosophie* (of which several hundred unsold copies remained in Lamarck's possession at the time of his death).[140] In 1820 he published his last major work, a philosophical treatise on the conditions of human knowledge that was heavily influenced by *idéologie* and the associated 'analytical' method. Nearing 80 by this point, he experienced a general decline in health that limited his professional activities, and relied primarily on his children Rosalie, Cornélie, and Antoine to care for him; he even dictated his last major work to Cornélie, as writing it in his own hand was no longer possible.

Lamarck was married three times and had eight children by his first two wives (see Fig. 1 below).[141] Three of those children died before him; one was declared insane and institutionalised at Charenton, and only one—his son Auguste—left children of his own. Lamarck was buried in a common grave in the Montparnasse cemetery, then moved into the catacombs; the exact location of his remains is unknown. His estate at the time of his death was approximately 12,000 francs, split among his five living children—a modest sum in comparison to some of his illustrious

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[140] "Catalogue des livres de la bibliothèque de feu M. le chevalier J.B. Lamarck." Paris: Imprimerie et Fonderie de Fain (1830). Digitized by the Wellcome Library. NB: As Pietro Corsi has shown, during Lamarck's lifetime, the *Philosophie* did not provoke much significant response at all; controversy over his evolutionary ideas was mostly sparked following the publication of the *Recherches sur l'organisation* in 1802. See Corsi, *The Age of Lamarck* (1988); see esp. Chs. 5, 7.

[141] The marriage certificate for Lamarck and his first wife, Marie Anne Rosalie Delaporte, has never been found, and an early reference found by Bourdier seemed to indicate that they did not marry until Delaporte was on her deathbed in 1792. However, Corsi reported that the children's baptismal certificates leave no doubt: Lamarck and Delaporte were already married by 1778, when their first child was born. See "Chronologie de la vie de Jean-Baptiste Lamarck," accessed August 2024 (https://redi.imss.fi.it/lamarck/chronologie/). I have compiled Bange and Corsi's timeline on Lamarck's wives and children into Fig. 1 below for easy reference.

colleagues and other old nobility, but nevertheless a far cry from destitution. For comparison, although a very few leading savants managed to accumulate yearly incomes in excess of 100,000 francs under the First Empire's practice of cumul, Robert Fox cites the remuneration for a single chairship at the Collège de France or the Sorbonne ranging from around 4,500 francs yearly to around 6,000. Parisian secondary school (lycée) professors rarely made more than about 3,000 francs, though some may have taken opportunities to supplement this figure by offering private lessons.[142] Lamarck's estate was therefore not extravagant in comparison to those of some of his élite colleagues, but it would be inaccurate to suggest he died in poverty. Similarly, an inventory of his possessions drawn up in 1801—as part of the process entitling his youngest two children to the inheritance left by their deceased mother—also supports the notion that Lamarck generally lived comfortably, if not luxuriously, in Paris.[143]

In this brief overview, my goal is to assess the relationship between Lamarck's scientific activities and his political beliefs. Because of the relative scarcity of biographical details on Lamarck himself, I have had to surmise his views largely from his professional activities, which necessarily introduces ambiguity in my interpretations of his personal convictions; I have tried to note this throughout the following chapter. Additionally, I have included a handful of commentaries on Lamarck, and references to his work, from several mid-nineteenth- and early-twentieth-century French periodicals as well as an 1834 novel. These secondary texts provide

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[142] See Robert Fox, "Appendix B: Exchange Rates and Incomes in Nineteenth-Century France." In: *The Savant and the State: Science and Cultural Politics in Nineteenth-Century France* (Baltimore: Johns Hopkins University Press, 2012), 291–292.

[143] See "Inventaire dissolutif de la comm[unau]té et continuation de la communauté d'entre le C[itoy]en Demonet Lamarck & la C[itoy]enne Reverdy son épouse," 19 prairial IX (8 June 1801). *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed May 2024, https://redi.imss.fi.it/lamarck/ice/ice_book_detail.php?lang=en&type=text&bdd=lamarck&table=bio_lamarck&bookId=12&typeofbookId=7&num=0

some insight into both his scientific legacy and the politics connoted by invoking his name in the century or so following his death, though none provides heretofore unknown biographical details. I argue that Lamarck was likely a moderate republican, sympathetic to Enlightenment liberal and humanist ideals but either too cautious or too uninterested—or both—to take an active role in politics himself. Where he did present himself as a political actor—for example, in his proposals to the Assemblée Nationale—he did so largely as part of a necessary strategy for a naturalist working in a national context where scientific activity and politics were strongly institutionally intertwined.

**Science and politics in the Revolution**

Assessing Lamarck's scientific legacy, historians have long rejected the notion that he was simply an unfairly maligned and professionally ignored 'precursor' to Darwin, touting evolutionary ideas too provocative for their time.[144] A handful of seminal secondary works in the twentieth century have integrated the limited biographical details with analyses of Lamarck's personal life and psychological characteristics to give an alternate explanation for the controversies his work sometimes provoked, generally focusing instead on the methodological conflict between 'systematisers' and 'empiricists.' For example, in her influential 1984 biography of Lamarck, Ludmilla Jordanova argued that his "persistent attempts to visualize nature's processes" succeeded in "defin[ing] an expanded field of scientific operation and … attempt[ing] an imaginative reconstruction of nature's ways."[145] In some ways reclaiming the accusation that

[144] See e.g. Madeleine Barthélemy-Madaule, *Lamarck, the Mythical Precursor* (Cambridge, M.A.: MIT Press, 1982); Corsi, "Before Darwin" (2005), 67–83; and idem., "The Revolutions of Evolution" (2011), 113–134.

[145] Jordanova, Ludmilla. *Lamarck* (Oxford, U.K.: Oxford University Press, 1984), 2.

Lamarck's ideas were excessively "speculative," Jordanova considered precisely this characteristic to explain why they "stimulated the imaginative drive for an integrated worldview," and appealed to those savants who held out against physico-chemical reductionism in the study of living matter.[146]

I discuss the view of Lamarck as particularly speculative or imaginative in more depth in Chapters 1 and 3; suffice it to reiterate here that this view has persisted in the historiography partly on the strength of Charles Darwin's and Charles Lyell's glosses of Lamarckian evolutionary ideas, which in turn borrowed heavily from the critique Cuvier advanced in his *éloge*. While it was standard practice among naturalists to use the form of the *éloge* to criticise one another posthumously, Cuvier was particularly adept at doing so. His *éloge* of Lamarck is a striking example of what historian Dorinda Outram has characterized as the tendency to "celebrate an image of the natural philosopher as apolitical and asocial," a strategy that permitted hidden, implied discussions of power and politics.[147] In this case, Cuvier's depoliticised description was then paraphrased by Lyell in his own refutation of species mutability, perpetuating the idea that Lamarck had been little more than a backwards-thinking transformist whose view of nature was irremediably tainted by what Lyell referred to as "fictions as ideal as the 'plastic virtue' and other phantoms of the geologists of the middle ages."[148] As Pietro Corsi showed in his 2005 essay on transformist ideas in Europe before Darwin, Cuvier and Lyell were far from the only naturalists to propagate Lamarck's name and variations of his ideas throughout

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[146] Ibid.

[147] Dorinda Outram, "The Language of Natural Power: The 'Éloges' of Georges Cuvier and the Public Language of Nineteenth Century Science." *History of Science* xvi (1978), 154.

[148] Charles Lyell, *Principles of Geology*, Vol. II (London: John Murray, 1832), 11.

Europe in the nineteenth century ("Before Darwin"). Still, it was largely through Lyell's critique that Charles Darwin formed his conception of Lamarck's mechanism of species change, and Lyell and Cuvier both portrayed Lamarck in a similar fashion—namely, as an atavistic, or at least outmoded, system-builder whose empirical evidence was shaky at best, and who had failed to adapt to the new positivistic science of the nineteenth century.

However, it should be noted here that Lyell, Darwin, and their countrymen were certainly not the only commentators who characterised Lamarck this way. I have discussed above and below, in Chapters 1 and 3, the memoirs of Madame de Genlis, who took Lamarck to task for publishing what she considered to be such a fanciful account of species transformation that it permitted the notion of incestuously bred one-eyed 'cyclops' and other mythological creatures; Genlis's work was generally more widely read in England than in France, though the work in which she commented on Lamarck does not seem to have been especially popular in general.

On the other hand, in his semi-autobiographical 1834 novel *Volupté*, which went through eight editions by 1874, the Romantic literary critic Charles-Augustin Sainte-Beuve (1804–1869) invoked Lamarck to metonymously connote a "desolate world" of materialist philosophy, "mute and dead" and characterised by grand hypotheses and wild system-building. Although it is unclear whether Sainte-Beuve had attended Lamarck's lectures in reality,[149] he trained as a physician in Paris during the 1820s, and elsewhere claimed that "Tracy, Danou, Lamarck, and

[149] The register of attendants to Lamarck's lectures was deposited in the MNHN's archives after his death, where Marcel Landrieu recovered it while researching his 1909 biography of Lamarck. Landrieu noted that Sainte-Beuve's name did not appear on the registry; however, it is an incomplete record as many signatures have been removed by autograph collectors, including some belonging to savants and naturalists known to have attended the courses. See Marcel Landrieu, "Lamarck, le fondateur du transformisme: sa via, son œuvre." In: *Mémoires de la Société zoologique de France* XXI (1909b), 84–85; 419–420.

physiology" constituted his true philosophical foundations.[150] His protagonist-hero Amaury, a priest who begins the text as a sensualist, attends Lamarck's lectures as a young man and praises his opposition to the new chemistry, his "philosophical hostility" to the biblical account of creation and the flood, and his non-teleological account of nature before eventually rejecting the 'Lamarckian' philosophical position.[151] The passage also specifically associates Buffon and Lamarck, calling the latter "the last representative of this great school of physicians and general observers" stretching from ancient Greece to the Enlightenment; this much suggests that by this time there was already a strong enough association to Lamarck's name to make it legible as a cultural signifier in this manner.[152]

In a similar vein, commentators on what does exist of Lamarck's biographical details have often presented him as a theorist whose scientific reputation was harmed by his own ineptitude navigating professional and interpersonal networks. At stake here is the question of whether Lamarck provoked controversy because his ideas in themselves were too radical, or whether responses like Cuvier's were ideological outliers propagated by rivals with their own personal motives for describing Lamarck as isolated and ignored. As Richard Burkhardt has pointed out, Lamarck clearly had strong enough connections to, for example, be exempted in the early days of the Revolution when the rest of Paris's nobles were expelled from the city.[153] This is consistent with Lamarck's role in the reform of the Jardin/Muséum, an undertaking that required him to navigate not only a series of complicated temporary alliances with his

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[150] Charles-Augustin Sainte-Beuve, *Portraits littéraires* T. III (Paris: Garnier Frères, 1852), 545.

[151] Idem., *Volupté* (Paris: Eugène Renduel, 1834), 223–226.

[152] Ibid. 224

[153] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 280.

colleagues, but also the political strategies whereby these naturalists presented themselves and their scientific work as matters of public utility to the national legislature.[154] Clearly, it is not the case that Lamarck was some kind of isolated scientific martyr for the entire 40-odd years in which he lived and worked in Paris. However, Burkhardt also argued that Lamarck's evolutionary ideas suffered for their association with his poorly received, anti-Lavoisierian chemical theories, and that Lamarck's own defensiveness about the latter led him to present his evolutionism poorly and with insufficient empirical evidence.[155]

Burkhardt expanded on his analysis of Lamarck's scientific methodology in *The Spirit of System* (1977), which, like Jordanova's biography, presented Lamarck as an often speculative thinker who failed to present convincing evidence for his evolutionary ideas to a scientific establishment that increasingly favored empirical evidence and 'small facts' over grand theories.[156] Charles Coulston Gillispie similarly suggested that the savant response to Lamarck's transformist arguments was tempered by the general rejection of the anti-Lavoisierian chemical theories on which they were premised,[157] whereas Pietro Corsi has instead emphasised the need to navigate the changing political landscape in the Napoleonic years, rather than hurt feelings or social ineptitude, in his analysis of Lamarck's rhetorical presentation of his evolutionary ideas.[158]

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[154] On the Jardin/Muséum and savant self-presentation during the Revolution, see Emma C. Spary, *Utopia's Garden* (2000), Chs. 4, 5.

[155] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 282–4

[156] Idem., *The Spirit of System* (1977). See esp. Chs. 1, 3, 6.

[157] Charles Coulston Gillispie, "The Formation of Lamarck's Evolutionary Theory." *Archives internationales d'histoire des science*s 9 (1956), 323–4.

[158] Corsi, "Biologie." (2006), 37–64.

The paucity of biographical details, combined with a historiography that has understood Lamarck largely as a precursor to Darwin, has led to a certain degree of deference to contemporaneous commentators like Cuvier and Lyell—who had, nevertheless, their own professional interests and political concerns to attend to when they summarised or criticised Lamarck's ideas. For example, as Lorraine Daston has pointed out, the charge that Lamarck's theories were marred by excessive imagination was very much continuous with a general shift in the late eighteenth and early nineteenth centuries to viewing the imagination as a site of social danger and as a counter-force to the pure rationality that scientific inquiry properly demanded.[159] Reconstructing Lamarck's political views, his place in his scientific community, and the way these factors interacted with his scientific theories often requires relying on secondhand accounts and, thus, disentangling the ideological knots tied around concepts like the imagination or the role of 'system-building' and speculation in science. The charge that Lamarck was insufficiently empiricist, for example, was widely perpetrated by Lyell, whose extremely critical gloss of *Philosophie zoologique* was nevertheless the most comprehensive explanation of Lamarck's ideas in England at the time.[160]

Robert J. Richards considered Lamarck to be more influenced by "the epistemological, psychological, and metaphysical doctrines of sensationalism" than by a "social ideology" per se,[161] and Burkhardt concurred that, rather than holding strong ideological convictions himself, Lamarck was "politically prudent," generally endorsing moderate republican positions where

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[159] Lorraine Daston, "Fear and Loathing of the Imagination in Science." *Daedalus* 127.1 (Winter 1998), 77–8; 81–2.

[160] See Pietro Corsi, "The Importance of French Transformist Ideas for the Second Volume of Lyell's *Principles of Geology*." *The British Journal for the History of Science* 11.3 (Nov. 1978), 231.

[161] Richards, "The Emergence of Evolutionary Biology" (1982), 247–8.

necessary as he navigated the changing political terrain of revolutionary and post-revolutionary France.[162] Certainly some of his institutional and professional activities brought him into the orbit of revolutionary and republican politics, but this was at least as much a result of the relationship between French political authority and the scientific establishment as it was a reflection of Lamarck's personal opinions. Especially given his position of moderate financial means, it is important to keep in mind when evaluating his professional engagements that his institutional affiliations and interpersonal relationships were not only a matter of personal choice, but of career security.

For example, in 1790 the Société d'Histoire Naturelle was established, largely as a replacement/continuation of the ancien régime's Linnaean Society. The new Société's members, who included Lamarck, tended to be sympathetic to revolutionary and republican views; though it was a naturalist's society, scientific and political activities did not always have a clear demarcating line between them. In 1792, in his capacity as a member, Lamarck was one of the savants who prepared scientific instructions for travelers on botanical missions—guidelines that specified what sorts of plants should be observed and collected, and what details or specimens the naturalists of Paris were seeking. As Lorelai Kury has discussed, this genre of scientific writing reveals the double character of scientific expeditions, "situated at the crossroads of the needs of naturalists and the more general need for control and usage of natural resources."[163] Thus, Lamarck's participation in the literary form was a political activity, insofar as the context of French scientific expeditions was that they depended upon public resources and therefore

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[162] Burkhardt, *The Spirit of System* (1977), 37

[163] Lorelai Kury, "Les instructions de voyage dans les expéditions scientifiques françaises (1750–1830)." *Revue d'histoire des sciences* 51.1 (1998), 83–4.

were expected to serve public need. However, this does not necessarily tell us much about Lamarck's personal beliefs or political convictions; he was likely not setting out to import political concerns into his scientific work or vice versa, but navigating a professional context in which the scientific work was also and inherently a political activity.

This was also not a new consideration for Lamarck, as botany had long held a double significance as both a site of scientific knowledge about the natural world and as a means of observing, cataloguing, and redistributing natural riches. In a report read in 1804 to the Société d'Agriculture of Seine-et-Oise on the colonial French botanist André Michaux (1746–1802),[164] society member Abbé Jean-Jacques Caron (1760–1849) described a "famous" herborisation undertaken in 1780 in Auvergne by Michaux, Lamarck, and André Thouin. Crediting Michaux for disseminating cedar seeds across the globe in such trips, Caron said: "He seemed to want to compensate the inhabitants of the land for the plants he was stealing from them, by replacing them with foreign vegetation that he anticipated might be useful to them."[165] Botany, particularly when done with public funding or the direction of state or royal societies, was an economic and political activity long before 1789; the ways in which Lamarck navigated this relationship during the Revolution are significant, but don't in themselves constitute evidence of any new political consciousness or commitments on his part.

Similarly, during the early 1790s Lamarck also served on the subcommittee known as the Commission temporaire des arts, authorised by the Comité du Salut Publique and responsible for

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[164] On Michaux's botanizing abroad, see Elizabeth Hyde, "'The neighborhood would be very interesting for a Botanist to visit,' or André Michaux, French Botanist in the American Field." *Journal of the Western Society for French History* 46 (2018), 24–41.

[165] Jean-Jacques Caron, "Notice historique sur André Michaux." In: idem., *Recueil de divers opuscules relatifs à l'agriculture, communiqués par M. l'abbé Caron à la Société royale d'Agriculture et des Arts du département de Seine-et-Oise* (Versailles: Chez Dufaure, 1843), 4.

cataloguing confiscated natural-historical collections and ensuring that they eventually made their way to public institutions. Like the travel instructions, this was therefore a necessarily political activity, insofar as it involved the state's acquisition and use of specimens like shells and other biological specimens. However, it is at least as plausible that political engagement was simply a going price Lamarck had to pay in order to work as a naturalist as it is that he held particularly strong republican views on a personal level. In 1792, his first wife Marie Anne Rosalie Delaporte gave birth to the couple's sixth child in July, and died herself in October; it also bears repeating that he was born a minor noble, a status that made his political position in Paris precarious in the revolutionary years but that had also not afforded him much in the way of inherited wealth. In other words, the financial and career incentives for his cooperation with the revolutionary government should not be underestimated.

In 1793, Lamarck participated in the preparation of the new revolutionary calendar, which was based around the yearly 'cycle of nature' and the nation's agriculture. He also edited articles for the agricultural journal *Annuaire du cultivateur*, which was principally edited by the then-Montagnard Gilbert Romme (1750–1795), one of the members of the Committee on Public Instruction and a confidant of Condorcet's. Lamarck was credited on the cover along with 15 other naturalists as a contributor to this publication.[166] Almost 110 years later, this would be described in *La Lutte social*, the newspaper of the Fédération socialiste révolutionnaire de Seine-et-Oise, as a joint publication of Romme and Lamarck.[167] However, as the newspaper blurb cited no source to back up this degree of collaboration, this is more noteworthy as a reflection of the

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[166] Gilbert Romme (ed.), *Annuaire du cultivateur, pour la troisième année de la République, présenté le 30 Pluviôse de l'An II.e à la Convention Nationale* (Auxerre: L. Fournier, an III [1794–1795]), cover.

[167] "Éphémérides — Mort de Romme." *La Lutte social de Seine-et-Oise* 4.171 (18 June 1904), [1].

respect that this Fédération evidently afforded to Lamarck's name than as a historical argument about the man himself. The paper also listed the date two ways—18 June 1904 and 25 Prairial An 112—suggesting at least a superficial alignment with the Jacobin revolutionary government; Lamarck's name by this point commanded respect in the French scientific establishment, and may therefore have appealed to the editors as a signifier of the kind of scientifically inflected socialism[168] they championed.

Even when Lamarck did have the opportunity to engage in political debate, it does not seem that he was always eager to do so. For example, as Burkhardt has pointed out, the Société d'Histoire Naturelle was not only a forum for scientific work, but also a site of rich political discussion, including by members who were enthusiastic about the Revolution; however, Lamarck, though active in the Société, "was a leader neither in political matter nor in presentation of scientific memoirs."[169] In 1792, he was one of four co-founders of the *Journal d'Histoire Naturelle*, the official organ of the Société, which was published by Le Cercle Social, generally recognized as the publishing house of the Girondin faction.[170] While many of its members were active legislators, and the Cercle did publish some overtly political periodicals, Lamarck's *Journal* (discussed briefly in Chapters 1 and 3) was styled more as a scientific publication, in which appeals to the public utility and educational value of natural history may have been a professional strategy as much as a coherent political argument. The historian of

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[168] By this I mean to denote only some positivist and occasionally technocratic elements of French socialism; this is not synonymous with the Marxian distinction between scientific and utopian socialisms, and indeed much of the French left at the time understood the relationship between science and socialism in ways that by Marx's schema would have landed them firmly in the utopian camp.

[169] Burkhardt, *The Spirit of System* (1977), 36

[170] See e.g. Mona Ozouf, "Girondins." In: Furet, François & Mona Ozouf (eds.), *A Critical Dictionary of the French Revolution*, translated by Arthur Goldhammer (Cambridge, M.A.: Harvard University Press, 1989), 360.

geology Franck Bourdier recorded in a timeline of Lamarck's life that in 1797 he expressed concern to a friend that he might be in danger of being banned or deported from Paris; Bourdier speculated in a parenthetical that his fears may have been due to his past revolutionary activities.[171] He did not provide evidence of such concerns, and it seems plausible that Lamarck may have simply been concerned about another wave of hostility toward the former nobility; in any case, he was never exiled, and even bought a house and land in 1795 that had become national property after being confiscated from an émigré.[172]

It is worth pausing here to note that the historical record has long included contradictory views on the extent to which even Lamarck's direct appeals to the legislature are indicative of his political views or activities. In a volume commemorating the MNHN's centennial, the zoologist Edmond Perrier (1844–1921) noted that in one of Lamarck's appeals to the Convention nationale, he had described himself as having "always been, since the Revolution, a determined friend of liberty, equality, and the Republic;" Perrier concurred that Lamarck merited the requested indemnity, but asserted that this was the case "even though he could not prove" his stated political convictions.[173] In 1909 his biographer Marcel Landrieu, on the other hand, argued that Lamarck had always expressed sympathy for the ideas of the Revolution, and was punished for it by later regimes; however, his evidence rested mainly on Lamarck's public addresses to the Convention and on texts like his book dedications. For example, he dedicated his *Recherches sur*

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[171] Franck Bourdier, "Esquisse d'une chronologie de la vie de Lamarck." In: *La vie et l'œuvre de Jean-Baptiste Lamarck* (2007), 33.

[172] See Corsi & Bange, "Chronologie de la vie de Jean-Baptiste Lamarck." *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed August 2024. https://redi.imss.fi.it/lamarck/chronologie/

[173] Edmond Perrier, *Lamarck et le transformisme actuel* (Paris: Imprimerie nationale, 1893), 16.

*les causes des principaux faits physiques* (1793) "Au Peuple Français," and added in a note that he had specifically declined to dedicate it to political figures including the King himself.[174]

He also generally eschewed the title of chevalier (which, according to Packard, he would not typically have inherited in the first place, as the youngest son of his family[175]), signing his correspondence only as Lamarck when he acted as secretary of the MNHN's Assembly of Professors and often favoring either his name alone or "Citoyen Lamarck" on his book covers and in dedications and author's prefaces. To the four of his children born between 1791 and 1797, he and his wives gave names that invoked or were derived from ancient Greek and Latin, a fashion during the mid-to-late 1790s in particular—though two of these children were then baptised in 1805, unusually late at the ages of eight and nearly 12, and with more conventional French names.[176]

Taken altogether, these details paint a picture of a savant who was at least publicly amenable to the Enlightenment ideals of the Republic, and who understood that his professional position made virtually all of his public speech acts—from book dedications to public addresses to his children's names—into political actions as well. This point is important to bear in mind when evaluating his scientific legacy, both because it demonstrates that he was not unwilling to adapt his rhetoric in order to protect his career, and because it gives a plausible political motive that may have animated some of the contemporaneous criticism of his methodology as a theorist.

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[174] See Landrieu, "Lamarck, le fondateur du transformisme" (1909b), 55–57.

[175] Packard, *Lamarck, the Founder of Evolution* (1901), 8

[176] His first wife, Rosalie Delaporte, died in 1792, the same year she gave birth to the couple's sixth child and second daughter, Aménaïde Cornélie. Almost exactly a year later, Lamarck married Victoire Charlotte Reverdy, 30 years his junior, who bore a son in 1794 and a daughter in March of 1797 before dying herself in November 1797 at the age of 24. These children were Aristide (baptised Jean Louis, he was later declared insane and interned at Charenton) and Eugénie (baptised Julie Joséphine Eugénie, she died in 1822).

However, I assess the significance of his cooperation with the revolutionaries with the caveat that he was navigating a precarious social, political, and economic position, and seems to have been aware that as a (minor) public figure his loyalties were being constantly assessed and could have cost him his work or even his right to remain in Paris.

Following his embrace—and public defence—of transformism at the turn of the century, Lamarck's political fortune as a naturalist hardly became less fraught. However, here again it is necessary to bear in mind that the politics of scientific practice involved interpersonal disputes and professional jockeying as much as the actual political content of scientific doctrines. For one thing, between 1799 and 1815 Lamarck had to contend with the scientific and political whims of Napoleon, who became gradually more hostile to the Idéologues generally and to Lamarck in particular. It is true that Napoleon objected to the liberal and materialist associations of *idéologie*, but as to the dislike with which he regarded Lamarck specifically, additional institutional and ideological factors were at play—chiefly a dispute over meteorology. As the episode is illustrative of some of the difficulties in evaluating Lamarck's nineteenth-century legacy overall, it warrants further discussion.

**Meteorology and the scientific community**

A core anecdote in Lamarck biography is almost always sourced to the "Histoire de ma jeunesse" (1854) of the astronomer François Arago (1786–1853). According to Arago, in December of 1809, the members of the Institut de France attended a salon at the Tuileries to present their work to Napoleon. Arago, who was about 23 at the time, received tacit approval for his astronomical work after a loudmouth standing next to him informed the emperor that Arago

had just measured the Spanish meridian; Lamarck, who was on his other side and came up next in the examination, did not fare so well. As Arago recalled the incident, Napoleon, not even waiting long enough to read the title on the book Lamarck had presented him, chastised him:

> "What is this? It is your absurd *Meteorology*, the work in which you compete with [famous astrologer] Matthieu Laensbergh, this almanac that dishonors your old age; now do some natural history, and I will receive your work with pleasure."[177]

Having in fact tried to present a copy of *Philosophie zoologique*, Lamarck, sixty-five and already known to be in poor health, was thus embarrassed in front of his colleagues. As he tried in vain to protest, the emperor added "I only accept this volume out of consideration for your white hair," before passing it off to an aide-de-camp, whereupon Arago recounted that Lamarck burst into tears.[178]

The story made for a compelling biographical detail about all three men; it was even included in an extract reproduced in *La presse littéraire* the same year that Arago's *Œuvres* was published.[179] The anecdote also appeared in much of the twentieth-century scholarship of Lamarck, from Jordanova's biography to Burkhardt's *Spirit of System*.[180] Jessica Riskin has described "tears of frustration rolling down [Lamarck's] cheeks" in "a chilly salon" attended by aides dressed in gold brocade.[181] In one of the earliest extended pieces of biographical writing on

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[177] François Arago, "Histoire de ma jeunesse." In: *Œuvres complètes de François Arago*, T. 1 (Paris: Gide & J. Baudry, 1854), 93–94.

[178] Ibid.

[179] Arago, "Histoire de ma jeunesse." Extract in: *La Presse littéraire: échos de la littérature, des sciences, et des arts* (5 mai 1854), 337–344.

[180] Jordanova, *Lamarck* (1984), 67; Burkhardt, *The Spirit of System* (1977), 10

[181] Jessica Riskin, "Introduction: Evolution, the Science Napolon Hated." *Republics of Letters* 6.1 (4 March 2018), 2–3.

Lamarck, the positivist and journalist Émile Corra (1838–1934) described the exchange as a "gratuitous insult" that indicated Napoleon was both ignorant of Lamarck's stated intentions in his meteorological works and incapable of appreciating his zoology.[182] Packard in 1901 cited an alternate version of the story in which Napoleon, "who really liked Lamarck," merely made a joke that the naturalist took poorly in the presence of his esteemed colleagues; however, this passage reads rather defensively, and in general Packard's biography was more overtly framed as a rehabilitation of an unfairly forgotten savant than more recent Lamarck scholarship has been.[183]

For his part, Lamarck himself recounted the incident in an 1818 dictionary article as the frustrating culmination of years of resistance to his meteorological studies from the Parisian establishment—in contrast to the farmers and other inhabitants of the departments, many of whom had for their part found the almanacs so useful as to send their author personal letters of thanks.[184] According to Lamarck's telling, his critics, "fearing that [he] would succeed in making some important discovery" and generally made the "dupes" of their own frivolous city life-styles, thus put an end to the coordinated meteorological data-collection enterprise that had been previously entrusted to him by Jean-Antoine Chaptal (1756–1832), then-Minister of the Interior.[185] Without the cooperation and observational data of the department prefects, the project could not continue, and besides, citing his age and his work in zoology, Lamarck stated that he could not produce any additional meteorological almanacs anyway.[186] The passage only alludes

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[182] Émile Corra, *Lamarck et son œuvre* (Paris: Siège de la Société Positiviste Internationale, 1908), 27.

[183] Packard, *Lamarck, the Founder of Evolution* (1901), 74

[184] Lamarck, "Météorologie." In: *Nouveau dictionnaire d'histoire naturelle, appliquée aux arts, à l'agriculture, à l'économie rurale et domestique, à la médecine, etc* (Paris: Déterville, 1818a), 474–475.

[185] Ibid. 475

[186] Ibid. 477

to Napoleon as "he who governed at the time," and does not include further details on the specific incident Arago later described.[187] However, it is written in a similar tone to, and with similar cited grievances as, much of Lamarck's other commentary on his scientific detractors. Burkhardt has written more on such passages in "Lamarck, evolution, and the politics of science" (1970), in which he concluded that although there was likely some distortion in Lamarck's own accounts of himself as silenced, neglected, and suppressed, he was not entirely wrong to point out that scientific work could be, and often was, judged or discredited outside of official channels and on the basis of interpersonal loyalties.[188]

The association of Lamarck's meteorological almanacs with astrology hinged on two issues: the fact that he considered the moon to have an effect on terrestrial weather events (though Lamarck presented this explanation as a simple application of then-fashionable Newtonian mechanics to climatic sciences, the connection was contested), and the fact that his almanacs gave probability estimates for the likelihood of certain climate and weather events, which could be construed as making astrological predictions. Contemporaneous accounts generally concur that these were the grounds on which Lamarck's name was smeared, often specifically by comparison to Laensbergh's.[189] The satirist Charles Joseph Colnet du Ravel (1768–1832) mocked Lamarck for a supposed non-scientificity as early as 1800, bundling together his criticism of Lamarck's anti-Lavoisierianism with the comparison of his meteorology

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[187] Ibid. 475

[188] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 280–284

[189] See *Biographie des hommes vivants, ou histoire par ordre alphabétique de la vie publique de tous les hommes qui se sont fait remarquer par leurs actions ou leurs écrits*, redigé par une société de gens de lettres et de savants, T. 4 (Paris: Chez L. G. Michaud, 1818), 75; Volney, *Tableau du climat* (1803), 270–271.

to astrology.[190] It likely did not help that even Lamarck's defenders seem to have accepted this general framework, defending the idea that the moon had a direct effect on the earth's weather (although this remains a somewhat common belief today, Arago was highly critical of it[191]) and the physiology of humans on earth, and sometimes even presenting Lamarck's scientific arguments as continuations to an ongoing project of predictive astrology.[192]

As the astronomer James Lequeux has recounted the controversy, meteorology at the time Lamarck began his almanacs was in a somewhat precarious position in France. By the 1770s, the topic had become an interest of savants including Lavoisier, but, following the turmoil of the Revolution, the abolition of royal societies and the execution of Lavoisier for tax farming disrupted the scientific infrastructure necessary for any large meteorological data-gathering endeavour, and Lequeux went so far as to describe Lamarck as its "sole immediate successor."[193] Because meteorological prediction generally required observations from numerous sites to be communicated over long distances and analysed together, it was particularly susceptible to the kind of disruption that a lack of centralised state support for science could engender. Gilbert Romme proposed that telegraph communications could make meteorology into a useful endeavor for sailors and farmers as early as a 1793 address to the Constitutional Assembly, and Lamarck

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[190] Colnet du Ravel, *Les Étrennes de l'Institut national et des lycées, ou Revue littéraire de l'an VIII*. Paris: Chez Moller (1800), 142–144.

[191] See François Arago, *Œuvres complètes*, T. 8 (Paris: Gide & J. Baudry, 1854), 25–82; 83–146; 120–124.

[192] See e.g. Joseph D'Aquin, *La philosophie de la folie, où l'on prouve que cette maladie doit plutôt être traitée par les secours moraux que par les secours physiques; et que ceux qui en sont atteints, éprouvent d'une manière non équivoque l'influence de la lune* (Chambéry: P. Cléaz, 1804), 217; J.-R. Jacquelin-Dubuisson, *Des vésanies, ou Maladies mentales* (Paris: Chez l'auteur, 1816), 192; Laurent-François Dethier, *Souvenirs patriotiques ou fragmens d'essais analytiques* (Paris: 1800), 3–4.

[193] James Lequeux, *Le Verrier—Magnificent and Detestable Astronomer* (New York: Springer, 2013), 270–271.

similarly called for a national meteorological bureau in his 1807 almanac, but, according to Lequeux, Napoleon thought any such scientific infrastructure ought to be available only for use by the state and the army, and the project stagnated.[194]

The French naturalist and republican politician François-Vincent Raspail (1794–1878) recounted a slightly different version of the dispute in his own meteorological almanac of 1865. According to Raspail, Napoleon favored Arago not out of pure scientific interest but to flatter a friend, and Arago and a handful of other savants who received Napoleon's patronage were the ones leading the campaign to compare Lamarck's meteorology to Laensbergh's astrology, hoping to induce him to return to studying invertebrates.[195] Indeed, Raspail went so far as to claim this internal politicking was the real reason that, by the 1840s, Lamarck was no longer widely remembered as even having contributed to the study of meteorology in France.[196] Raspail did not provide evidence for these claims, however, and is remembered as being particularly sensitive himself to professional and interpersonal slights, which seems to have consistently colored his portrayal of Lamarck as a brilliant naturalist unfairly neglected by the scientific establishment.[197] Furthermore, as Robert Fox has pointed out, Raspail made his own career positioning himself as an outsider to the stultified Parisian scientific establishment; defending Lamarck was part of Raspail's "consistent and deliberate" strategy to gain attention for his own willingness to eschew the savant mainstream.[198]

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[194] Ibid. 271

[195] François-Vincent Raspail, *Prévision du temps. Almanach et calendrier météorologique pour l'année 1866* (Paris: Chez l'Éditeur, 1865), 88.

[196] Ibid. 89

[197] See Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 276–278.

[198] Fox, *The Savant and the State* (2012), 20

For his part, Lamarck himself insisted that his meteorological almanacs were *not* political, and had only been unlucky to provoke the ire of cossetted Parisians whose indulgent city life-styles predisposed them against the sort of useful scientific work the Ministry's meteorological project aimed to perform.[199] This defence should, if nothing else, indicate the extent to which Lamarck's self-presentation was a deliberate rhetorical strategy; his claims of being silenced or suppressed were likely not entirely inaccurate representations of the internal dynamics of scientific communities, but were also part of his conscious effort to game such dynamics for his own benefit. In other words, without much in the way of personal memorabilia, it is inherently difficult to assess the accuracy of most commentary on Lamarck's place in the scientific community during his lifetime, because observers, including Lamarck himself, had various competing interests and loyalties when they composed such accounts.

The dispute over meteorology thus boils down to many of the same problems that Lamarck faced in other aspects of his career. Though he had friends and colleagues who respected him and his work, he was, for various reasons, not always successful at navigating the kinds of interpersonal and patronage relationships upon which much scientific work depends. He was also, unfairly or not, associated with then-unfashionable modes of scientific inquiry by the turn of the nineteenth century, due in part to his age and in part to his own very public opposition to theories like Lavoisierian chemistry. And, although he actively avoided presenting himself as a political radical, it is nonetheless true that his scientific and philosophical influences predominantly leaned liberal and materialist, which sometimes likely worked in his favor (as his

[199] Lamarck, "Météorologie" (1818a), 475

successful appeals to the national legislature in the 1790s suggest) and other times complicated his position politically, especially where Napoleon was concerned.

As I have discussed more in Chapter 3, it would be inaccurate to suggest that Lamarck was universally silenced or neglected during his life: he made his career as a naturalist, was widely respected as a conchologist and botanist, and had friends and defenders as well as detractors even in his more controversial later years. Even when his work was genuinely scorned or repressed, this was the result of numerous factors, including the social and professional dynamics of the French scientific establishment; certainly transformism was genuinely a controversial idea, but Lamarck also struggled to leverage his personal relationships and public image as a naturalist, and the sometimes-poor reception of his work had to do with these latter issues as well as with the actual scientific content at hand.

**Concluding remarks**

The evaluation of Lamarck's scientific legacy has been further complicated by historiographic developments around the turn of the twentieth century. Following the publication and popular success of Darwin's *Origin of Species* in 1859, some French naturalists championed Lamarck's name in order to defend a French national priority claim to the theory of evolution; furthermore, by the early twentieth century, biologists and historians in France and beyond embraced the idea that evolutionary theory required aspects beyond the mechanisms then

considered 'Darwinian,' proposing instead an expanded, 'Neo-Lamarckian' version of Lamarck's arguments and attesting to a renewed scientific and cultural appreciation for the man himself.[200]

Thus, for example, on Bastille Day in 1907 (the date was established as a national holiday in 1880), *Le Tribun*, the socialist paper for Paris's eastern suburbs of Montreuil-Vincennes, ran an announcement on the MNHN's upcoming public celebrations of Lamarck, his work, and his legacy. As the editors put it, however, this was not just any cultural event, but a "*réhabilitation*"—a redemption or rehabilitation of "the great savant, who was little-known during his life and who, today, is considered the father of modern philosophy."[201] From the announcement one further learns that Lamarck not only paved the way for Charles Darwin, but actually provided the very hypotheses Darwin took up as his own—"but, as Darwin was English, he was taken at his word." Furthermore, the theory of evolution was not only groundbreaking in biology, but in the social field: "If democracy finally came into power, it is because the paths were cleared by the Lamarcks, the Geoffroy-St-Hilaires, the Darwins."[202]

As this piece demonstrates clearly, French political and scientific interest in Lamarck has long been part of a national self-conception as much as it has been motivated by a desire to celebrate the naturalist himself. Scientific achievement has been made a point of pride for many modern nation-states, including France; in particular, efforts to make a priority claim for Lamarck over the theory of evolution are often tinged with nationalist sentiment and have little

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[200] See e.g. Packard, *Lamarck, the Founder of Evolution* (1901), 332–367; Landrieu, *Lamarck, le fondateur du transformisme* (1909a); Wheeler & Barbour, "Introduction." In: idem. (eds.), *The Lamarck Manuscripts at Harvard* (1933), xiii–xxxi; Erik Nordenskiöld, "Lamarck." In: Idem., *The History of Biology* (1936), 316–330; and More, "Lamarck." In: Idem., *The Dogma of Evolution* (1925), 163–184.

[201] "Lamarck." *Le Tribun: organe radical et socialiste des cantons de Montreuil-Vincennes* (14 juillet 1907), 1.

[202] Ibid.

to do with the actual history of evolutionary ideas (which certainly predated Lamarck). It is no coincidence that the MNHN's celebrations were in preparation around the same time that scientists and historians like Perrier, Landrieu, and Corra were also publishing biographical works on Lamarck, casting him as a forgotten genius in the pantheon of French science. Liberal Third Republic politicians tended to emphasise both the past and present achievements of French scientists in order to portray France itself as a formidable intellectual power for the new century —a line of rhetoric that also tended to pitch up in intensity following international or military embarrassments, such as the loss of the Franco-Prussian War. Additionally, prior to the 'Modern Synthesis,' a major problem for proponents of evolution by natural selection remained that Darwinians could not agree on a mechanism to explain inheritance by reproduction, leaving a scientific lacuna that French Lamarckians and neo-Lamarckians were often eager to try to resolve.

As I discuss in Chapters 4 and 5, Lamarck's legacy should properly be evaluated with reference to medicine, hygiene, and public health at least as much as to the history of evolutionary theory. However, this has not been a guiding principle of most Lamarck scholarship, and certainly not of the turn-of-the-century scientific biographies that formed much of the basis for later investigations into Lamarck to frame him largely as a precursor to Darwin. As I show in this dissertation, medical and hygienic treatises of the nineteenth century did build on Lamarck's ideas, and some even cited him explicitly as an influence. However, the connection to medicine and public health has not generally been given as prominent a role in Lamarck scholarship as his contributions to the debates over evolution. Thus, a paper like *Le Tribun* could present Lamarck as a forgotten genius in 1907, playing into a nationalist narrative of French

scientific achievement wherein the ultimate measure of success was the popular reputation enjoyed by the Englishman Charles Darwin.

As I have summarised in this chapter, the idea of the forgotten, suppressed, or martyred French evolutionist is an inaccurate understanding of the state of affairs both during Lamarck's lifetime and afterward. Though he struggled with poor reception to some of his works, and was at times indeed mocked or ignored by some of his illustrious colleagues, Lamarck also had significant social and institutional connections throughout his career. He successfully addressed the national legislature numerous times throughout the 1790s, appealing on behalf of both himself and his fellow naturalists at the Jardin/Muséum. Even in declining health, he still managed to continue teaching until 1820, and published a major work that year. His name was explicitly cited in medical treatises throughout the nineteenth century, and elements of his ideas about human physiology and the effects of habituation and the environment appear in countless more works sans attribution; even savants who did not directly read him were likely aware of his name and some of his ideas by cultural osmosis or through shared third influences. Pietro Corsi has also shown that Lamarck's ideas were discussed not just in France, but across scientific communities in Edinburgh and continental Europe.[203] Goulven Laurent has discussed the particular influence of Lamarck in palaeontology and fossil studies of the nineteenth century, and Patrick Matagne has shown that Lamarckian transformist principles also played an important role in the consolidation and dissemination of ecology, and provincial scientific inquiry in general, in

[203] See Corsi, "Before Darwin" (2005); idem., "The Revolutions of Evolution" (2011); and idem., "Edinburgh Lamarckians? The Authorship of Three Anonymous Papers (1826–1829)." *Journal of the History of Biology* 54.3 (Sept. 2021), 345–374.

France.[204] The 'isolated genius' was always a myth, and one that Lamarck himself sometimes contributed to. By the time the *Origin* reached publication, Lamarck was no neglected footnote in the history of science, and later events like the MNHN's commemorations of him were not so much reviving his legacy as re-narrativising it.

Certainly Lamarck's transformist ideas were genuinely controversial for both scientific and political reasons, and both conservative and clerical responses must be taken into account when evaluating his legacy. However, such ideological objections were never cleanly delineated from the interpersonal politicking that characterised the French scientific establishment, as I have shown above in the example of the meteorological controversy. Whereas, in certain British working-class radical circles, Lamarck's name and the idea of transmutationism were often invoked as a scientific legitimisation of progressive and socialist politics, in France Lamarck was neither uniformly marginalised from the scientific mainstream, nor metonymically important to underground radicals in an analogous way.[205] His own political commitments appear tepidly liberal in his published and preserved works; he was neither the first nor the only French transformist, and although his career as a naturalist more or less required him to interact with the national political situation in order to secure remuneration and publication, he does not seem to have gone out of his way to seek further opportunities to act in a capacity as a political animal.

As I will show in the next chapter, following from his general influence in medicine and public health, Lamarck's name did carry something of a political legacy throughout the

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[204] Goulven Laurent, "Paléontologie(s) et évolution au début du XIXe siècle: Cuvier et Lamarck." *Asclepio* 52.2 (Dec. 2000), 133–222; Patrick Matagne, "L'écologie en France au XIXe siècle: résistances et singularités." *Revue d'histoire des sciences* 49.1 (1996), 102–103; see also idem., *Les mécanismes de diffusion de l'écologie en France de la Révolution française à la Première Guerre mondiale* (doctoral thesis, Université Paris VII, 1994).

[205] See Desmond, *The Politics of Evolution* (1990).

nineteenth and early twentieth centuries. However, this was not so much a simple conflict of science versus Church orthodoxy as it was the result of the French use of biological and medical sciences in the broader project of state consolidation and nation-building. Lamarckian ideas also tended to enter this political project by the same process of osmosis mentioned above: though he may not have been culturally canonised until later, Lamarck was an influential enough savant that throughout the nineteenth century a great deal of scientific thinking did draw from his arguments, whether consciously or not. Elements of his 'environmentalist' thinking and his ideas about the effects of habitual actions on the physiology, for example, remained present in many arguments over public health legislation and reform.

As for the man himself, he lived and worked in neither glory nor obscurity, and was just as willing to defend himself by calling his own work apolitical as by flattering the ruling powers. As I show in Chapters 1 and 3, he followed Cabanis and other Idéologue influences in using his physiological and transformist opinions as the conceptual basis by which to argue that, as a naturalist, he had valuable insight into the kinds of social and political reforms that the nascent French republic needed. However, there is no evidence that he ever made any such proposals directly in the political arena, preferring instead to include in his transformist works scattered remarks on the insalubrious physiological effects of, for example, repetitive factory labour or poor education.[206] These he did not present as following from any holistic political position, but as specific issues on which his scientific expertise locally qualified him to speak; though he seems to have understood on some level that science and politics always mutually influence one

[206] See e.g. Lamarck, *Philosophie zoologique*, T. 2 (1809b), 398–399.

another, there is better evidence that he pursued limited career opportunities in medicine (see Chapter 4) than that he sought any voluntary active engagement in politics.

Lamarck certainly dealt with professional challenges arising from the controversial nature of some of his ideas; however, this was much more complex than a mere conservative rejection of transformism, and it was never the case that he worked in obscurity, or even in the degree of household poverty that Cuvier and others claimed after his death. Lamarck in his day was not the towering national figure his biographers would later seek to make him—but nor was he a suppressed 'martyr to science,' toiling away alone in punishment for his radical ideas. Much of his zoological and botanical work was received positively, and although he generally failed to rally enough professional allies for his chemical, meteorological, and transformist works to become widely respected in his day, he continued to teach and publish until his health prevented it. Lamarck was neither a political radical nor a mere victim of the scientific establishment, but a moderately successful savant in his own day whose legacy would eventually come to be sutured into a rather teleological story about the development of evolutionary theory.

**Fig. 1: Wives and children of Jean-Baptiste Lamarck**[207]

| Wives | Children | Birth/death dates | Notes |
|---|---|---|---|
| Marie Anne Rosalie Delaporte | | d. 2 Oct. 1792 | The couple's marriage certificate has never been found, leading some early biographers to assert that Lamarck did not marry her until she was on her deathbed. However, the baptismal certificate for her first child indicates unambiguously that the couple were already married by 1778. |
| | Rosalie Joséphine | b. 8 Aug. 1778; d. 1837 | Lived with Lamarck until his death and helped care for him; died an unmarried rentier. |
| | André | b. 22 April 1781; d. 1817 | Godfather was André Thouin; joined the navy during the revolution and died of yellow fever on deployment in the Antilles. |
| | Antoine | b. 7 Jan. 1786; d. 10 Jan. 1860 | Godfather was A.L. de Jussieu; worked as a painter and died unmarried. |
| | Charles René | b. 21 April 1787; d. in childhood | Godfather was René Desfontaines; godmother was Marie Charlotte Pélagie de Monet, the father's elder sister. |
| | Guillaume Emmanuel Auguste | b. 21 Jan. 1791; d. 7 Dec. 1880 | Godfather was Guillaume Brugières; godmother was Emmanuelle Marguerite Anne; attended the École Polytechnique and worked as an engineer; left living children when he died. Lived with Lamarck until his death and helped care for him. |

[207] See Bange & Corsi, "Chronologie de la vie de Jean-Baptiste Lamarck;" Bourdier, "Esquisse d'une chronologie de la vie de Lamarck" (2007); Jordanova, *Lamarck* (1984); Burkhardt, *Spirit of System* (1977); Corra, *Lamarck et son œuvre* (1908); Packard, *Lamarck, the Founder of Transformism* (1901).

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| | Aménaïde Cornélie | b. 1792; outlived her father | Birth certificate not found; lived with her father until his death and helped care for him; is depicted in relief with her father on the back of the statue placed to commemorate him at the MNHN, with the legend “La postérité vous admirera, elle vous vengera, mon père.” |
| Victoire Charlotte Reverdy | | b. ~1773; d. 2 Nov. 1797 aged 24 | Married 9 Oct. 1793. |
| | Aristide | b. 15 Oct. 1794 | Baptised 17 Sept. 1805 as Jean Louis; godparents were Jean-Baptiste Valenciennes and his wife; later interned at Charenton asylum, where Esquirol became chief physician in 1826. |
| | Eugénie | b. 5 March 1797; d. 30 Oct. 1822 | Baptized 17 Sept. 1805 as Julie Joséphine Eugénie; godparents were Jean-Baptiste Valenciennes and his wife. |
| Marie Louise Julie Mallet | | b. ~1768; d. 27 Aug. 1819 | Married 27 May 1798; was the sister of Denise Mallet, who had married Lamarck’s brother Philippe François de Monet in 1794. Julie and Denise’s father was a freemason, as was Philippe François, with whom Lamarck had lived in Paris in 1771 after moving out of a nearby country house occupied by another brother, Louis Philippe. |

**Chapter 3: Lamarck's system**

In this chapter my aim is not to rehabilitate Lamarck, per se, but to examine several pervasive distortions of his life and work in the historical literature. I begin with Charles Darwin's gloss of Lamarck's transformist theory, showing how Darwin's idea of "Lamarck nonsense" was influenced in part by his mentor Charles Lyell's anti-evolutionary arguments in the *Principles of Geology* (1830–1833). Darwin's account of Lamarck's ideas, and the distinction Darwin sought to draw between Lamarck's mechanism of speciation and his own, became entrenched in the historiography some hundred-odd years later, as biologists and historians of biology in the 1960s embraced the notion of a strict difference between 'Darwinian' and 'Lamarckian' evolutionary theories. Darwin, and Darwinian biologists, were not Lamarck's only critics; in this chapter I also address the representation, perpetrated by Georges Cuvier and others, of Lamarck as an overly speculative naturalist, stubbornly clinging to outmoded Enlightenment methods of investigation that led him astray from the rigorous empirical demands of proper scientific inquiry. I show that this criticism, though not always entirely unfair, was commonly levelled at savants on all sides of the scientific debates of Lamarck's day, and that the image of Lamarck as being uniquely prone to baseless speculation has more to do with the successful political maneuvering of Cuvier and others than it does any deeper reading of Lamarck's own work.

At stake is the role of the will in Lamarck's transformist theory. Although Lamarck did not believe that all living beings possessed a will, and thus did not argue that all species transformation was dependent on voluntary action, it is not true that he entirely excluded

voluntary action from the process of species transformation where intelligent animals were concerned. In order to correct both the Cuvierian line of criticism that portrayed Lamarck's transformist theory as an absurd voluntary process, and certain responses that have sought to defend Lamarck by explaining his evolutionary arguments solely in terms of needs and habits, I provide a close reading of Lamarck's own arguments, primarily drawing from the *Philosophie zoologique* (1809). I explain the mechanics of Lamarck's account of biological and species change, in which an organism's habits and responses to the environment stimulated the motion of fluids inside the body that could shape and re-shape the soft tissues. Over time this could lead to the entrenchment of certain habits in an individual; the inheritance of certain tendencies and temperaments in the offspring; and even, eventually, the formation of new organs and their accompanying biological functions.

Thus, this fundamental biological malleability—the reactivity of an organism to its environment—was the means by which both individual and species change occurred. While the nervous fluid could be, and constantly was, moved by external impressions beyond the organism's control, one portion of the fluid was subject to an organism's will by means of the emotion of its inner feeling, which meant that for Lamarck, intelligent animals (particularly humans) were capable of exerting control over their own actions, habits, and thus, eventually, biological development. This chapter will also address the influence of sensationalism in Lamarck's work from a more physiological angle, showing how his physiology was informed by, and supported, the notion that all ideas took their origin from the impressions made by external objects on the perceiving organs. With the context of the previous two chapters in mind, it is

clear how Lamarck's physiology was therefore grounded in some of the same epistemological assumptions as Idéologue politics and French empiricism more generally; the implications of this for Lamarck's own politics have also been investigated more thoroughly in Chapter 2. Finally, this chapter also presents several contemporaneous reactions to Lamarck's idea that an animal's habits altered its physiology, rather than the other way around. I show how, in the first half of the nineteenth century, debates over form and function in the nascent science of biology became the battleground for wider debates about morality, free will, teleology, and the existence of God. Placing Lamarck's work, and the reactions to it, in this context makes clear the stakes of disputes about speciation and transmutation for those concerned about morality, religion, and their respective relationships to the natural sciences.

A proper physiological understanding of Lamarck's writing on the will bolsters the argument that his transformism was ultimately a contribution—if sometimes a circumspect one—to ongoing French debates about the national future, and to naturalists' participation in such debates via such practices as cross-breeding experiments and acclimatisation efforts. Lamarck understood biological changes to the human species in concert with existing social and political conditions, and thus he believed that social reform and management of the environment were key factors in the ongoing development of the species. By emphasizing the importance of the will, my goal is to show how Lamarck discussed natural transformation and social change as complementary forces. It was by this linkage that he claimed that naturalists had a uniquely important perspective on social and political issues.

**Darwin, Lamarck, and the will**

Lamarck spent much of his career as a botanist, conchologist, and invertebrate zoologist. However, in his 1844 letter to Hooker, Darwin's disavowal of "Lamarck nonsense" invoked ideas of a tendency to progressive development and the idea that animals could, over time, will their own change. Darwin's characterisation of Lamarck and his ideas has persisted in much of the historical literature, along with the related idea that Lamarck had some special responsibility for the idea of the inheritance of acquired characteristics, while Darwin alone was responsible for a wholly different mode of speciation: 'natural selection.'

While my focus in this chapter is on the role of the will in Lamarck's thought, the question of progressive development and the debate over mechanisms of organic change are both germane to this issue. For Darwin, "Lamarck nonsense" was convenient shorthand for a combination of all three ideas: a process whereby an animal could voluntarily perfect itself in response to its own wants and needs, eventually passing the new characteristics on to its offspring and thereby improving the whole species. Darwin was particularly influenced by both his mentor the geologist Charles Lyell (1797–1875), and Lamarck's colleague-cum-rival-cum-eulogist, Georges Cuvier (1769–1832), in forming this idea of what 'Lamarckism' meant. Furthermore, Cuvier's, Lyell's, and Darwin's remarks have powerfully affected the historical view of Lamarck and his ideas. As Pietro Corsi made clear in his 2005 essay on transformist ideas in Europe before Darwin, Cuvier and Lyell were far from the only naturalists to propagate Lamarck's name and variations of his ideas throughout Europe in the nineteenth century ("Before Darwin"). Still, it was largely through Lyell's critique that Charles Darwin formed his

conception of Lamarck's mechanism of species change, and Lyell's own criticism echoed the *éloge* given by Cuvier.[208]

A staunch and longtime critic of species transformation, in his 1832 *éloge* Cuvier had collapsed together the roles of desire and habit in Lamarck's argument, claiming that according to his deceased colleague's theory, "it is by the desire to swim that membranes form on the feet of aquatic birds; … by the desire to fly, that the arms of all birds become wings, and their fur and scales develop into feathers."[209] It was standard practice among naturalists to use the form of the *éloge* to criticize each other posthumously, and Cuvier was particularly adept at doing so. His *éloge* of Lamarck is a striking example of what historian Dorinda Outram has characterized as the tendency to "celebrate an image of the natural philosopher as apolitical and asocial," a strategy that permitted hidden, implied discussions of power and politics, and has likely contributed to our tendency to view Lamarck's work as a naturalist outside of its social and political context.[210]

Cuvier's depoliticised description of Lamarck's ideas was then paraphrased by Lyell in his own refutation and ridicule of species mutability, perpetuating the idea that Lamarck had been little more than a backwards-thinking transformist whose view of nature was irremediably tainted by what Lyell referred to as "fictions as ideal as the 'plastic virtue' and other phantoms of the geologists of the middle ages."[211] As Michael Bartholomew has long since shown, Lyell was

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[208] Lyell, *Principles of Geology*, Vol. II (1832), 1–22

[209] Georges Cuvier, "Éloge Historique de M. de Lamarck." In: *Recueil des Éloges Historiques Lus Dans les Séances Publiques de l'Institut de France,* Vol. III (Paris: Imprimeurs de L'Institut, 1861), 198–199.

[210] See Outram, "The Language of Natural Power" (1978), 154.

[211] Lyell, *Principles of Geology*, Vol. II (1832), 11

also alarmed that Lamarck's transformism implied a progressive natural history of human intelligence and therefore also a natural history of the capacity for voluntary action.[212] Lyell's critique specified that Lamarck's theory included a "*tendency to progressive advancement* in organisation, accompanied by greater dignity in instinct, intelligence, &c," and that belief in species transformation ensured "the future perfectibility of man in his physical, intellectual, and moral attributes."[213] While Darwin was not troubled by this aspect of Lamarck's theory, as we have seen, he did adopt Lyell's concern, taken from Cuvier, regarding ideas about both an innate "tendency to progression" and organisms willing their own change.[214]

The historical literature that has focused on Lamarck has neither thoroughly nor adequately addressed either his investigations into human organisation and the physiology of mind, or the significance of such investigation. In particular, and in contrast to Darwin and his contemporaries, these scholars have often sought to minimise the role of desire and the will in Lamarck's writing. For example, in his *Spirit of System*, Richard Burkhardt correctly pointed out that Lamarck only ascribed will to a select few, highly complex organisms, and as a result concluded that it "could play no major role in the general process of organic change," a view with which Ludmilla Jordanova (1984) concurred.[215] Robert J. Richards similarly argued that Lamarck's explanation of organic change was dependent on needs and habits, and not the will at all, stating categorically that "Will, as he understood it and in its usual meaning, simply had no

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[212] Michael Bartholomew, "Lyell and Evolution: An account of Lyell's response to the prospect of an evolutionary ancestry for man." *British Journal for the History of Science* 6. 3 (June 1973), 261–303.

[213] Lyell, *Principles of Geology*, Vol. II (1832), 16–17; 27; original emphasis

[214] Darwin, "Letter no. 729" (1844), 1–3

[215] Burkhardt, *The Spirit of System* (1977), 175; Jordanova, *Lamarck* (1984), 55

immediate role in evolution."[216] Although Pietro Corsi did acknowledge the will in Lamarck's work, he characterised Lamarck's consideration of the 'will' as "simply the phenomenal expression of a complex process of nervous fluid dynamics," thus minimising any role for agency and desire in his conception of transformism.[217] Such arguments have generally been deployed against the notion that Lamarck considered species transmutation writ large to be a consciously directed process, with the will merely the antiquated insertion of a psychic element into the fledgling biological sciences.[218]

However, in Lamarck's system the will was a crucial link between his natural historical account of species and his concerns with humans in society. It appeared in his writing not because he was a lone voice carrying on a tradition of unscientific eighteenth-century vitalist conjecture, but because he was intensely interested in the ongoing debates about the possibility of guiding human progress and French national policy. Lamarck's understanding of human physiology allowed him to identify what he believed to be the natural historical origin and the manner of development of moral agency, an approach that he used to stress the particular insights a naturalist might have into debates about society and moral reform that had occupied French political commentators since at least the mid-eighteenth century.

For example, Lamarck expressed concern in *Philosophie zoologique* (1809) about the prevalence of dull, repetitive life-styles and work stifling men's imaginations, thus preventing the development of the sort of genius he believed necessary for advancement in literature, arts, and

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[216] Richards, "The Emergence of Evolutionary Biology" (1982), 267

[217] Corsi, "Before Darwin" (2005), 70

[218] For example, see J. Walter Wilson, "Biology Attains Maturity" (1969), 401–418.

even scientific inquiry.[219] "Their habitual ideas turn in a little circle," he wrote of such men, "and they make few efforts to expand it, because they have only a distant interest in doing so."[220] In speaking thusly of habitual ideas, Lamarck was not merely referring to an abstract or immaterial mental condition. Rather, according to him, all operations of the understanding (that is, thoughts) were physical acts, in which the subtle nervous fluid rushed through and around the channels of the organ of intelligence—the *hypocephalon*, or two wrinkled hemispheres of the brain.[221] Physiology, for Lamarck, was always a matter of such interplay between fluids—in this case, the nervous fluid—and solid tissues such as the brain, which preserved impressions on its delicate surface that the nervous fluid could then trace over in the future. Thus, in the same way that any repeated action could become an entrenched habit as the nervous fluid carved out a particularly route that became easier to follow, a repeated thought could also become 'second nature' by altering the brain's physiology.[222] When Lamarck spoke about men who lived repetitive lifestyles and failed to make the necessary efforts to expand their thoughts, he was proposing an explicitly voluntary means by which he believed they could alter their own physiology if they cared to do so: diversifying the paths of their own nervous fluid and thus expanding their thoughts and strengthening their intelligent faculties.

Of course, not all animals possessed intelligence, and even among those who did, Lamarck thought many of their actions were involuntary, guided by instinct rather than any

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[219] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 414

[220] Ibid. 415

[221] Ibid. 368, 376

[222] Ibid. 318–319

intelligent direction of their own physiology. Nevertheless, this aside demonstrates one way in which the modification of organic physiology, which was directly mediated by habit,[223] could be driven indirectly by a conscious and willed process in an intelligent animal. By thus ascribing certain physiological changes indirectly to the will, Lamarck was not departing from what he perceived to be a naturalistic explanation—one grounded in his observations of living beings and their physiology. This was no "psychic" intervention in nature, but the outcome of a physical process that Lamarck described in terms of fluid dynamics. Furthermore, as this particular example shows, the question of voluntary action was particularly germane where issues of human society and politics were concerned. Faced with concerns about the effects of increasingly repetitive, dull life-styles and divided labour, Lamarck explained the effects of such social developments in terms of physiology, and also suggested that it was through self-directed physiological modification that people ought to mitigate any undesirable outcomes. Excluding the will from his account of biological change and species transformation would thus mean overlooking the way in which he sought to present political and social issues as problems that naturalists, such as himself, were specially qualified to diagnose and comment on.

**Empiricists and system-builders**

As the preceding suggests, the perception of Lamarck's ideas as overly speculative, or of his mechanism of species transformation as unscientific, have often been attached to a broader methodological critique in savant and natural historical circles. From the eighteenth century into

[223] See e.g. Ibid. 266

the nineteenth, natural history was undergoing numerous methodological and institutional changes, partly as a result of factors like increasing specialisation and professionalisation; such changes were consistent with the larger trends in scientific discourse and practice. Accompanying such shifts was a sense among some naturalists that, in contradistinction to their intellectual forebears, they could reform and improve scientific practice by insisting on rigorous adherence to empirical observations, the use of controlled experiments to investigate the natural world, and a resistance to excessive speculation or theorisation. This was, however, a rhetorical style and strategy as much as a true methodological description of natural historical practice, and understanding what was at stake for naturalists in this respect complicates the picture of Lamarck as a 'speculative' thinker, or one whose work lacked proper observational groundwork. As I will show throughout this chapter, such criticisms of Lamarck were not entirely unfounded, but the perception that his work was uniquely flawed in these ways, relative to his contemporaries, is largely a result of the legacy of anti-transformist arguments from Cuvier and Lyell, as well as Charles Darwin's later efforts to distinguish his own evolutionary theory from Lamarck's controversial transformism.

Navigating the multifaceted terrain of natural historical practice, Lamarck styled himself a *Naturaliste philosophe*, a title that led Burkhardt to argue that he was chafing against the "over-emphasis in contemporary science upon the importance of facts and facts alone."[224] In this framing, part of Lamarck's public-image problem was that he insisted on clinging to an outmoded Enlightenment style of naturalism that his peers were eager to dispose of by the turn of

[224] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 285

the century. As Burkhardt pointed out, by the time Lamarck came to believe in (and publish on) his theory of species transformation, he was well practiced in presenting his own ideas as iconoclastic challenges to the scientific mainstream: it was in 1794 that he first published his *Recherches sur les causes des principaux faits physiques*, beginning his public criticism of the "pneumatic" chemistry of Antoine-François de Fourcroy (1755–1809), Antoine Lavoisier (1743–1794), and others. Lamarck's arguments against this system were not just local disputes, but constituted a wholesale rejection of the 'new' principles of chemistry; his own chemistry depended on pre-Lavoisierian principles, including tetravalent elemental theory and a non-Newtonian 'phlogiston' theory of colors.[225] Lamarck also criticised the new experimental method for subjecting substances to violent tests that would change them into "unnatural" compounds.[226] By the turn of the century, Lamarck himself had not only embraced out-of-fashion chemical ideas, but also repeatedly presented his own chemical work as being wilfully ignored by establishment savants who were determined to suppress challenges to their own reputations or epistemological authority.[227]

Burkhardt saw a continuity between Lamarck's chemical work and his transformist theory, both in terms of Lamarck's self-presentation as a naturalist and in terms of his methodological orientation. As he put it, "Lamarck was not afraid to construct an edifice," this last a word Lamarck used himself in the manuscript version of the introduction to his *Hydrogéologie* (1802) in a passage defending the return of theorising to the physical sciences,

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[225] See e.g. Burlingame, "Lamarck's Chemistry" (1981), 64–81.

[226] Jordanova, *Lamarck* (1984), 69

[227] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 280–284

which he described as having been overtaken by the "wrong" of excessive emphasis on the collecting of mere facts.[228] Lamarck stated that both facts and theories were necessary in the sciences; however, Burkhardt argued that he undermined his own presentation of his transformist theory by focusing too heavily on theory-laden *grands faits* rather than first-order *petits faits* and by failing to consistently show how his theory actually followed from the facts and observations he cited. While Lamarck's biographer Ludmilla Jordanova pointed out that he engaged in observational work as a naturalist throughout his career, she also stated that he defended species transformism on deductive, rather than inductive, grounds, as "he regarded transformism as proven" and therefore "did not feel obliged to go and search for instances of it."[229]

Certainly such critiques are consonant with the one Lyell offered in his *Principles of Geology*, in which he stressed the absence of "positive facts," "well-authenticated facts," and "positive data" at critical junctures in Lamarck's argument.[230] Cuvier, too, had long used the demand for "positive facts" in science to criticise his intellectual opponents, including Lamarck.[231] In his debates with Cuvier during 1830, the zoologist Étienne Geoffroy St.-Hilaire

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[228] Quoted in Ibid., 285

[229] Jordanova, *Lamarck* (1984), 80

[230] Lyell, *Principles of Geology*, T. II (1832), 1–22; see especially 8–13. Readers may note the irony in this charge given that, as Alistair Sponsel has recently shown, Lyell himself was far from immune to building grand theories on the basis of what many considered to be too few facts. Alistair Sponsel, *Darwin's Evolving Identity: Adventure, Ambition, and the Sin of Speculation* (Chicago: University of Chicago Press, 2018).

[231] Dorinda Outram, *Georges Cuvier: Vocation, Science, and Authority in Post-Revolutionary France* (Manchester: Manchester University Press, 1984), 128–32. This shift away from an inductive science based on the mere observation of 'facts' to the derivation of generalised laws is characteristic of a broader epistemic shift in European science, as noted in William Whewell's *Philosophy of the Inductive Sciences* (Cambridge: Cambridge University Press, [1840], 2014) in England, for instance, and commented upon by Philip F. Rehbock in his now-classic *The Philosophical Naturalists: Themes in Early Nineteenth-Century British Biology* (Madison, W.I.: University of Wisconsin Press, 1983).

(1772–1844) took the opposite approach, reflecting a sea-change in European science away from an emphasis upon mere facts, and toward a greater appreciation for those skilled philosophical naturalists who could derive from these collections the generalised laws of nature. Geoffroy thus presented himself as the vanguard of a reformed scientific movement that would shift attention from Cuvier's small facts back to the higher philosophical principles.[232] However, to those who sided with Cuvier, Geoffroy's repeated claim of allegiance to Lamarck only reinforced the perception that Lamarck was too speculative, his fanciful theories having extended beyond the explanatory power of the facts and beyond his true areas of expertise: botany and conchology.

In truth, throughout the late eighteenth and early nineteenth centuries, claims to be uniquely sensitive to facts and observations were made by savants on virtually all sides of any given issue, and they cannot always be taken at face value. Although Lamarck did defend the value of drawing scientific hypotheses and theories in the *Hydrogéologie*, he presented himself in this passage as a moderate thinker, charting a path between two dangers: over-zealous speculation, and rigid adherence to the observed facts alone.[233] The passage thus relied on the rhetoric of positive facts and empirical observation, even as Lamarck simultaneously argued for the value of *grands faits* and theorisation. This was a typical posture in his transformist arguments as well: for example, *Recherches sur l'organisation* (1802) opened with the enjoinder "to gather the observed facts and use them to discover unknown truths," and the preface to

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[232] Corsi, "The Revolutions of Evolution" (2011), 115; see also Toby Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades Before Darwin* (Oxford: Oxford University Press, 1987).

[233] Lamarck, *Hydrogéologie* (Paris: L'Auteur, au Muséum d'Histoire Naturelle, 1802a), 5–6.

*Philosophie* (1809) stressed that facts and observations formed the basis of his theories.[234] Similar claims appeared in the preface to *Histoire* (1815–22) and in *Système* (1820).[235] Even during the 1790s, when he was publishing his chemical treatises, Lamarck was at least aware of the value of invoking positive facts and empirical observation: in the first issue of his *Journal d'histoire naturelle*, published in 1792, he asserted that the *rapports* between plant species and families were examples of the "solid knowledge that we can acquire by observing nature," and that "because true rapports are positive facts, no one could call them into doubt."[236] The eye of a botanist who was properly "trained" or "educated" would eliminate all ambiguity that could otherwise arise due to "opinion" or an individual's "will to accept" the evidence; thus, Lamarck invoked empirical observations as indisputable truths that, once recognised, would simply elide any issues of professional disagreement over varying interpretations.[237]

Furthermore, it is critical to bear in mind that for Cuvier, in particular, empiricism represented not just an effective method of investigation, but also a height of achievement and prestige in the natural sciences. At the turn of the nineteenth century, natural history was still a relatively immature science in comparison to the systematisation of universal laws of nature that characterised recent developments in physics and astronomy. Operating under the assumption

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[234] Lamarck, *Recherches sur l'organisation des corps vivans* (1802b), iv; Lamarck, *Zoological Philosophy* (1809c [1914]), 7–8.

[235] For example, see Lamarck,"Avertissement." In: idem., *Histoire naturelle des animaux sans vertèbres* (1815–1822), i–xvi; and Lamarck, "Discours Préliminaire." In: idem., *Système analytique* (1820), 1–6. Lamarck frequently reproduced passages from his own earlier works in later publications, sometimes verbatim and sometimes with revisions or additions.

[236] Lamarck, "Sur l'étude des rapports naturels." In: Lamarck, Bruguière, Olivier, Haüy, & Pelletier (eds.), *Journal d'histoire naturelle* 1 (1792), 365–7.

[237] Ibid.

that natural history, too, could and should uncover fundamental laws of nature, Cuvier explicitly aspired to spearhead such a triumph, even asking, "and why should natural history not also have its Newton one day?" at the beginning of his *Discours sur les révolutions de la surface du globe*.[238]

No doubt the Englishman's prestigious reputation seemed appealing to Cuvier, who spent his career in Paris navigating the challenges of being both an outsider from the provinces and a Protestant;[239] however, his aspirations to Newtonianism did not shield him from criticism precisely on the grounds that he lacked, or had misinterpreted, empirical evidence for his arguments. Critically, Cuvier's arguments against the transmutation of species did not stop at empirical observations, but rather depended on a deductive line of reasoning that extinction was a general law of nature.[240] Though he considered the fossil record to support a theory of geological "revolutions"—sudden, radical changes in the earth's history that punctuated much longer periods of relative stability—Lamarck had long criticised his colleague for relying on a very limited fossil set of just a few large land species (some of which Cuvier had also made his career describing and naming himself). Lamarck's chairship as professor of insects and worms did not bring him into contact with so many large, flashy specimens like the Mastodon or Megatherium; however, he argued that his extensive collections of rather less exciting marine mollusks provided thorough empirical evidence against Cuvier's assertions. For one thing, such

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[238] Georges Cuvier, *Discours sur les révolutions de la surface du globe, et sur les changemens qu'elles ont produits dans le règne animal* (Paris: Chez G. Dufour et Ed. d'Ocagne, 1826 [1813]), 2.

[239] On Cuvier's ongoing difficulties securing his position among the Parisian scientific élite, see Outram, *Cuvier* (1984).

[240] See Cuvier, *Discours sur les révolutions* (1826 [1813]), 4–14.

aquatic organisms were unlikely to have been wiped out by "revolutions" like the floods Cuvier believed had taken out many of his large mammal populations, which suggested at the very least that extinction was not a general law of nature after all. Furthermore, Lamarck argued that his extensive invertebrate collections provided the observational proof that a species was not a true biological category, but an artificial classificatory concept that naturalists used by necessity in order to group together similar specimens. Having pored over the collections, Lamarck confirmed an argument he had already advanced in his botanical days: that, although two specimens might at first appear to be radically different to one another, there was in reality a continuous gradation of organisms stretching from one recognised species to the next. Indeed, with sufficient empirical observation, 'transitional forms' between recognised species were revealed to be more the rule of nature than its exception: "The richer our collections grow, the more proofs do we find that everything is more or less merged into everything else, that noticeable differences disappear, and that nature usually leaves us nothing but minute, nay puerile, details on which to focus our distinctions."[241] Thus, already by the *Zoologie* of 1809, Lamarck had zeroed in on his own critique of Cuvier's supposed empiricism, asking rhetorically what "experienced zoologist or botanist" could remain in doubt of his transmutationist theory.[242] The rhetoric of empirical science was slippery, and easily manipulable on all sides in professional disputes.

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[241] Lamarck, *Zoological Philosophy* (1809c [1914]), 37

[242] Ibid. 38

One further revealing example is a passage that first appeared in *Recherches sur l'organisation*, then again with heavy alterations in *Philosophie*. The passage defended a critical piece of Lamarck's physiology: the idea that organs or body parts that were used frequently would strengthen over time, whereas those that were neglected would weaken, eventually even shrinking and disappearing or becoming totally useless over the course of many generations. This mechanism, often referred to (though not by Lamarck himself) as the 'use–disuse principle,' was the means by which the fluid dynamics of everyday motion could, with habitual repetition, eventually alter the physiology in noticeable and even heritable ways. In the *Recherches* of 1802, the passage began with the idea that persistent use of an organ would strengthen it over time, and lack of use would diminish it.[243] At the bottom of this page, Lamarck introduced a hypothetical case: a population of children who were raised with one eye permanently covered. Indeed, this was the passage that Madame de Genlis objected to in her 1807 memoirs (discussed above in Chapter 1). In Lamarck's *Recherches sur l'organisation*, the hypothetical eye-covering case was explained in several paragraphs (the word "cyclops" appeared nowhere in the passage), before Lamarck moved to discussing real cases in the animal kingdom—including moles, the *aspalax*, certain avian anatomy, and the claws of quadrupeds—that he argued demonstrated his 'use-disuse' principle in action.

In *Philosophie*, on the other hand, the hypothetical example of selectively bred one-eyed children had been excised entirely, and the introduction of the idea of use and disuse was followed by an enjoinder: "Instead of contenting ourselves with generalities that can be

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[243] Lamarck, *Recherches* (1802b [2001]), 53

considered as hypotheticals, let us directly examine the facts"—that is, cases of existing animals in whose anatomy and physiology Lamarck believed he could identify real examples of organs that had changed in form or ability over time as a result of their habits.[244] Having already asserted that the influence of the environment on organic form and organisation was "a very positive fact"—phrasing that also did not occur in the earlier *Recherches* of 1802—he went on to present a litany of examples of this phenomenon, including the teeth of sharks and other vertebrates; the eyesight and blindness of moles, the Spalax, and the Proteus; the leglessness of snakes; and the winglessness of certain insects.[245] It is unclear whether Lamarck was aware of Madame de Genlis's response to this passage when he composed *Philosophie zoologique*, or indeed whether the hypothetical case of the one-eyed children may have provoked criticism from other commentators. Nevertheless, the editorial changes that he made to this passage between *Recherches sur l'organisation* (1802) and *Philosophie* (1809) suggest that he was at least convinced of the rhetorical value of appealing to 'positive facts'—that is, empirical observations—rather than hypotheticals, deductive reasoning, or the sort of theorising that might be more readily deemed 'system-building.'

As Burkhardt has pointed out, such methodological claims did not necessarily correspond with Lamarck's own way of practicing science.[246] Even in this particular passage, there is an obvious problem in his logic: the "positive facts" were merely the actual anatomical and physiological observations of various animals. The explanation of how these animals came to

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[244] Lamarck, *Philosophie zoologiqu*e, Vol. I (1809b), 239

[245] Ibid. 219; 240–246

[246] Burkhardt, *The Spirit of System* (1977), 210

exist in their current forms required Lamarck to make numerous assumptions and assertions, such as that it was part of the "plan of organisation" of reptiles for them to have four legs, and that therefore the leglessness of snakes was an anomalous condition requiring explanation through some secondary mechanism, such as the use and disuse of organs.[247] Still, Lamarck's own rhetorical emphasis on facts and observations complicates any idea that he was uniquely wedded to the anachronistic "systems" of Enlightenment natural philosophy, or that he consistently presented himself or his transformist work this way.

Indeed, in practice most naturalists found it difficult to stick to the rigid, purely empirical methodology that they sometimes claimed allegiance to. For example, Cuvier's supposedly analytical, empirical science has often been contrasted with the more synthetic, philosophical one favored during the Enlightenment.[248] But as Martin Rudwick has pointed out, Cuvier himself used the term 'facts' with nuance, permitting some low-level theorising as well as the interpretation, or "reading," of fossils in his paleontological work.[249] 'Analytical' and 'synthetic' science were not as disparate as they may first appear. In fact, throughout the eighteenth century the phrase "spirit of system" had been a favorite epithet among savants, "so popular and effective that everyone, on all sides of any given dispute, used it against everyone else."[250] None of this is to dismiss the importance of theorising and deductive reasoning in Lamarck's work, including

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[247] See Lamarck, *Philosophie zoologique*, Vol. I (1809b), 245

[248] Jessica Riskin, *Science in the Age of Sensibility* (2002), 12

[249] Martin J. S. Rudwick, *Georges Cuvier, Fossil Bones, and Geological Catastrophes: New Translations and Interpretations of the Primary Texts* (Chicago: University of Chicago Press, 1997); see especially chapters 10 and 15.

[250] Riskin, *Science in the Age of Sensibility* (2002), 12

his transformist theory. However, critiques—like Cuvier's—that portrayed such aspects of the theory as uniquely methodologically suspect, or scientifically anachronistic, were not just scientific disputes but also part of a larger strategy by which Lamarck and his contemporaries jockeyed for professional status and epistemological authority. These factors are crucial to bear in mind when assessing Lamarck's legacy and the reception of his theories.

**Medicine, physiology, and *idéologie***

At this point, it is necessary to begin examining Lamarck's physiological arguments in more detail. While my aim is not to defend these arguments, per se, reconstructing Lamarck's thinking requires understanding the ways in which he did ground his transformist theory in respectable medical and physiological positions of the day. Certainly, naturalists in this period could and did disagree with one another, particularly on sensitive issues like the question of species of transformation or the existence and origin of human moral agency. However, while Lamarck's ideas provoked their fair share of genuine criticism—such as from Cuvier[251] and Lyell—his investigations of living bodies were not so far outside of the scientific mainstream as to be self-evidently absurd. Some of his ideas were not even particularly novel: for example, as Burkhardt has shown, the theory of species mutability, i.e. evolution, was already accepted to varying degrees by many of the zoologists at the Muséum d'Histoire Naturelle by the first

[251] Cuvier's criticisms of Lamarck arose from a variety of concerns, including scientific objections as well as more overtly political and religious ones. Additionally, Cuvier and Lamarck each had to navigate the complicated terrain of science and scientific patronage in post-revolutionary France; Cuvier's reactions to Lamarck and his work were shaped by his attempts to secure his own career and scientific authority in a complex and shifting political context. On Cuvier's attempts to navigate such concerns, and how this played into his criticism of Lamarck, see Outram, *Georges Cuvier* (1984), especially Ch. 6.

decade of the nineteenth century.[252] To understand the role of voluntary action and the will in Lamarck's transformist theory, it is necessary to emphasise that on these topics, too, Lamarck was building from ideas already circulating amongst his peers—particularly the '*idéologie*' and physiology of Cabanis and others—as well as from his own medical background. He presented human moral agency not as a supernatural or vitalistic intrusion into the natural world, but as the natural, physical result of a process of physiological development that had occurred over time.

Like many naturalists of his day, Lamarck began his scientific career in pursuit of medical studies—in his case, he began these studies after he left the army in 1766. Accounts of this period of his life are sparse, but one letter from his daughter, Rosalie, reportss that he studied medicine at "l'école de médecine" (presumably the Paris Faculty) beginning in 1772—though the *nécrologie* of Étienne Geoffroy Saint-Hilaire (1772–1844), a published version of the remarks Geoffroy made at Lamarck's funeral on 20 December 1829, dated the beginning of his medical studies to 1768.[253] While Rosalie's letter did not specify how long her father's course had lasted, Geoffroy stated that Lamarck's studies occupied him for the following four years, a claim repeated by the historian Marcel Landrieu in 1909. Although Landrieu was unable to find any record of Lamarck in the medical school's archive,[254] the 1830 auction catalogue for Lamarck's personal library includes more than two dozen texts on medicine, physiology, and

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[252] Burkhardt, *The Spirit of System* (1977), 201–209

[253] Étienne Geoffroy St.-Hilaire, "Nécrologie de M. de Lamarck." Printed in: *Gazette médicale de Paris* 1 (1830), 14.

[254] Landrieu relayed that the archives of the Paris Faculty of Medicine from the years predating the Revolution had been lost, and the "Commentaires de ce qui s'est fait et passé de remarquable à la Faculté de médecine de Paris" in the Bibliothèque contained no record of Lamarck. Landrieu speculated that he may have been affiliated only with the Faculté's "brilliant rival" l'Académie de Chirurgie (Landrieu, *Lamarck, le fondateur du transformisme*, 1909a), 25 n. 2.

anatomy, including several reference books from the 1770s.[255] As this much makes clear, Lamarck was aware of anatomy and physiology not just as a naturalist, but also insofar as they formed the basis of broader efforts to understand and enhance human health and well-being.[256]

Nor was medicine an entirely theoretical interest for Lamarck: in an unpublished lecture on the phrenologist Franz Joseph Gall (1758–1828) preserved in manuscript form, Lamarck discussed actually having treated numerous patients who had contemplated suicide (his treatment involved dandelion, emetic, and Hoffmann's drops, an ether solution).[257] He posited that, for afflicted individuals, the tendency to suicide was the result of a monthly cycle of general physiological disturbance and heightened sensitivity—a cycle whose cause he could not identify, though the theory of lunar disturbance was evidently considered plausible enough for him to specify that he disagreed with it. This, then, is an example of how his physiological knowledge, his interest in medicine, and his atmospheric and meteorological studies all functioned as elements of his larger investigations of living beings. For Lamarck, the link between organisms and their environments was quite tangible: as early as his *Recherches sur les causes des principaux faits physiques* (which, although published in 1794, was drafted between 1776 and 1780), he argued that living bodies were shaped by the motion of certain vital fluids, namely

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[255] The "Catalogue des livres de la bibliothèque de feu M. le chevalier J.B. Lamarck" (1830) grouped Lamarck's books loosely by subject matter, and the overtly medical, physiological, and anatomical texts appear on pp. 4–5, nos. 63–94.

[256] Many Europeans interested in zoology, anatomy, and natural history similarly sought medical training. Indeed, according to John Zammito, "Medicine was the only academic and professional path for a naturalist in early modern Europe" (*The Gestation of German Biology*, 2018), 7.

[257] Reproduced in Wheeler & Barbour, *The Lamarck Manuscripts at Harvard* (1933), 35–38.

electricity, caloric, and the magnetic fluid.[258] According to his theory, these fluids passed freely between the environment and an individual's body, meaning that the animal's physiology was always enmeshed in a larger process of material exchange and circulation with the outside world. Inside the body, the fluids underwent "animalisation," and, having done so, maintained the animal's irritability and caused its vital movements. As the fluids flowed through the cellular tissue in response to the animal's received impressions, they carved out new channels and "tubes," over time resulting in a more complex organisation.[259] In more developed species, this process had eventually created an organ of intelligence, which became sufficiently complicated to carry out the judgments and deliberations necessary for the organism to *will* certain actions.[260]

This process also explained how a natural phenomenon, like certain environmental conditions or cyclical changes, could cause or exacerbate a condition like suicidality—which was, after all, simply the subjective manifestation of certain cerebro-physiological processes. Indeed, Lamarck often referred to the circulation of the vital fluids as part of the "*économie animale*," a term that had been adopted by Montpellier medical vitalists in the eighteenth century to express a monistic view of humans as both physical and moral beings.[261] Within this medical

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[258] See also Lamarck, *Zoological Philosophy* (1809c), 188–189; Lamarck, *Recherches sur l'organisation* (1802b), 157–200.

[259] See Lamarck, *Zoological Philosophy* (1809c), 201–233; see also Smith, *The Problem of Life* (1976).

[260] Lamarck, *Zoological Philosophy* (1809c), 355

[261] On the *économie animale* and Montpellier medicine, see Bernard Balan, "Premières recherches sur l'origine et la formation du concept d'économie animale." *Revue d'histoire des sciences* 28.4 (Oct. 1975), 289–326; Charles T. Wolfe and Motoichi Terada, "The Animal Economy as Object and Program in Montpellier Vitalism." *Science in Context* 21.4 (2008), 537–579; and Philippe Huneman, "Montpellier Vitalism and the Emergence of Alienism in France (1750–1800): The Case of the Passions." *Science in Context* 21.4 (2008), 615–647. Lamarck used the term *économie animale*, as well as the related *organisation animale,* in every major text from the *Recherches sur les causes* of 1794 through the *Système* of 1820. For this insight I am indebted to the text-searchable editions of Lamarck's works uploaded by CNRS under the direction of Pietro Corsi, https://redi.imss.fi.it/lamarck/index.php?lang=en.

framework, the consonance between a body and its surroundings was a matter of physics, a conviction that motivated Lamarck to publish his yearly meteorological almanacs from 1799–1810 and to send two copies of his *Mémoires de physique et d'histoire naturelle* (1797) to the faculty of the École de Santé to keep in the school's library.[262] The intimate *rapports* between the physical and moral aspects of human existence made physics and meteorological observations foundational to both physiology and medical practice, a view that Lamarck also shared with Cabanis and that supported his claim that his almanacs could be useful not only to farmers and mariners, but also to doctors (see, e.g., the cover of Lamarck's 1803 almanac).

Certainly, Lamarck was never primarily known as a physician, and it is unclear how many patients he personally treated, or how much time he spent practicing medicine at all. However, it is important to bear in mind that he repeatedly and deliberately presented his physiological knowledge as having value not just in the study of animals or the 'species question,' but also for those interested in curing human bodies. Indeed, in the discours d'ouverture of his 1809 lecture course on invertebrate zoology, he directly addressed himself to those of his students who studied "the art of healing," asking,

> Who cannot see that the knowledge we can obtain from [the naturalist's] research can shed great light on those changes in state that our own organization undergoes, on those changes that we can cause it to undergo by means of our actions, on the means of increasing and perfecting our faculties, on the means of conserving in its best possible state the health we enjoy?[263]

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[262] The letter in which Lamarck provided this explanation, dated 29 floréal an V, was reproduced as "Lettre inédite de Lamarck à l'Assemblée des Professeurs de l'École de Santé." Legrand, Noé (ed.), *Bulletin de la Société française d'histoire de la médecine* 8 (1909), 185–6.

[263] Lamarck, "Discours d'ouverture de mon cours pour 1809." In: Max Vachon (ed.), *Inédits de Lamarck: D'après les manuscrits conservés à la Bibliothèque centrale du Muséum national d'histoire naturelle de Paris* (1972), 214.

Not only does this make clear the link that Lamarck wanted to draw between medicine and natural history, it also brings us to the importance of voluntary action—the will—in such discourses. After all, medical intervention is not a purely 'natural' process, but one by which human beings could improve or ameliorate their own biology. And as is apparent in this quote, Lamarck assumed that such conscious interventions had essentially the same outcome as any other change to the human organisation—that is, physiology could be altered either by impersonal natural forces or by deliberate human actions. Indeed, the capacity for voluntary action was itself dependent on the physiology, meaning that there was a sense in which humans intervening in their own physiology was simply part of a larger process by which nature acted upon itself

Lamarck believed that biological functions—he referred to these generally as "faculties"—each depended on specific organs and organ systems; if the corresponding organs did not exist, the faculty could not either. Thus, in the same way that an animal with no eyes or damaged eyes could not see, an organism without a nervous system, prima facie, could not feel.[264] This non-feeling category included all plants as well as the simplest and lowest animals—though, unlike plants, lower animals had an additional faculty of irritability, by which they could be moved by outside stimulus.[265] Irritability could occur at any point on the animal's surface and did not require specialised parts the way sensation did; it arose directly from what Lamarck called the "orgasm," a state of tension that resulted from the "exciting cause" of life.[266] Both the

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[264] See eg. Lamarck, *Philosophie zoologique*, Vol. 1 (1809b), 205

[265] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b) 40

[266] See Lamarck, *Philosophie zoologique*, Vol. 1 (1809b), 411–2.

orgasm and the exciting cause were essentially heuristic devices: Lamarck argued that since vital motions were stimulated, rather than transmitted in the purely mechanical way of non-organic motion, there must be some exciting cause capable of animating bodies whose existence he was justified in assuming. He also considered the orgasm to vary in strength, and to be stronger in animals than in plants, simply on the circular grounds that animals displayed irritability whereas plants did not. He stated that the "special cause" exciting life was "to be found in the environment" and varied according to environmental factors like location, season, and climate. In this way, he argued, he had avoided the temptation to "thoughtlessly attribute to some special organ an existence essential for life to be able to occur."[267] Thus Lamarck presented this argument as being a naturalistic explanation, not a supernatural one, though he never provided a full explanation or argument as to what this exciting cause of life actually was, or how it arose.

In addition to irritability, complex animals had developed a nervous system, which received impressions on their senses that could move their "inner feeling" [*sentiment intérieur*], which in turn drove nervous fluid to the muscles in order to stimulate motion.[268] These animals thus moved by their own power, though they still required stimulation from an external sensory impression in order to begin a motion. Their nervous systems consisted of nerves spread throughout the body that could receive sensations, as well as a central nucleus to which to convey these sensations; Lamarck often referred to the central nucleus as a brain, though by this he did not mean an organ that could produce intelligence or thoughts. It was only in higher

[267] Ibid. 355–356

[268] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 146; 289–290

animals that intelligence could be found; it depended on the existence of the "hypocephalon," which in vertebrates appeared as the two soft, wrinkled hemispheres covering the medullary mass. This organ, an add-on to the brain that encompassed the nervous nucleus but was not necessary for the existence of a simple nervous system, existed in extremely imperfect form in fish and reptiles; showed more development in birds; and was at its highest in the late orders of mammals, with humans at the top end of this series.[269] Only in intelligent animals could intellectual acts—thoughts, judgments, and acts of will—determine the animal's movements by stimulating the emotions of the *sentiment intérieur* in order to direct the nervous fluid toward specific muscles.[270] Thus, it was only in these select, higher animals that movement could be willed or voluntary (see Fig. 1).

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[269] Ibid. 160–162. N.b.: Although Lamarck believed the organ of intelligence was most developed in vertebrates, he believed it was possible that a select few cephalopod molluscs belonged to this subset of "the most perfect" animals, and possessed a true hypocephalon and a rudimentary capacity for intelligent acts. Besides such late orders of molluscs, the intelligence generally appeared from simplest to most highly developed in fishes, reptiles, birds and then mammals, with the faculty reaching its maximal development [*tous ceux qu'elle peut avoir*] in this last group.

[270] Ibid. 289–290

| Faculty | Organ | Capacity for motion | Example |
|---|---|---|---|
| Irritability | No special parts, but required stronger orgasm than plants possessed | Exclusively when impelled by external stimulus | Most polyps; infusorians |
| Feeling (sensitivity) | Nervous system (nerves and central nucleus) | Motive force operated from within the organism by means of the *sentiment intérieur*, but had to begin with a sensation stimulated by an external cause | Insects; most molluscs |
| Intelligence | Hypocephalon (two soft, wrinkled hemispheres in addition to pre-existing central nervous organ) | Motive force operated from within the organism by means of the *sentiment intérieur*; could be excited by external sensory stimulus ('physical sensibility') or by intelligent acts (thought, judgment, will) that determined an action and stimulated the sentiment intérieur to direct nervouse fluid to the correct muscles ('moral sensibility') | Mammals; birds; reptiles |

**Fig. 1: Development of the nervous system and the capacity for motion in the animal scale**

Lamarck was certainly not the first or only naturalist to describe organic faculties as being dependent on specific organs in this way, or to use this argument to explain why lower animals lacked intelligence and the capacity for voluntary action. For example, his remarks on the role and importance of the nervous center for allowing an animal to act by will echoed similar assertions made by the conservative second-generation *idéologue* Anthelme Richerand (1779–1840) in his *Elémens de physiologie* (1801), a copy of which Lamarck held in his personal library at the time of his death.[271] Lamarck cited Richerand 13 times throughout *Philosophie*, at times to disagree with a physiological point but more often to bolster his own arguments. Richerand was a surgeon and physiologist, and his physiological writings were informed by his own experience and research; in addition, like Lamarck, he was heavily influenced by Cabanis.

[271] Anthelme Richerand, *Elements of Physiology*, translated by G. J. M. De Lys & John D. Goodman (Philadelphia: James E. Moore, 1801 [1823]), 27; "Catalogue des livres de la bibliothèque de feu M. le Chevalier J.B. de Lamarck" (1830), 5

Common elements of all three men's writings include not just their arguments about intelligence and the will, but also aspects of the "hydraulic" model of physiological change that Lamarck relied on.[272]

Indeed, as Elizabeth Williams has pointed out, Lamarck was hardly alone in borrowing from the science of *idéologie* for his physiological arguments. The Idéologues were critical in the broader Parisian medical revolution of the 1790s onward, organising and sustaining investigations in the human sciences within scientific institutions and societies, as well as providing a sensationalist epistemology that many medical reformers adopted—especially in the early years before *idéologie* became associated with the threat of radical materialist politics.[273] This was the sensationalist tradition that Lamarck worked within—guiding, for example, his belief that all ideas originated from the senses, and his conviction that the physical and moral aspects of man were inextricably linked and mutually capable of acting upon one another. Furthermore, the Parisian reformers and Idéologues in the 1790s–1800s had major intellectual, interpersonal, and institutional links to the medical teachings and culture of the Montpellier school. Cabanis himself, who was educated in the Montpellier clinical school by his intellectual mentor J. B. L. Dubreuil (1748–1783), wrote that Montpellier teachings, particularly the emphasis on the sensibility, were of such profound significance to medicine that they would eventually become a new foundation for the entire discipline.[274] Viewed within the context of

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[272] On Lamarck's 'hydraulic' model of the body, see Lamarck, *Zoological Philosophy* (1809c [1914]), 201–233. On similar models from other European physicians in the early modern period, see Staum, *Cabanis* (1980), 55–63.

[273] Elizabeth A. Williams, *The Physical and the Moral: Anthropology, physiology, and philosophical medicine in France, 1750–1850* (1994), 76–77.

[274] Ibid. 73–76

this intellectual culture linking Paris to Montpellier, and *idéologie* to Enlightenment medical vitalism, it should therefore come as no surprise that elements of Montpellier thought, like the animal economy, appeared in Lamarck's writing. The sensationalist ideas he adopted from Cabanis, Richerand, and others were situated within a broader medico-physiological discourse and medical reform movement; Lamarck was not aberrantly clinging to outmoded Enlightenment ideas, but grounding his transformist theory in one of the major medical currents of turn-of-the-century Paris.

Of course, this was not an unproblematic association for Lamarck. As early as 1800, French medical men and their ideas were popularly associated with materialism, and by 1830, this perceived link was an even more powerful rhetorical tool for critics of medicine. The perception was that medical authors had rejected the tendancy, embraced in other areas of French thought, toward spiritualism—especially since 1815.[275] Instead, medicine remained in thrall to what were now perceived as outdated Cabanisian theories, most fundamentally the idea that the moral domain was ultimately nothing but the physical as considered from a different viewpoint.[276] This was the root of Cabanis's argument that the study of mind was subordinate to the science of physiology, granting naturalists and physicians a uniquely valuable perspective on human psychology, as well as on political issues like educational reform; Lamarck, too, grounded his understanding of the mind in his physiology, and concurred with Cabanis that the

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[275] L.S. Jacyna, "Medical Science and Moral Science: The Cultural Relations of Physiology in Restoration France." *History of Science* vol. 25 (1987), 113.

[276] C.f. Immanuel Kant, *Groundwork of the Metaphysics of Morals*, translated by Mary Gregor and Jens Timmermann (Cambridge: Cambridge University Press, 1998).

‘moral’ and the ‘physical’ both took their basis in the physical organisation.[277] Thus, as these Cabanisian ideas increasingly came to be perceived as materialist and passé during the first few decades of the nineteenth century, it was perhaps the very fact that Lamarck had developed his theory within this established framework—and not as an idiosyncratic or fringe position—that made him a ripe target for certain criticisms of his arguments about the mind and voluntary action.

In his *éloge* of Lamarck, Cuvier portrayed him as a “solitary” figure working on the fringes of the scientific community, whose isolation meant he had "never had the chance to be contradicted,” making him prone to excessive confidence in his own speculative ideas.[278] However, as Dorinda Outram has pointed out, this was a very shrewd framing, and one that did not necessarily reflect accurately on Lamarck’s actual social status. Rather, Cuvier was taking aim at the idea that Lamarck had been a solitary 'martyr to science,’ a narrative that had already begun to take shape during Lamarck's lifetime, and that admirers had used to portray him positively as a great and uncompromising naturalist.[279] Lamarck may indeed have struggled to persuade others of his theories in part due to a degree of interpersonal difficulty,[280] but he was never definitively isolated from the Parisian scientific community in the way Cuvier’s comments may seem to imply. Lamarck retained positive relationships with at least a handful of prominent naturalists, such as Geoffroy and Thouin, and according to Pietro Corsi and Raphaël Bange,

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[277] Lamarck, *Philosophie zoologique*, Vol. 1 (1809b), 364

[278] Cuvier, Éloge Historique de M. de Lamarck” (1861 [1832]), 192

[279] Outram, “The Language of Natural Power” (1978), 157; on the myth of Lamarck as an isolated martyr, see also Corsi, “The Revolutions of Evolution” (2011), 117.

[280] See Burkhardt, “Lamarck, Evolution, and the Politics of Science” (1970).

attendance at his lectures remained steady between 1816 and 1820 (beginning in 1821, Lamarck's lectures were delivered by his colleague Pierre André Latreille [1762–1833] in his place).[281] Moreover, Lamarck's ideas in themselves were not so much the product of an overactive imagination—Cuvier's accusation—as they were an attempt to systematically develop ideas that were already circulating in savant circles, particularly sensationalist psychology and the idea that living beings might have a developmental history.

Thus, a perception of Lamarck as an isolated or marginalised figure, prone to flights of unrestrained speculation, risks perpetuating misconceptions not just about Lamarck himself, but also about the French intellectual context he worked within. Often, such a reading of Lamarck has been influenced by Cuvier's *éloge*—but, as Outram has shown, *éloges* were complex literary and rhetorical forms through which Cuvier was not just commemorating or criticising his colleagues, but also staking out the boundaries of legitimate scientific practice and authority.[282] Examining Lamarck's arguments in the context of both his medical background and the immense intellectual debt he owed to Cabanis and sensationalism, it is clear that his physiology and his defense of species transformism were grounded in ongoing, widespread naturalist discussions and debates. This includes his remarks on the role of voluntary action and intelligence in species transformation: Cuvier distorted Lamarck when he claimed that Lamarck believed lower animals were capable of genuine free will, but it is true that Lamarck did believe that sufficiently intelligent animals, namely humans, could act freely and could even modify their own species-

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[281] Bange & Corsi, "The students of Lamarck in numbers." Unpublished. Accessed August 2023. https://redi.imss.fi.it/lamarck/ice/ice_book_detail.php?lang=en&type=text&bdd=lamarck&table=bio_lamarck&bookId=21&typeofbookId=4&num=

[282] See Outram, "The Language of Natural Power" (1978)

biology over time. This was neither a new nor a particularly radical position, but one grounded in his *idéologie*-inflected faculty physiology, as well as in his understanding of plant and animal breeding, as discussed in Chapter 1.

**Intelligence, freedom, and the will**

A willed act always depended on an animal's judgment, and all such mental activities were aspects of thought, meaning that they could therefore only be carried out by the organ of intelligence.[283] Lamarck's ideas about the role of the will in evolution should therefore not be confused with the caricature of a water-bird willing membranes to spontaneously form between its toes, as Cuvier and Lyell had each mockingly suggested. However—like Buffon, Cabanis, and many of his *idéologue* influences—Lamarck did consider humans to be sufficiently intelligent that they could consciously interfere in the process of species development. He understood biological changes to the human species as being in a mutually determining relationship with existing social and political conditions, and thus he believed that social reform and management of the environment were both key factors in the ongoing development of the species; it was with reference to this linkage that he claimed that naturalists had a uniquely valuable perspective on social and political issues. He did not present his theory of species transformation as depending on an immaterial psychic element of desire; rather, he located an animal's will, desires, and thoughts as the outcome of a long developmental process in which the physiology grew ever more complex and new organs differentiated. This sort of developmental

[283] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 358

argument was not a strictly new one in Lamarck's national and intellectual context, nor was the idea that it might provide a natural history of intelligence, voluntary action, and moral agency: as we have seen, Lamarck drew heavily from his mentors and contemporaries as he developed and explicated these ideas. By arguing that accumulated physiological changes could eventually breach the species barrier, Lamarck did extend the idea of plasticity beyond what Buffon and Cabanis had argued. However, the idea that organisms grew more complex and intelligent over generations of development was certainly nothing new to the scientific mainstream in Lamarck's day.

It is also critical to recognise that, according to Lamarck, not all acts of will were equally free. According to him, animals with an organ of intelligence "control [*dominent*] more or less their power to act, according to the perfection of their organ of intelligence."[284] The will at its most primitive was merely a name for the capacity to self-move; it was only in very highly developed organisms that will could involve the sorts of free, reasoned actions and decisions constituting any degree of moral agency. Even for humans, the will was only "more or less free," as it was still a function of the physiology.[285] On a physiological level, it was the motion of the nervous fluid that caused an organism to act, and the fluid flowed through the previously existing channels and tubes in the organism's tissues. A new environmental stimulus could create new channels, especially if the stimulus was strong and was repeated over time, causing the organism

[284] Ibid. 313

[285] Ibid.

to adopt new habits and daily activities. But this was a slow process, and any specific act of will was still largely dependent on the actual condition of the organism's physiology.

While human actions thus had some degree of direct determination by the material body and environment, the will also controlled a portion of the nervous fluid, stimulating it "by means of the emotions of [the] inner feeling."[286] These emotions could be physical (that is, aroused by the sensation of external objects) or moral (arising from ideas or thoughts already impressed on the organ of intelligence), and could sometimes even lead to actions on their own, without the intervention of the will.[287] In order to act by will, whether freely or not, animals needed the "intimate feeling of their existence," or *sentiment intérieur*, which was a generalised sense of self that arose from the amalgamation of all their physical sensations.[288] Intelligent animals could even notice [*apercevoir*] this feeling, and for those limited few like humans who had sufficiently complex processes of thought and attention, this "noticing" formed the basis of a self-aware consciousness.[289] However, even for humans, the process of deliberating and willing an action had an element of self-deception built in. The will was always dependent on the judgment, itself a function of the physiology of the organ of intelligence, and so for Lamarck the will was "free in appearance," yet guided and constrained by all of the habits and conditions that modified the organisation over time.[290]

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[286] Lamarck, *Zoological Philosophy* (1809c [1914]), 300

[287] Ibid. 336

[288] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 256

[289] Ibid. 313

[290] See Lamarck, *Zoological Philosophy* (1809c [1914]), 337–360.

Lamarck very deliberately claimed agnosticism on the topic of a soul or vital principle, stating that "The only knowledge that we can acquire [of an exciting cause of organic movements] is, and always will be, confined to what we can glean from the study of [nature's] laws; beyond nature, in a word, is only confusion and lies."[291] He explicitly denied that matter itself could possess the faculty of sensitivity,[292] but argued instead that it was only the being "in its entirety" that could feel, a position that has led Bernard Baertschi (2005) to argue that for Lamarck, feeling was an emergent property (see also Kaitaro 2008).[293] It was on this basis that Baertschi categorised Lamarck as a materialist, and indeed intelligence, will, and one's *sentiment intérieur* were all material phenomena in the sense that Lamarck considered matter a necessary precondition for any such subjective experience. Nevertheless, and complicating Baertschi's conclusions, it is important to recognise that Lamarck considered the moral and physical domains to be ontologically distinct, even if they were intrinsically united. Intelligent beings experienced not just physical needs and emotions, but moral ones as well. It was via these latter that humans could excite their own "will to action," while the former simply resulted in automatic, involuntary acts.[294] Lamarck's materialism should therefore not be understood as precluding him from maintaining a belief in human moral agency—but neither should his

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[291] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 3; see also Lamarck, "Nature." In: *Nouveau dictionnaire d'histoire naturelle*, Vol. 22 (1818b), 343–399; and Lamarck, *Système analytique* (1820), 8.

[292] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 252

[293] Baertschi, "Diderot, Cabanis and Lamarck" (2005), 451–463; see also Timo Kaitaro, "Can Matter Mark the Hours? Eighteenth-Century Vitalist Materialism and Functional Properties." *Science in Context* 21.4 (2008), 581–592.

[294] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 294

remarks on willed actions or the moral aspects of intelligent organisms be read as referring exclusively to genuinely freely chosen actions.

It is also important to emphasise that, like Cabanis, when Lamarck wrote about *morality* he used the term broadly, opposing it to the purely physical (physiological) aspects of organisms. The moral aspects of man did include what we might narrowly think of as 'free will' or moral agency, but humans were far from the only organisms to have moral aspects or moral emotions in a Lamarckian sense; in this broader sense, a *moral emotion* was not necessarily a free or conscious one. Thus, when Lamarck recognised a distinction between the "physical sensibility" and the "moral sensibility," this was not strictly a distinction between automatic and involuntary action. In animals that had sensitivity (a nervous system) but lacked intelligence (a hypocephalon), sensations stirred by external objects could produce some need, stirring an emotion in the *sentiment intérieur* and thus driving nervous fluid to the muscles that would need to act in order to satisfy the provoked need.[295] This was the physical sensibility (Fig. 2), so-called because it originated with a sensory impression received from an outside stimulus.

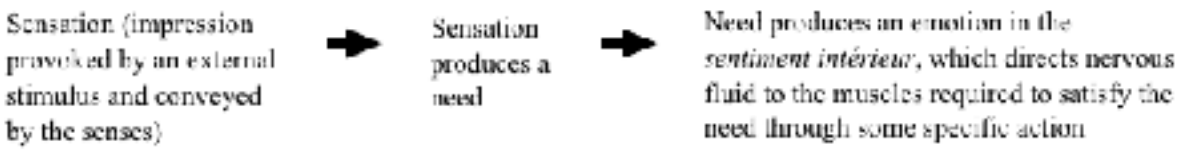



**Fig. 2: The physical sensibility**

[295] Ibid. 289–90

On the other hand, although animals with an organ of intelligence could, and often did, act via their physical sensibility, they additionally had the capacity for movement that began with their own thoughts and feelings: this was the moral sensibility (Fig. 3). In this process, it was a thought—which arose when the nervous fluid traced over the hypocephalon and transmitted to the *sentiment intérieur* the impression left by some previous stimulus—that provoked an emotion in the *sentiment intérieur*. Simultaneously, an intelligent judgment moved the will, which in turn determined the animal's intended action, and the corresponding muscles to which the *sentiment intérieur* would direct the nervous fluid.[296] (See Figs. 2, 3.) These acts of will were what could introduce an element of choice into an animal's movements, but animals with a will—even humans—were still subordinate to the conditions of their organisations as modified by their previous habitual actions.[297]

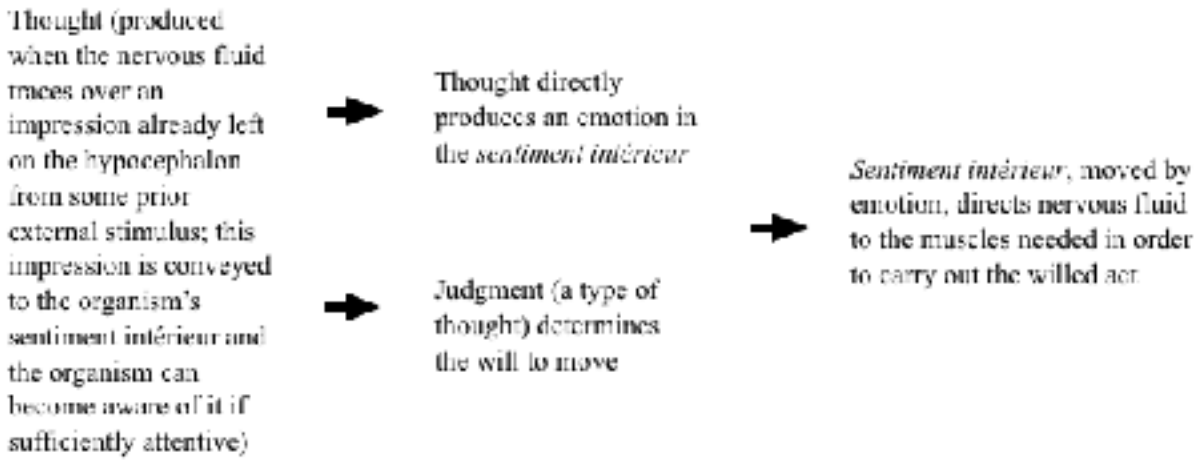



**Fig. 3: The moral sensibility**

[296] Ibid.

[297] Ibid. 313, 337

Adding a final level of complexity to Lamarck's conception of voluntary action, he argued that "since the will is always dependent on some judgment, it is never truly free"—by which he meant to emphasise that a determination of the will did not arise de novo, but followed as the result of a chain reaction of intellectual acts.[298] A judgment itself was, "like the quotient in an arithmetic operation, a necessary result of the elements comprising it."[299] What created the false belief in total freedom of determination was the multitude of component elements entering into any given judgment; the fact that these elements could be wrongly excluded, included, or overlooked on the basis of various prejudices; and the fact that they could be qualitatively affected by a person's disposition, health, age, sex, habits, propensities, prior knowledge, and other factors.[300] Thus, for Lamarck a willed act was, in one sense, actually a determined event: the will always depended on a judgment, which in turn was simply the result of any component thoughts—with these thoughts themselves resulting from the physiology of the organ of intelligence, as altered by habit and the impressions left by external stimuli. As Lamarck stipulated, "all operations of the understanding are equally [*aussi*] physical acts," meaning that thoughts and moral actions could be phenomenally described by the fluid dynamics of the nervous system, the organic physiology, and the impressions made by external objects on the sensitivity.[301]

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[298] Ibid. 342

[299] Ibid.

[300] Ibid.

[301] Ibid. 368

Yet Lamarck clearly did not consider humans to be mere bio-chemical machines, and his belief that the will was constrained did not prevent him from writing about humans as having agency and choice in their activities. Indeed, in the final pages of *Philosophie*, he contrasted reason to instinct on precisely the grounds that instinctual actions occurred "without choice or deliberation;" what distinguished humans even from other reason-possessing animals was that humans could "acquire a great deal of reason, and use it to direct the majority of [their] actions."[302] Thus, and although the *will*, in the limited sense in which Lamarck used this term, was free only in appearance, it is clear that he considered humans to be capable of some genuine choice in their actions. All intellectual acts were, simultaneously, physical processes—and, as a naturalist, it was these physical processes that Lamarck claimed he was qualified to discuss. However, by attributing reason and intelligence to a sufficiently complex organisation, he also preserved in his system a place for human voluntary action that he could describe in naturalistic terms. Philosophically this may have been something of a sleight-of-hand: he never provided an account of how the physiology, which operated on material laws of motion and cause and effect, could produce or support genuinely free acts of consciousness, which evidently had material

[302] Ibid. 449

instantiations but were not reducible to such bio-chemical phenomena.[303] Still, heuristically assumed or not, reason—which is really to say, the highly complex organisation that allowed for the cultivation of reason—served in Lamarck's system as the naturalistic basis for humans' ability to deliberate and act freely.

Voluntary action was thus a kind of dialectic between the material body and the subjective experience, but it was a developmental relationship. This understanding of the moral domain was what led Lamarck to argue that "the moral feeling exercises in course of time a greater influence on the organisation than the physical feeling is capable of working."[304] An organism's habits and actions were not just the direct consequences of its physical environment. Rather, each new idea that was impressed onto the organ of intelligence changed the physiology subtly, and a self-aware organism could make judgments and carry out acts of will that were mediated by this organ of intelligence. Lamarck's views on the will and moral feeling thus drew from a monistic-materialist perspective, and were clearly far more nuanced than Cuvier's absurd portrayal of animals 'willing' their own organs into existence.

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[303] A related, and analogous, problem occurs in Lamarck's description of self-directed motion in animals with a nervous system. Though he generally argued that physiology was a 'hydraulic' system of fluids and tubes that operated according to natural laws of motion, in sensitive animals the *sentiment intérieur* had a dual role, both receiving perturbations in the nervous fluid and directing a portion of that fluid to the muscles that needed to move in response. Lamarck gave no explanation as to what made the *sentiment intérieur* capable of acting as both subject and object of animal motion; he only defined it as an "intimate feeling of their existence" that sensitive animals possessed and that "endows animals with the faculty of acting by emotions which cause them internal excitement" (Lamarck, *Philosophie zoologique*, Vol. 2 [1809b], 255). The *sentiment intérieur* was thus fundamentally different than the rest of the physiology in the sense that it had the ability to actively "direct" other parts, rather than simply receiving and transmitting motion according to the laws of mechanics (see Ibid., 289–290). How this ability actually arose, Lamarck did not say. He provided an account of self-driven motion that did not invoke a soul or vital principle, but also did not contain a complete mechanical or material explanation to replace such a thing. Like the orgasm, the *sentiment intérieur* frequently reads more as a heuristic assumption than as a direct product of physiological observation.

[304] Ibid. 291–292

**Physiology and social reform**

Thus, it is crucial not to dismiss the importance of self-directed physiological change in Lamarck's thought. After all, it was the repeated motion of the vital fluids that carved out and widened certain channels and tubes inside the physical organism, and the individual's own thoughts and actions that directed those fluids. Habitually repeating the same actions, or living in the same environmental conditions, would thus form and re-form one's physical organisation, and such changes could be inherited. From "stale air" and malnourishment to climate to education to being forced to submit to authority—any physical or social aspect of one's manner of living would eventually make its mark upon the body.[305] Lamarck was quite clear that this process influenced the intelligence, too, insofar as it was the product of a particularly complicated organisation. "One observation that has struck me for a long time," he wrote in his 1802 *Recherches sur l'organisation des corps vivans*,

> is that having remarked that the habitual use and exercise of an organ proportionally develops its extent and faculties, just as lack of use proportionally diminishes its strength … I noticed that of all the organs of the human body, the one most forcefully subdued to this influence … is the organ of thought—in a word, the brain of man.[306]

His conviction about the special susceptibility of the brain to acquired changes was also grounded on his discussion of the physiology as a hydraulic mechanism. According to this model, an 'impression' on the hypocephalon was not a metaphor, but a literal inscription left by the agitated nervous fluid on the delicate tissue of the animal's cerebral hemispheres. The

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[305] Lamarck, *Zoological Philosophy* (1809c [1914]), 114, 160, 383, 399; Lamarck, *Système analytique* (1820), 284, 342–344

[306] Lamarck, *Recherches sur l'organisation* (1802b), 125–126

simplest ideas were the direct impressions made by external objects upon the sensory organs, conveyed by the nervous fluid to the organ of intelligence; each one was etched into a specific part of the brain's physiology (though this organ had to be sufficiently primed by an act of attention in order to receive and retain new impressions), and could then be recalled in the future when the nervous fluid traced over that same place and conveyed the resulting perturbations to the *sentiment intérieur*. Though Lamarck did not attempt to explain exactly how this process of engraving worked—to do so would be to "risk committing one of the numerous abuses to which the imagination gives rise"—he was quite clear on the fact that it was a literal, physical description: ideas were "really traced and engraved on" the brain, and he explained the loss of memory over time as a smoothing or blurring of the impressions carved into this organ.[307] Impressions were also easier to make and preserve when an organism was younger and its hypocephalon softer and more delicate; tissue became stiffer and more fixed with age.[308]

All of this meant that the brain played a critical role in the overall process of re-shaping the physiology, even as the brain itself was also part of this physiology and subject to the same sort of constant change. External objects impacted upon the sensing organs, altering the brain as the nervous fluid inscribed their impressions onto its tissues; in sufficiently intelligent humans these simple sensory ideas could later be recalled and recombined into more complex ideas and judgments that informed acts of will and the cultivation of new habits. In turn, these new actions, habits, and life-style choices then altered the rest of the physiology and informed what sort of

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[307] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 377

[308] Ibid. 378

sensory input a person was exposed to in the future. The environment and the physiology were in constant interplay with one another, and the organ of intelligence was both a subject and an object of this process.

For Lamarck, then, 'willing' one's own physiological change could simply mean slowly altering one's own physiology by the deliberate cultivation of certain habits or life-style choices. Intelligent animals were still strongly subordinate to the power of habit, but they could choose to introduce variation into at least some of their own actions, and more so the more "perfect" their organ of intelligence was.[309] Additionally, one's faculty of judgment—a critical component of intelligence, and the impetus for acts of will—could be developed and strengthened by practiced use, though according to Lamarck, many people were denied the opportunity to do so due to habits imposed upon them from youth, such as being forced to submit to external authorities and to conform to the beliefs of others.[310] In general he believed that the intellectual faculties had to be developed in each individual through repeated use, which would strengthen the corresponding special organs.[311] In other words, the physiology of the hypocephalon was a function of an individual's habits and circumstances; certain "tendencies" could be inherited from one's parents, but this was not quite the same as possessing an innate ability or trait. The mental physiology was plastic, particularly in a person's youth, meaning that it was was not simply determinant of a person's actions, but changed in response to them.

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[309] Lamarck, Philosophie zoologique, Vol. 2 (1809b), 313; 319. Lamarck used the concept of 'perfection' in at least two different senses in the *Philosophie*, but here he meant it to indicate a higher degree of development and physiological complexity.

[310] Ibid. 436

[311] Ibid. 364–365

Although Lamarck's account of moral character suggested that any sufficiently intelligent animals might deliberately effect some self-improvement, the capacity for judgment and complex reasoning set humans apart regarding the extent to which they could capitalise on knowledge of the natural world to ensure and direct their own social progress. Because of his belief that the brain was particularly susceptible to the effects of habitual actions and thoughts, and that the physical organisation was most malleable in youth, a habit or inclination that one persistently indulged as a child could eventually result in irreversible physiological changes in that individual.[312] In *Philosophie zoologique* he listed, as primary circumstantial factors in organic variation, the climate, temperature, atmosphere, place, manner of living, and daily actions and habits.[313] Substantial physiological changes on a species level, such as the appearance of a new organ, could take millennia, but the effects of habituation were apparent within an individual's lifespan. Lamarck's argument was not an essentialist one, but he did entertain the possibility that certain traits might become fixed in a given individual over the course of their life. Thus, the effects of habituation and the environment could be constraining in this relative sense, even as the species more broadly always remained physiologically malleable and responsive to any future changes in lifestyle and circumstances.[314]

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[312] Lamarck, *Zoological Philosophy* (1809c [1914]), 370

[313] Ibid. 114

[314] Lamarck's account of instinctual behaviors described them as examples of such *relatively* fixed traits: two parents who had developed similar habits and propensities could pass along the acquired changes in their organization to their offspring, who would then be inclined toward similar behavior. In infants the instincts dictated their behavior more or less mechanically, but this did not mean that Lamarck believed in 'innate ideas.' See Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 362–364.

Such habit-induced changes were central to Lamarck's consideration of how human society might benefit from the lessons to be learned from his transmutationist natural history. While Lamarck was not active as a politician or social reformer, he did discuss some striking social implications of his physiological arguments. For instance, he considered early education to be particularly important for the advancement of both individuals and a society, as it would force people to strengthen their intellect in their youth while it was most soft and malleable; direct their attention to their moral (and not just physical) needs and well-being; and inculcate in them the habit of varying their thoughts, which would in turn stimulate the complex ideas and mental operations that led to higher development of the physical, natural, political, and moral sciences.[315] This was a way of effecting social change via manipulation of human physiology: education 'worked,' according to Lamarck, because it compelled people to fix their attention on the external objects impacting on their senses, thus ensuring that more and varied ideas would be impressed onto the hypocephalon instead of simply passing by unnoticed.[316] Thus, a properly educated person could benefit physiologically from the stimuli provided by their environment; in contrast, those whose circumstances forced them to be continually occupied with "the same ideas, doing the same work" suffered monotony in mind as well as body.[317]

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[315] Lamarck, *Zoological Philosophy* (1809c [1914]), 398

[316] Ibid. 399

[317] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 414–415

This latter was a problem Lamarck saw as an unfortunate consequence of modern civilisation.[318] Whereas people in a state of nature would all be more or less equally exposed to a variety of experiences and influences, with civilisation came the poverty of the multitude, who were reduced to "coarse and arduous work which … considerably limited their ideas."[319] Repeating the same actions and habits meant that the vital fluids would constantly rush over the same few ideas in the brain, and then through the same few tubes and channels in a person's bodily physiology. This meant in turn that many people were missing out on the variation in the motion of the vital fluids that would normally drive the development and complication of the organisation, particularly in the brain.[320] Instead, for those whose actions became limited and repetitive, the motion of the fluids was correspondingly confined, causing their habitual thoughts and actions to become ever more entrenched. Life-style and organisation exerted a mutual influence on one other, and, under such constrained circumstances, the intellectual faculties could not develop according to their full potential. Habits impressed upon people in their youth could discourage the development and proper exercise of the judgment, resulting in a population taught to believe whatever they were told and to submit to external authorities; such habituation,

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[318] While Lamarck did not categorically exclude the possibility of 'civilized' countries or peoples outside of Europe, in his published works he was generally referring to Europeans when he discussed the state of humans in civilization. See Lamarck, *Histoire naturelle* (1815–22), 280; passage reprinted in Lamarck, *Système analytique* (1820), 209.

[319] Lamarck, *Système analytique* (1820), 282

[320] Lamarck, *Recherches sur l'organisation* (1802b), 128; see also Lamarck, *Philosophie zoologique*, Vol. 1 (1809b), 374.

Lamarck maintained, was a bigger cause of an underdeveloped faculty of judgment than were simple idleness or carelessness.[321]

Over time, the tendency for civilisation to limit people's daily actions and thoughts led to a corresponding "scale of degrees of intelligence," which Lamarck believed created the biological conditions for certain people to dominate and abuse others.[322] Those who varied their daily activities and work would slowly strengthen and develop their organs of intelligence, but those who repeated the same actions every day, whether by their own volition or due to circumstances outside their control, would stagnate—a concern that Cabanis had also raised in regards to workhouses.[323] Lamarck considered the resultant scale of intelligence to be a barrier to the improvement of human society. In fact, he argued that diminishing the inequality between people's intellectual faculties was the most important thing for humanity's betterment [*perfectionnement*] and happiness.[324] While civilization had produced a few geniuses—in *Recherches sur l'organisation* (1802), Lamarck named Newton, Bacon, Montesquieu, and Voltaire as examples—it left "the immense multitude" vulnerable to abuse and domination by the more powerful few.[325] These variations in people's manner of living were, for Lamarck, a natural-historical explanation of social inequalities—that is, humanity's natural history was also its social history.

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[321] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 436

[322] Lamarck, *Système analytique* (1820), 280–285, 332–333

[323] P.J.G. Cabanis, *On the relations between the physical and the moral aspects of man*, translated by Margaret Duggan Saidi (Baltimore: Johns Hopkins University, 1802 [1981]), 432.

[324] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 345

[325] Lamarck, *Système analytique* (1820), 209

That humans were endowed with intelligence thus indicated the possibility for conscious self-betterment, as cultivating the right habits and environment would favorably mould their organisation. Over time, the human species as a whole could make itself more intelligent, happier, and more sociable. But this was only one possible future, and Lamarck thought it would be difficult for those in civilisation, with its strict division of labour and dull, repetitive life-styles, to achieve this end. While he was aware that there were many other theorists who had advanced ideas about how best to improve society on a moral basis, he, like Cabanis, was of the opinion that they proceeded in ignorance if they did not take note of the insights to be derived from natural history. Correctly understood, the two approaches necessarily complemented one another. "As the objects I am going to consider have been considered as the exclusive domain of the *moralist*," he wrote in *Histoire* (1815–1822), "the obvious part belonging to the *naturalist* has not been sufficiently recognised."[326] The naturalist's contribution was critical for ensuring social harmony, cooperation, and social progress. Without a proper physiological understanding of the origins of human actions and tendencies, it would be virtually impossible to direct one's own conduct, or that of others, in a manner favorable to the improvement of society.

By writing about the effects of a person's environment on their organisation, Lamarck placed himself in ongoing conversations about the sorts of biological and social threats France was facing. His conviction that humans could direct and control their own physiology was the foundation of his proposed answer to these threats. For Lamarck, then, *biologie* was bound up inextricably with social change and moral agency, and he was always attuned to the links he saw

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[326] Lamarck, *Histoire naturelle* (1815–1822), 281

between the history of nature and the future of society. Natural and social transformation produced humans as moral agents endowed with free will, and humans could in turn change their own bodies and environments, continually re-forming and re-creating society. This was the real role of the will in biological change.

**Critical reception: form and function**

The naturalists of Lamarck's inellectual milieu generally accepted the notion that nature was at least somewhat plastic, and were aware of living beings' capacity to alter their appearance and to be altered—for example, by humans, who might selectively breed plants or animals for various reasons. Thus, those who raised objections to Lamarck's ideas generally were not trying to deny that living bodies admitted any degree of change; rather, debates focused on the degree of such change, and how it might come about. One particular point of contention was Lamarck's assertion that it was an animal's habits and needs that would drive physiological changes—even resulting in the development of new organs—rather than the animal's form and physiology determining what sort of habits and life-style it could engage in.

This issue was at the heart of Cuvier's criticisms of Lamarck: for Cuvier, an organism's form was determined by its 'conditions of existence,' and not the other way around. Certainly Cuvier was opposed generally to the idea of species mutability, having begun defending species fixity in 1799.[327] More specifically, however, Cuvier's teleological 'functionalist' view clashed with Lamarck's belief that habitual actions drove an organism's physiological adaptation to its

[327] See Outram, *Georges Cuvier* (1984), 122

environment.[328] Thus, for example, a contemporary attendee of Cuvier's lecture course of 1805 noted that Cuvier made "ironic comments … on the formation of different organs by habits" as he was "ridicul[ing]" Lamarck's *Recherches sur l'organisation* of 1802.[329]

Disputes over the relationship between organic form and function extended beyond the increasingly contentious relationship between Lamarck and Cuvier. The issue reared its head again in the 1830 Cuvier–Geoffroy debates, which pitted Cuvier's teleological views and empiricist methodology against Geoffroy's transcendentalist 'philosophical anatomy' and his emphasis on deriving universal laws of nature rather than simply accumulating positive facts. As this much indicates, the philosophical debate over functionalism was terrain on which numerous contentious issues were to be found, including questions about final causes, the existence of God, and the relationship between living beings and their environments. Questions also simmered about the role of free will in processes of organic change, as in Cuvier's *éloge* of Lamarck; Cuvier's was an argument by reductio ad absurdum, but it also belied a genuine concern that attributing organic development to an act of animal will would encroach upon the wisdom and omnipotence of a divine Creator. Moreover, Cuvier was not the only naturalist to criticise Lamarck on these grounds.

Lamarck's conviction in the power of habitual action to alter the physiology was a point of friction between his transformism and the essentialist 'cranioscopy' (later dubbed *phrenology*) of Franz Joseph Gall. Although Lamarck agreed with the general principle that an organ or body

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[328] On the Cuvierian teleology and its relation to Aristotelian notions of causality, see Appel, *The Geoffroy-Cuvier Debate* (1987).

[329] Quoted in Corsi, *The age of Lamarck* (1988), 181.

part would become more prominent if it was exercised routinely, he thought that Gall exaggerated the extent to which personality traits and intellectual abilities manifested in distinct new shapes and ridges of the skull, except in a select few extreme cases. He also argued that Gall had a tendency to view traits that were merely "dominant" as innate, which was not just a "dangerous opinion" but also a "genuine error."[330] For his part, Gall criticised Lamarck's assertion that the physiology could be altered in response to an organism's actions, arguing that Lamarck "supposes that the feeling of need occurs before the interior organs, and that the exercise of the exterior organs precedes the existence of these organs"—in other words, that Lamarck was attributing physiological development to a feeling of need that, in actuality, could only be its outcome.[331] Furthermore, Gall continued, Lamarck had no explanation for where early organisms' inclinations would have come from: could a snake have chosen to acquire the legs of a giraffe, or a blind mole the eyes of an eagle? Finally, would it not have been more befitting a wise Creator to have endowed each organism with its unique physical form and

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[330] Lamarck, *Philosophie zoologique*, Vol. 2 (1809b), 364; Lamarck also made his position clear on p. 360, stating that the intellectual faculties were not innate but the product of habitual use and development throughout an organism's life.

[331] Gall & Spurzheim, *Des dispositions innées* (1811), 97–98

internal faculties from the first, rather than waiting for animals to develop differentially through accidents of circumstance?[332]

Although Gall was generally not someone of whom Cuvier held a high opinion, on these particular points their arguments partially converged—not just in the false accusation that Lamarck had attributed some form of free will to lower animals, but also in their shared conviction that it was an animal's form and organic characteristics that determined what sorts of actions it was suited for, rather than attributing this to the process whereby its habitual actions shaped its physiology. For Cuvier, this distinction came back to an argument about the "conditions of existence"—the circumstances and environment in which a species lived, which he thought had to have been determined in harmony with the animal's morphology, such that animals were naturally adapted to their ecological niches and had no need to undergo the sorts of major physiological changes Lamarck's system described. In an 1832 lecture at the Collège de France, Cuvier's criticism of Lamarck thus tied together an argument about functionalism (that it was absurd for Lamarck to have believed that it was "habits and functions which, over time, had created organs") with a misrepresentation of Lamarck's comments on the nervous fluid—which

[332] Ibid., 99–100. N.B. Somewhat like Lamarck himself, Gall was often accused of developing and defending a theory that was fatalist, materialist, and atheistic; Gall's defense of the idea of innate intellectual faculties was a frequent target of criticism from such detractors. Although he sometimes spoke of natural science as operating within a different domain than religion—meaning that his doctrine of cerebral localisation would neither confirm nor deny the existence of God of human free will—he also made other references throughout his work to God as a kind of divine architect or intelligent creator. He does not seem to have regularly attended church services despite having been raised in a Catholic family, but Paul Eling and Stanley Finger (2021) conclude that his personal belief in God was likely sincere, and that it may be accurate to describe him as a Deist. See Eling and Finger, "Franz Josef Gall on God and religion: 'Dieu et Cerveau, rien que Dieu et Cerveau!'" *History of the Behavioral Sciences* 58.2 (Spring 2022), 183–203.

was, in Cuvier's gloss of Lamarck's ideas, a fluid whose movement was "determined by a very strong desire" that could enhance and alter parts of the physiology by sheer force of "passion."[333]

Thus, references to Lamarck's position on the importance of habits and needs in shaping the physiology often blended together elements of numerous overlapping concepts in the life sciences—including Cuvierian ideas of functionalism, questions about the attribution of will or agency to non-human animals, and phrenological conceptions of psychological fixity and brain localisation.[334] For example, an early work by the physician–philosopher Louis-Françisque Lélut (1804–1877) characterised Lamarck as having believed that an animal's habitat gave rise to its needs, counterposing this position to his gloss of Gall as having asserted on the contrary that it was the biological needs that determined what habitat an organism was to live in.[335] Although this line is relatively inconsequential to the rest of the work, it is indicative of what was at stake when Lamarck defended the idea of self-driven physiological change: not just the idea of biological plasticity, but also a broader debate about form and function, and the use of teleological arguments in the life sciences. In his *Treatise on physiology* (1837), the German neuroanatomist Karl Friedrich Burdach (1776–1847) linked Lamarck's idea that "the organisation was determined by the manner of life" to the overtly materialist-empiricist arguments of the Enlightenment philosophe Claude Adrien Helvétius (1715–1771) about the role

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[333] Georges Cuvier, "Quatrième Leçon." In: *Histoire des sciences naturelles depuis leur origine jusqu'à nos jours, chez tous les peuples connus*, vol. 3, rédigée, annotée, et publiée par M. Magdeleine de Saint-Agy (Paris: Chez Fontin, Masson, et Cie., Libraires, 1841), 85–87.

[334] Furthermore, Gall's ideas in particular were also the subject of epistemological debate, as Cuvier in particular sought to define the bounds of élite scientific practice in exclusion of both popular scientific practice and 'pseudo-sciences.' See Outram, *Georges Cuvier* (1984), Ch. 6.

[335] Louis-Françisque Lélut, *Qu'est-ce que la phrénologie?* (Bruxelles: Établissement Encyclographique, 1837), 198.

of education in "moral individuality," and stated that both Lamarck and Helvétius had placed inadequate emphasis on the "independence" of "type" of living beings.[336] Burdach was heavily influenced by the German idealist Naturphilosophie movement; these lines suggest that for him, an argument like Lamarck's, which emphasised the role of habits and circumstances in re-shaping the physiology, posed a threat to the idea that living organisms were defined by some biological, morphological, or metaphysical essence or identity.

An 1844 treatise by the physician and anthropologist Julien-Joseph Virey (1775–1846) also linked a critique of materialism in the life sciences with opposition to the idea of physiological plasticity. Virey's language recalled Cuvierian ideas about functionalism: Virey argued that physiologists who had followed Lamarck in "confus[ing] as identical … life and organisation" thus misunderstood organs as resulting from their functions, rather than the other way around.[337] This quasi-Lamarckian position Virey presented as depending on an organism's agency: an animal "aspiring" to flee something painful or bothersome would "strive" [*s'efforcerait*] to create new organs and body parts in order to meet its needs—a process that plainly could not explain adaptive changes in insensate plants.[338] Virey's rhetorical strategy of eliding the argument about habituation with a mechanism of voluntary action recalls remarks that Cuvier had made previously: for example, glossing Lamarck in an 1831 lecture, Cuvier had stated that according to Lamarck, "It is the habits and above all the will that give rise to the

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[336] Karl Friedrich Burdach, *Traité de physiologie considérée comme science d'observation*, translated by A.J.L. Jourdan, T. 8 (Paris: J.-B. Baillière, 1837), 570–571.

[337] Julien-Joseph Virey, *Examen critique des faits touchant le vitalisme* (Paris: imprimerie de Bourgogne et Martinet, 1844), 4.

[338] Ibid. 5

formation of organs."[339] Although this was of course a misrepresentation of Lamarck's own beliefs about voluntary action and physiological change, Virey evidently perceived such ideas as rhetorically effective enough to take a similar tack in his own work. His passage presented this notion in a larger critique of physico-chemical and mechanical ideas in physiology, including Dutch physiologist Herman Boerhaave's (1668–1738) "static-hydraulic mechanism" and Hallerian ideas about irritability—both genuine influences in Lamarck's work. Virey was also generally opposed to the sensationalism and materialism of Condillac and Cabanis, respectively. Although he was amenable to some of Lamarck's ideas about the plasticity of nature, he consistently perceived dangerous religious consequences lurking in any transformist doctrine that allowed for a self-evolving natural entity capable of operating without direct intervention from a supernatural element, vital force, or supreme intelligence.[340] Thus, when Virey criticised Lamarck and his ilk for treating function as prior to form, his commentary was grounded in a religious argument that specifically took issue with his understanding of Lamarck's beliefs about self-driven evolution. In this reading, to assert that an organism's habits could alter its physiology was to supplant the divine will with a natural one.

This is not to say that Lamarck's argument about the effects of habit was wholly rejected during his lifetime. For example, in an 1816 treatise, the German physiologist Friedrich Tiedemann (1781–1861) attributed to Lamarck the systematic explication of the effects of habit

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[339] Georges Cuvier, "Cinquième leçon." Printed in *Gazette Littéraire* (Paris: Paulin [Maison Sautelet et Comp], 27 janvier 1831), 140.

[340] See Pietro Corsi, "Julien-Joseph Virey, le premier critique de Lamarck." In: Scott Atran et al (eds.), *Histoire du concept d'espèce dans les sciences de la vie*. Paris: Fondation Singer-Polignac (1987), 181–192.

on cerebral anatomy and function, and argued that on the contrary, Gall and Spurzheim's "hypothesis of the plurality of the cerebral organs" posed a barrier to understanding the importance of habits and education.[341] Tiedemann, whom Timothy Lenoir considered a second-generation 'teleomechanist,' was influenced by Lamarck as well as Cuvier, and the teleological ideas of the 'Göttingen school' of the late eighteenth century; Tiedemann, like many of his German peers, sought to unify principles of Cuvierian anatomy with the 'embryological criterion,' the assumption that anatomical homologues indicated a common developmental ancestor.[342]

Even among readers who did not accept that habitual changes could account for speciation, Lamarck's ideas were not wholly rejected: for example, a Dr. François Simon (1759–?) of Metz published a treatise on hygiene in 1827 in which he expressed that Lamarck's transmutationist argument "may seem risky," but agreed that "we must at least recognise that the influence of the circumstances in the milieu in which we live, that is habit, produces the differences that we remark upon between animals of the same species, between the diverse varieties of man, and in the customs and pronounced characters of the inhabitants of certain countries."[343] Indeed, Simon thought that the effects of habituation produced physiological distinctions between workers employed in different types of labour, citing the curved spines of gardeners and the supple ligaments of acrobats; he also considered incarcerated people to be

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[341] Friedrich Tiedemann, *Anatomie du cerveau*, translated by Antoine-Jacques-Louis Jourdan (Paris: J.–B. Baillière, 1823 [1816]), XXXIX.

[342] See Timothy Lenoir, *The Strategy of Life: Teleology and Mechanics in Nineteenth-Century German Biology* (Dordrecht: Springer Netherlands, 1983), 54–56.

[343] François Simon, *Traité d'hygiène appliquée à l'éducation de la jeunesse* (Paris: Villeret, 1827), 310.

adapted to their "revolting" prison air, to the extent that they could, perversely, even come to find the salubrious outside air unbearable in comparison.[344] Thus, for Simon and to some degree also for Lamarck, habitual actions could over time function as a kind of inscription of social class onto the body, reinforcing the existing social order through the alteration of individuals' biology; I will further explore such connections between hygienic discourses, including occupational hygiene, and Lamarckian notions of transmutation and adaptation in Chapter 5.

**Concluding remarks**

As this chapter has demonstrated, assessing Lamarck's legacy demands attention to both the details of his physiological arguments and the intellectual context in which he worked. Despite Darwin's perception of "Lamarck nonsense," in his own context, Lamarck's transformist ideas were not particularly outlandish or even unprecedented. Though there was legitimate controversy among his intellectual peers in regards to some of his claims—the idea that biological plasticity could breach the species barrier; the role he attributed to habit in the development of species; his assertion that voluntary actions could alter the physiology—none of these ideas was so far outside the scientific mainstream as to appear irredeemably absurd on their face. Indeed, as I have shown, much of Lamarck's transmutationist physiology was grounded in principles already expounded and defended by others, particularly Cabanis. That these ideas provoked criticism, such as from Cuvier, indicates not that they were uniformly deemed outside the bounds of legitimate scientific practice, but on the contrary that such boundaries were

[344] Ibid. 309

constantly being defended and re-negotiated. Lamarck's name and legacy were contested even within his own lifetime, as in, for example, the contrast between Cuvier's attempts to portray him as an isolated and overly speculative 'system-builder,' versus Geoffroy's frequent depiction of him in the late 1820s as a wise, aged and blind 'martyr to science' whose wisdom had been unjustly ignored in his own time.[345] In truth such narratives, and others—such as the 'precursor myth,'[346] or efforts in the early twentieth century to rehabilitate Lamarck by using ideas attributed to him in order to compensate for perceived deficits in Darwin's theory of evolution[347]—tell us at least as much about Lamarck's readers, critics, and acolytes as they do about Lamarck himself.

This chapter has revolved around the issue of the will in Lamarck's transformist thought, namely the argument that sufficiently intelligent animals could, over time, exert a conscious effect on their own physiology by modifying their actions to preferentially develop certain organs, muscles, or body parts. In order to contextualise this idea and the powerful criticism of it perpetuated by Cuvier and Lyell, I have first introduced some of the methodological debates in European natural history in the early nineteenth century. Although Lamarck was certainly not a

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[345] See e.g. Corsi, "The Revolutions of Evolution" (2011); and Appel, *The Cuvier–Geoffroy Debate* (1987).

[346] See, for instance, Glass, Temkin, & Straus, Jr. (eds.), *Forerunners of Darwin* (1968 [1959]); and Barthélemy-Madaule, *Lamarck, the Mythical Precursor* (1982). In the early twentieth century, the conception of Lamarck as a forerunner to Darwin was also invoked by some French historians, often using the precursor myth to argue that Lamarck's theory was unjustly ignored prior to Darwin's. For example, see de Nussac, "Lamarck et le muséum d'histoire naturelle" (1912), 64–68.

[347] Many of these scholars were proponents of an expanded, 'Neo-Lamarckian' version of Lamarck's arguments, or at least attested to the increased popularity of Lamarckism and Neo-Lamarckism during this period, particularly in the US. For example, see Packard, *Lamarck, the Founder of Evolution* (1901), 332–367; Landrieu, *Lamarck, le fondateur du transformisme* (1909); Wheeler & Barbour (eds.), *The Lamarck Manuscripts at Harvar*d (1933), xiii-xxxi; Nordenskiöld, "Lamarck" (1936), 316–330; and More, "Lamarck" (1925), 163–184.

pure empiricist, and thus the portrayal of him as a 'system-builder' is accurate to some extent, I have emphasised that this insult was hurled at savants on virtually any side of any given issue, and that even a supposed empiricist like Cuvier allowed, in practice, some degree of theoretical speculation to enter his own work. This much bolsters my argument that Lamarck's remarks on the will and voluntary action were not simply a result of inserting a psychological or vitalist mechanism into his more empirically grounded anatomical and physiological observations.

Rather, a close examination of Lamarck's physiological system reveals that he was firmly committed to the claim that any will, consciousness, or moral aspects of an organism were, ultimately, the product of the material physiology and its developmental history. Indeed, it was on this basis that he presented his social commentary—such as remarks on the importance of early education or the dangers of repetitive manual labor—as being grounded in his expertise as a naturalist. Also of interest in this respect is his background in medicine, conceived of in this milieu as a broad embrace of efforts to reform society by improving and tending to human health. Such interventions could range from exposing the populace to virtuous and salubrious sensory stimuli, to treating mental maladies that arose from the interplay of the physiology and the environment, to attempts to encourage favorable traits and tendencies to develop in adults and then to eventually reappear as inherited characteristics in their offspring. Thus, and although Lamarck did believe that some non-human animals possessed intelligence and a capacity for voluntary action, the role of the will in his transformist theory was primarily as a means by which humans could study and ameliorate themselves, on both an individual and a species level.

Voluntary action was not a primary mode of organic alteration, as in the caricature of a water-bird willing its toes to form membranes; it was not even a capacity that most animals possessed, and even for those that were sufficiently intelligent, most of their actions were still constrained by their habitual movements and thought processes, and thus were not purely 'free.' Yet, to deny that Lamarck saw any interplay between free will and physiological development would be to ignore the ways in which his transformist ideas developed in response to, and in the context of, broader debates about biology and society, and how naturalists should and could contribute to national improvement and regeneration. In this respect Lamarck was not a particularly anomalous or even novel thinker; he drew heavily from sensationalist epistemology and *idéologie*, and was not the first naturalist to suggest that the earth and living beings had a developmental history, nor even that developmental organic plasticity could go so far as to be the mechanism of speciation.

None of this is to deny that Lamarck was genuinely prone to fallacious thinking at times, or that his theories sometimes wanted for evidence. As I have shown throughout this chapter, Lamarck attempted a Cabanisian solution to the philosophical problem of free will by attributing both the physical and the moral aspects of living beings to a fundamental physico-chemical reality. However, in practice this means that at critical points in his argument, he simply made heuristic assumptions or invoked forces or functions he could not directly observe. For example, trying to differentiate organic motion from the simple series of transitive causes characterising a non-living mechanism of motion, he invoked an "exciting cause" of life; in more highly developed organisms he also attributed to the *sentiment intérieur* (itself an assumption of

rhetorical necessity rather than a directly observed entity) a dual role whereby it could both receive impressions and actively direct the nervous fluid in the highly specific ways needed to stimulate particular motions (see Figs. 2, 3).

These elements of Lamarck's physiological system are genuine weaknesses, in the sense that they are not based in direct anatomical observations; however, it is important to emphasise that Lamarck also did not present these elements as vitalist insertions into his physiological system. Life and will, according to him, were both natural processes with natural histories; whether or not his argument is philosophically convincing, it is important to make clear that he did not present himself as appealing to supernatural or vital forces in his discussions of intelligence, the will, and human society. Rather, it was the very fact that voluntary action was supposedly the product of natural history and the physical organisation that gave Lamarck grounds to claim a special expertise for naturalists in certain social reformist efforts. Thus, my argument in this chapter is not that Lamarck's physiological arguments must be rehabilitated or defended, but that, if we want to understand the role he saw for voluntary and deliberate action in the process of speciation and biological transformation, then it is necessary to bear in mind that for him, all conscious and mental processes were also physical phenomena. The 'physical' and the 'moral' came to exist in forms differentiated enough to speak of them in such terms only by a gradual process of natural development; there was no insertion of a soul or other metaphysical entity in order to produce thought, consciousness, or morality. Thus, where Lamarck did affirm a role for deliberate action in species transformation (namely, where humans were concerned) this was not a departure from materialist or empiricist arguments; convincingly or not, he presented

the will and other moral aspects of humanity as functions of the brain's physiology, and therefore as being just as much within the purview of the naturalist as the development of any other organ. This point is critical in order to understand how Lamarck has been misrepresented, both by those who accused him of portraying all evolution as a matter of desire, and by those who have tried to defend him by denying that he saw any causitive role for voluntary action in the evolutionary process whatsoever.

Finally, this chapter has concluded with remarks on the controversy over functionalism, a point that Cuvier, especially, appealed to in order to criticise Lamarck. In the context of the ongoing French national debates introduced in Chapter 1, and the physiological discussion in this chapter, it is clear that arguments over biological form and function were contentious because they provoked questions about materialism, free will, and the existence of God. Lamarck's idea that habits caused biological alterations was a troubling one not just for naturalists, but for anyone concerned about such moral and philosophical debates. Notably, one strategy in criticism of Lamarck's comments on form and function was to conflate habitual actions with willed actions, thus suggesting that Lamarck himself had believed that all adaptation and evolution was ultimately driven by an animal's passions or desires. In pointing this out, my aim is not simply to reiterate that this was a misrepresentation of Lamarck's views, but to drive home the fact that such criticism of Lamarck for supposedly absurd ideas about animals willing their own biology to change arose in the context of wider debates about morality, religion, and how the nascent biological sciences could bolster or threaten such ideas.

**Chapter 4: Lamarck's transformism in medical context**

Today, Lamarck is remembered primarily as a zoologist and a botanist, albeit one whose legacy cast a long shadow in French natural history and life sciences more broadly. However, the connections between Lamarckian biology and medicine have received less attention in the secondary literature. In Chapter 1, I introduced the political and scientific context preceding Lamarck's work, and contemporaneous to it. Here, I focus on the medical context more specifically. I argue that attention to the history and practice of medicine is germane to studies of Lamarck for three main reasons.

First, after leaving the army in 1766, Lamarck himself pursued medical studies—a common practice for European naturalists in the eighteenth century, as medical faculties still offered one of the only academic and professional paths for those interested in zoology, anatomy, natural history, and more.[348] Accounts of this period of Lamarck's life are sparse, but a letter from his daughter, Rosalie, along with remarks from the funeral éloge delivered by Étienne Geoffroy Saint-Hilaire and archival research conducted by the historian Marcel Landrieu, confirm Lamarck's studies, mostly likely beginning in 1772 and lasting four years. Additionally, the 1830 auction catalogue for Lamarck's personal library includes more than two dozen texts on medicine, physiology, and anatomy, including several reference books from the 1770s.[349] Nor was medicine an entirely theoretical interest for Lamarck: in an unpublished lecture on Franz Gall preserved in manuscript form, Lamarck discussed actually having treated numerous patients who had contemplated suicide (his treatment involved dandelion, emetic, and Hoffmann's drops,

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[348] Zammito, *The gestation of German biology (*2018), 7.

[349] "Catalogue des livres de la bibliothèque de feu M. le chevalier J.B. Lamarck"(1830)

an ether solution; see Chapters 2 and 4).[350] Lamarck never seems to have made his living primarily as a physician; however, his investigations into living beings consistently unified his physiological knowledge with his atmospheric and meteorological studies to form a complete picture of how the body functioned. For Lamarck, the link between organisms and their environments was quite tangible: in his view, living bodies were shaped and altered by the motion of certain vital fluids, namely electricity, caloric, and the magnetic fluid.[351] Thus, although not primarily a doctor himself, he was consistently aware of the medical implications of his work, and at times explicitly addressed physicians and medical students as people who might benefit from and adopt his ideas.[352]

Second, French medicine in the early nineteenth century encompassed more than just the individual clinician–patient relationship. Building off the work of Elizabeth Williams, I argue that medicine in the last decade of Lamarck's life, and into the nineteenth century, must be understood as an interdisciplinary endeavour that spurred on many of the ideas and intellectual approaches later associated with 'social sciences,' especially anthropology and ethnology. Doctors were not only concerned about treating individual patients, but also with investigations into the nature and well-being of human society. This more expansive view of medicine is most accurately located as a pursuit of the 'science of man,' and involved academic and political pursuits in additional to clinical practice. Insights from zoologists, physiologists, and natural historians were freely synthesised in this intellectual tradition, which considered the remit of

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[350] Reproduced in Wheeler & Barbour (eds.), *The Lamarck Manuscripts at Harvard* (1933), 35–38.

[351] See Lamarck, *Zoological Philosophy* (1809c [1914]), 188–189; idem., *Recherches sur l'organisation des corps vivans* (1802b [2001]), 157–200; idem., *Recherches sur les causes des principaux faits physiques*, Vol. 1 (Paris: Chez Maradan, 1794).

[352] See e.g. Lamarck, "Discours d'ouverture de mon cours pour 1809" (1809a [1972]), 214.

medicine to include debating philosophical questions about the nature of humanity in addition to conducting more narrow investigations into health and disease. Thus, debates about—for example—the origins and ages of species were relevant to medical practitioners and writers as well as to naturalists.

Third, and following from the above, Lamarck's name was directly cited in some medical texts; his published works were sometimes listed as recommended reading for those interested in or studying medicine; and even some clinical and patient-focused medical practices in the nineteenth century were predicated on Lamarckian ideas about human physiology and its susceptibility to change. Though Lamarck was certainly not the only naturalist to argue that species were mutable, or that habituation could alter the physiology, his position at the Muséum national d'Histoire naturelle meant that his name was often invoked or cited in scientific and medical literature as a respectable savant, and many of his ideas continued to circulate after his death—among his direct acolytes as well as among many naturalists and physicians who became familiar with him indirectly.

Thus, in this chapter I first give an overview of the role of French medicine in the early nineteenth century, focusing on the legacy of Cabanis to show the rising professional status of physicians during this period. By the end of the nineteenth century, physicians possessed political power in France that would have been impossible and perhaps unthinkable even a century earlier; additionally, and like many scientific disciplines, medicine underwent a process of professionalisation over the nineteenth century, and gradually amassed a great deal more social and professional prestige. Simultaneously, physicians in the early nineteenth century were also engaged in debate and discussion internal to the discipline over how medicine ought to be

practiced and what its epistemological foundations were. I thus examine a few physicians' writings as case studies, including those of the alienist Philippe Pinel (1745–1826) and one of his critics.

Next, I discuss the relationship between medicine and the nascent 'social sciences,' particularly anthropology and sociology. Building off the work of Elizabeth Williams, I situate Lamarck's legacy within the tradition of 'anthropological medicine' and discuss the shift toward population thinking and efforts to locate society itself as an object of scientific knowledge. This included mathematical tools like vital statistics, medical topographies, ethnographies, and notions of statistical and medical 'normality.' Throughout the nineteenth century such medical and scientific study of the population became an increasingly valuable method in the French state's biopolitical endeavours, a connection that will be explored more thoroughly in Chapter 5 below.

Finally, I discuss some of the medical literature and practices that directly named Lamarck, or relied on elements of his biological arguments. Citations of his name were not always particularly substantive; some sources simply invoked him as a respected figure to bolster their own arguments, or listed his works without a great deal of elaboration. However, and without over-emphasising the importance of Lamarck as an individual in the practice of nineteenth-century medicine and naturalism, I argue that such citations still give us a reasonable sense of his intellectual stature, particularly in medical treatises. Then, focusing on the prescription of gymnastics and physical exercise, I examine some common medical practices and beliefs that rested on Lamarckian ideas, whether the authors cited him by name or not. Some such authors doubtless absorbed these ideas indirectly, or from other savants (such as Cabanis).

Nevertheless, the persistence of such ideas about habituation, biological malleability, and physiological alterations throughout the French nineteenth century still suggests that the debates and discussions Lamarck contributed to were both popular and influential, throughout his life and in the subsequent century. Lamarckian and transformist ideas about physiology remained pervasive, in medicine in particular, long after Lamarck's death and were often foundational for clinical physicians—as well as for others interested in human bodies and health.

**Cabanis: medicine and politics**

As I have discussed above in Chapter 1, the science of *idéologie* was only truly en vogue for a relatively brief period, but cast a long shadow over French philosophy, medicine, and psychology across the nineteenth century. The Idéologues held their most concentrated institutional power under the Directory government, and in general tended to espouse moderate liberal and republican positions. However, even after their rising tensions with Napoleon and then the Restoration monarchy had led to the suppression of the Faculty of Medicine in 1822, elements of *idéologie* and the closely related sensationalist psychology remained influential in French medicine.

*Idéologie* itself was never a singular scientific method, but described a loose methodological family (often referred to by 'Idéologues,' such as Cabanis, as *analysis*) that aimed to uncover the deeper truths and universal laws that structured phenomenal observations. It was this quality that led the historian of medicine George Rosen to describe *idéologie* as a meeting point of empiricism and the "passive psychology" of Étienne Bonnot de Condillac

(1714–1780).[353] For Condillac and his followers, including Cabanis, all ideas of the human mind had their origin in sensations—that is, in the impressions made by external objects upon the sensory organs. Thus, an idea could always be broken down to its component sensations, which could be traced back to their external sources. There were no human ideas or mental faculties that did not ultimately take their source from sensory impressions; human understanding could be studied, corrected, and eventually refashioned by careful application of the 'analytical' method. Whereas Immanuel Kant (1724–1804), whose first *Critique* was published in 1781, had defended a distinction between *a priori* and *a posteriori* judgments, the Idéologues considered even an inherited tendency or instinct to be ultimately and strictly a product of sensation. If Kantian transcendental idealism dictated that human observation could never directly access the external phenomena in-themselves, *idéologie* instead embraced the naïve realist position that the external objects could truly be known and described—but only by precise analysis of their noumenal representations.[354]

Though often, in practice, little more than a vague formulation, *idéologie* was thus often considered by its proponents to be a universal scientific methodology.[355] Cabanis, who considered "physiology, the analysis of ideas, and moral philosophy" as "simply three branches of one and the same science, which may appropriately be designated as the 'science of man,'" viewed medicine as a means to discover and analyse the origins of sensations themselves.[356] The

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[353] George Rosen, "The Philosophy of Ideology and the Emergence of Modern Medicine in France." *Bulletin of the History of Medicine* 20.2 (July 1946), 331.

[354] See Immanuel Kant, "Introduction." In: *Critique of Pure Reason*, translated by Marcus Weigelt and Max Müller (New York: Penguin Books, 2007 [1781]), 37–56.

[355] Rosen, "The Philosophy of Ideology" (1946), 332

[356] Cabanis, *Rapports du physique et du moral* (1802), quoted in Rosen, "The Philosophy of Ideology" (1946), 334–5

treatment of individuals and the practice of curative clinical medicine were largely instrumental in this view of medicine; investigating diseases and learning how to cure them was in some sense only a means of discovering higher truths about human physiology and sensation. This didn't necessarily negate clinician interest in caring for patients, but is indicative of a more general shift in French medicine in the early nineteenth century away from the individual doctor–patient relationship and toward a more expansive view of health as a general property of the city or social body.

As Dora Weiner and Michael Sauter have pointed out, this shift began even before the Revolution, made possible by the increasing centralisation and nationalisation of various social services, including medical care. However, the Revolution provided the conditions for this process to speed up, especially as the republican government attempted to distance itself from the Church and sought control over some of the social services this latter had long provided—including hospital administration. The "modern notion of the city itself as a patient" was already familiar to many reformers by this point (for example, see Chapter 1 on the 'medical journalism' of Pinel and others), but the economic and political upheavals of the 1790s provided new opportunities for the reform and overhaul of the hospital system, and a reckoning about the role and remit of medicine more generally.[357]

As Weiner has shown elsewhere, retooling the medical system was both philanthropic and pragmatic: "The goal was a citizenry conscious of good health as a personal and a public need."[358] No longer designated as long-term "ailing poor," Paris's paupers were supposed to

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[357] Dora B. Weiner & Michael J. Sauter, "The City of Paris and the Rise of Clinical Medicine." *Osiris* 18 (2003), 24.

[358] Dora B. Weiner, *The Citizen-Patient in Revolutionary and Imperial Paris* (Baltimore: Johns Hopkins University Press, 2002), 45.

view their stays in the renovated and revamped hospitals as motivation to become "citizen-patients:" the right to healthcare also implied a responsibility to return to productive work for the good of the state.[359] Indeed, it is clear in Cabanis's writing that much of the value of medical investigations lay in the fact that they would ensure a robust and healthy workforce in the future.

For example, in his *Rapports* of 1802, Cabanis registered concern that the workhouses where city-dwellers tended to labour were insalubrious because "the monotony of the impressions that are transmitted to [the nervous system] cannot help but shrink the realm of its operations"—an effect that agricultural workers were more protected from, as they were in the habit of contemplating a wider variety of objects and of engaging in more varied physical tasks.[360] Work was both a duty the patient owed to the state in exchange for medical care, and a site of medical management itself, for "it is obvious that the habits of nations, like those of individuals, most often depend on the nature of their work."[361] Managing the workplace, and ensuring there were enough able-bodied labourers available to fill it, were thus critical functions of the new hospital medicine, which Cabanis envisioned in service of maintaining a society that had the sheer bodily capacity to continually generate wealth. I will further explore this connection between medicine, health, and economics in Chapter 5 below.

Given many physicians' burgeoning interest in tending to the health of the whole population, city, or social body, the early nineteenth century saw the rise of new professional activities and opportunities under the broad umbrella of medicine. Distinguishing between

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[359] Ibid. 13

[360] Pierre Jean Georges Cabanis, *On the relations between the physical and moral aspects of man*, translated by Margaret Duggan Saidi (Baltimore: Johns Hopkins University Press, 1981 [1802]), 434.

[361] Ibid. 501

therapeutic (curative) medicine, preventive care, and the education of the citizenry in health maintenance, Weiner traced the origin of the 'hygienist' to a new interest in public health, spurred on especially by the frequent epidemics the French armed forces experienced on deployment, such as during Napoleon's invasion of Syria (1798–1801), and in Martinique following the Napoleonic Wars.[362] Weiner differentiated physicians from hygienists based largely on their orientation toward individual therapeutics: "Whereas physicians balked at becoming civil servants … hygienists envisaged preventive and therapeutic measures of broad scope that required the collaboration and power of the government."[363]

However, in practice there was not always a clear distinction between hygienists and physicians, between preventive and therapeutic medicine, or between individual and 'social' medicine. For example, Cabanis was a physician before he aspired to found a 'science of man,' and even in his aspirations to doctor all society, he retained an interest in the bodies and health of individuals. After all, it was precisely by altering individuals that he sought to treat the social body: "One can, by improving individuals' physical states, also improve their reason and their inclinations, and even in the long term perfect the ideas and habits of the human race."[364] Individual therapeutics and medical counsel were never, in Cabanis's mind, divorced from the larger social reforms that he envisioned.

Cabanis did think that individual health and habits depended on factors that were sometimes beyond the individual's control: age, sex, inborn temperament, illnesses, and the

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[362] Weiner, *The Citizen-Patient* (2002), 281–2

[363] Ibid. 312

[364] Cabanis, *Rapports* (1802), 318

climate, which humans had only limited control over.[365] Furthermore, human moral character derived from governance, policy changes, and trade and economic relations. This was hardly a novel observation, but in Cabanis's monistic physiological doctrine, the moral effects of such factors expressed as a result of changes to the physical organisation: for example, he wrote that the eighteenth century, with its expanding global trade and early industrialisation, had "necessarily introduced new habits [in consumers], and these habits began to improve or degrade the physical and moral constitutions of individuals."[366] Furthermore, "bad laws" as well as "certain deficiencies in the commercial or political relations of different populations [could] produce various types of national corruption whose effects [would] soon influence the judgment and the moral character of the individuals."[367] However, he also emphasised the importance of factors like diet and the nature of one's work—"all the physical habits that can be subjected most often to well-pondered plans."[368] Thus, political reform and policymaking always and simultaneously had medical and physiological consequences—and, conversely, prudent medical care and guidance was an essentially political issue. Maintaining one's health and vigor required diligence and correct action on the part of the individual, the physician, and the government.

This much was consistent with Cabanis's monistic philosophy: early in the *Rapports* (1802), he defined the moral sciences as "no more than a branch of the natural history of man," adding that "the ethical is only the physical nature considered from certain particular points of

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[365] Ibid. 52

[366] Ibid. 416

[367] Ibid. 432

[368] Ibid. 52

view."[369] His empiricist thought drew from John Locke's sensationalist argument that sensory impressions were the origins of all ideas, and from Destutt de Tracy's (1754–1836) formulation of the science of *idéologie*, according to which all human ideas could be studied as phenomena of sensibility.[370] Furthermore, Cabanis's belief that human physiology was altered by factors like climate, diet, daily activities and habits, and even the sights and spectacles people were exposed to all meant that perfecting human society depended on careful medico-political management of the people's physical environments and sensory stimuli. Thus, for Cabanis, the conscientious physician owed a duty of care not only to his individual patients but also to his *patrie* and indeed to all of humanity; in a 1798 essay, he referred to such a physician as one of the state's "mandarins," though he removed this term from later editions.[371] For him, the individual doctor–patient relationship necessarily radiated out to encompass the physician's duty to, and interest in, the broader social and national body.

Much of Cabanis's ambitious vision for medicine would not come near to fruition until long after his death. For example, the then-named Académie royale de médecine was not created until 1820 (its predecessor, the Société royale de médecine, having been abolished in the Revolution), and struggled to secure funds and professional status until around 1870—after which point the Pasteurian debates helped fuel its ascension to a more exclusive and 'scientific' status.[372] In politics, too, the medical influence reached its peak under the Third Republic:

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[369] Ibid. 13, 50

[370] See Spary, *Utopia's Garden* (2000), 4.

[371] Martin S. Staum, *Cabanis: Enlightenment and Medical Philosophy in the French Revolution* (Princeton, N.J.: Princeton University Press, 1980), 109.

[372] See George Weisz, *The medical mandarins: the French Academy of Medicine in the nineteenth and early twentieth centuries* (Oxford, U.K.: Oxford University Press, 1995), 33–4.

between 1876 and 1914, doctors made up about 10% of the Assemblée nationale, second only to lawyers among the liberal professions in Parliament.[373] The medico-political tradition remained strong in France throughout the nineteenth century, with a particular emphasis on preventive ('hygienic') medicine, but doctors could not really establish a sustained influence in national politics until the Third Republic; the number of doctors in national political life actually declined between 1815 and 1848.[374] The more successful physician-legislators of the Third Republic tended to come from wealthier backgrounds and usually represented rural bourgeois opinion on the national stage; additionally, they often came from military training.[375] Cabanis's ambition for the role of medicine in politics became easier to actualise later in the nineteenth century in part because the rising professional status of doctors meant that they had more specific training and career paths that were distinct to those of other professionals—a marked contrast to the years following 1798, when efforts to democratise science and medicine threw medical training and education into disarray. The later physician–legislators often positioned themselves rhetorically as being in a position to cure society's social and economic ills, a claim redolent of Cabanis; however, in practice, their more expansive medical and hygienic goals were difficult to legislate, let alone achieve, and the medico-political vision drifted more conservative over time, especially after 1914.[376]

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[373] Jack D. Ellis, *The physician-legislators of France: medicine and politics in the early Third Republic, 1870–1914* (Cambridge: Cambridge University Press, 1990), 2–4.

[374] Ibid. 7–8

[375] Ibid. 19; 48–9

[376] Ibid. 107; 170–205

Still, the close relationship between French medicine and politics throughout the nineteenth century merits emphasis in this dissertation because—like Lamarck—Cabanis and later physicians in his tradition sought to aid and modify the social body precisely by understanding and attending to the individual physiology. Cabanis believed that man's physical nature was susceptible to significant modifications, leading him to call on humanity "to foresee, to calculate, to direct this action."[377] Both he and Lamarck believed that self-directed physiological change was not only possible, but potentially highly beneficial. As Cabanis put it, modifying the human race was akin to prudent selective breeding of plants and animals: with concerted and coordinated effort, medical management of the individual could—and should—be elevated to the hygienic art of improving the whole species, producing a mighty race of men he aspirationally analogised to stallions.[378] By inducing changes that could be propagated by reproduction, a learned physician–politician was capable of re-moulding the human species to better serve state and social interests.[379] Furthermore, as mental phenomena depended upon the physical organisation, medical and physiological knowledge of the human brain also qualified physicians to make pronouncements upon ethics, political science, and social organisation.[380]

Thus, for Cabanis, there was no strict distinction between a physician and what would later come to be known as a hygienist. At the time Cabanis wrote, professional roles for physicians were still in relative disarray following revolutionary reforms; additionally,

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[377] Cabanis, *Rapports* (1802), 318

[378] Ibid. 308

[379] On reproduction and heritability, see Ibid. 71

[380] See L. S. Jacyna, "Medical science and moral science: The cultural relations of physiology in Restoration France." *History of Science* 25 (1987), 115.

physicians generally had a low professional and social status. His call for medical knowledge to be exploited in policymaking and governance should therefore be read as an attempt to secure higher prestige (and pay) for physicians, just as much as it was a philosophical argument. Still, the professional politics at play do not detract from the significance of the specific philosophical and scientific framing that Cabanis used in order to defend the importance of medicine and medical knowledge.

Additionally, it is important to note that even aligning medicine with politics did not necessarily secure physicians a guaranteed professional role: as Staum pointed out, Cabanis often "faced the dilemma of deciding at what point the natural order needed the corrective hand of government, just as in science he had to decide when the natural order of facts needed the rational rules of methods."[381] In other words, although his rhetoric emphasised the importance of medical knowledge in the art of governance, even Cabanis himself was not always sure exactly how best to go about actually incorporating physicians in the civic process. Even later in the nineteenth century, doctors tended to be confined to local politics while they were actively practicing; those who entered the national Parliament did so at a significantly older age than other deputies, and the move usually marked an end to their private clinical practices.[382] Thus, although Cabanis envisioned public service as a natural extension of the physician's work, in actuality, carving out a professional role and a career path for medical men in politics was a dynamic process throughout the nineteenth century, and entailed significant changes to the status and philosophy of medicine during this period.

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[381] Staum, *Cabanis* (1980), 94

[382] Ellis, *The Physician-Legislators of France* (1990), 144

Furthermore, even Cabanis's direct followers did not necessarily agree with his specific political positions, even when they did concur that medicine and politics ought to be practiced in tandem. For example, whereas Cabanis was generally a moderate liberal republican, his younger disciple Anthelme Richerand (1779–1840), another major influence on Lamarck, long leaned conservative and eventually embraced an ultraroyalist position.[383] Richerand agreed with much of the physiological and medical philosophy Cabanis espoused, such as that Condillac had been correct to argue that ideas were not innate but came from sensory stimuli, as well as Cabanis's basic argument that physiology and analysis were both branches of the 'science of man.'[384] However, and while Cabanis certainly agreed that factors like the climate effected changes to the human physiology, in Richerand's writing the emphasis on different physiological 'varieties' was stronger, and leaned closer to a fixist position. Though he argued against a racial-essentialist pro-slavery position, he asserted immediately after that differences in the physical organisation, including those induced by climate, created an "obvious inequality in the perfection of the moral and intellectual faculties" of different human races.[385]

Richerand, who practiced as a surgeon, was nonetheless more successful as a populariser; his *Elements of Physiology* (1801) eventually went through 10 editions and was translated into numerous languages, including Italian and English. Thus, his remarks on race and climate did not represent marginal positions in the field of medicine; Richerand amassed a significant reputation of his own, in addition to disseminating many Cabanisian and Lamarckian ideas about climate, physiology, and the relationship between the physical and moral aspects of man. Like Cabanis,

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[383] See Staum, *Cabanis* (1980), 151–3

[384] See Cabanis, *Rapports* (1802), 33; and Richerand, *Elements of Physiology* (1801 [1823]), 406.

[385] Richerand, *Elements of physiology* (1801), 608–9

Richerand also considered the body's temperaments and dispositions to depend on a dizzying array of physical and social factors, including one's early education, manner of living, climate, weather, and acquired habits.[386] However, he also emphasised the relatively fixed traits and physiologies that could result from such environmental variations, and could in turn result in ostensibly distinct physiological functions and needs in different climates. For example, he argued that nutritional and dietetic needs varied in different climates, due to the effects of climatic factors on the digestive process; furthermore, even medical pharmacy had to be practiced differently with reference to variations in the climate, and some medicines that could be given freely by, for instance, English doctors to their domestic patients needed to be restricted or proscribed in other places.[387] Additionally, and like Lamarck and many contemporaneous naturalists, Richerand also described in detail the phenotypical differences he considered as marking different races, including hair and skin color, facial features, and skull shape.[388] As Rana Hogarth has discussed in her study of the medicalisation of blackness in the Atlantic world, physicians' remarks on the supposed medical or physiological differences between races were never neutral or incontrovertible observations; they were politically useful fictions that both reified the concept of biologically distinct 'races' and, often, provided justifications to naturalise racist inequities—even among those commentators who opposed the chattel enslavement of Africans.[389]

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[386] Ibid. 59

[387] Anthelme Richerand, *Des erreurs populaires relatives à la médecine* (Paris: Chez Caille et Ravier, 1812), 58–60.

[388] See Richerand, *Elements of physiology* (1801), 607; on Lamarck see e.g. Lamarck, *Recherches sur l'organisation* (1802b, [2001]), 135.

[389] See Rana Hogarth, *Medicalizing Blackness: Making Racial Difference in the Atlantic World, 1780–1840* (Chappell Hill, N.C.: University of North Caroline Press, 2017); see esp. Chs. 1, 2.

As this much makes clear, climatic and environmentalist medical theories came with numerous and varying political commitments. While Cabanis himself, along with most of the early Idéologues, was a moderate liberal, the cultural politics of medicine and physiology became particularly fraught in the decades following the upheaval of 1789 and the Napoleonic Empire. Indeed, as L. S. Jacyna has pointed out, the popular—and not entirely unwarranted—association of medical science with materialism became a liability for the profession during the Restoration, as liberal and materialist politics were associated with political turmoil, instability, and the nominally radical politics of the early Revolutionary years.[390] Though Cabanis's ideas were hardly eradicated from French medical theory, a rival school of thought did gain prominence and institutional power in the 1820s and 1830s, calling for a rapprochement between medicine and Christianity, and for a more limited and experimentally-based medical practice than the sort of grand theorising about a 'science of man' that Cabanis had favored.

Furthermore, in French medicine the concept of 'heredity' was solidifying in the early nineteenth century, particularly in regards to perceived social ills like madness, syphilis, scrofula, and tuberculosis. Carlos López-Beltrán has argued that the idea of 'hereditary diseases' solidified in postrevolutionary France and represented a shift away from some of the climatic thinking that had dominated in the eighteenth century.[391] Additionally, and as I have shown above, climatic thinking was not even necessarily mutually incompatible with more fixist conceptions of heredity or inherited diseases, dispositions, or temperaments; even climatic medical theorists allowed for the possibility of *relatively* fixed traits or vulnerabilities. Thus, to trace the legacy of

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[390] Jacyna, "Medical Science and Moral Science" (1987), 119.

[391] Carlos López-Beltrán, "Forging Heredity: From Metaphor to Cause, a Reification Story." *Studies in History and Philosophy of Science* 25.2 (1994), 230.

Lamarck's ideas, it is also necessary to understand how such arguments about biological malleability and change over time could be compatible with both the Cabanisian materialism many perceived as a radical threat from the left, and with medico-scientific conceptions of degeneracy, racial hierarchy, and hereditary inferiority. Thus, both institutional and methodological changes in medicine during the nineteenth century form a critical aspect of this history.

**Professionalisation and intra-disciplinary debates**

The professional status of medicine in France changed dramatically over the course of the nineteenth century, and physicians' efforts to secure status and authority for themselves affected both the theories they defended, and the reception of their ideas in the broader scientific community. As George Weisz discussed in his prosopography of members of the Academy of Medicine between the 1820s and 1930s, élite medical career paths grew increasingly rigid, uniform, and competitive throughout the nineteenth century; the ossifying (and aging) medical establishment became increasingly marked by a ladder of posts and honors achieved through competition, a demanding process that was less amenable to the sort of reformer–politician–physician Cabanis may have envisioned around the turn of the century.[392] Additionally, as Robert Nye and Ian Dowbiggin have each discussed, studying, naming, and purporting to treat various forms of deviancy or difference was one way in which physicians justified the social utility and political import of their work, ultimately helping to consolidate and strengthen their institutions

[392] See Weisz, *The Medical Mandarins* (1995), Ch. 10

and professional societies, and the social position of medicine more broadly.[393] As both Nye and Dowbiggin have emphasised, medical theory was not the sole or even primary source of fears about degeneration, biological inferiority, or disease; rather, medicine often provided a language through which to describe and understand such phenomena, and serving this political function was simultaneously beneficial for many medical practitioners and writers.

Furthermore, and as part of the process of 'professionalisation,' medicine in the nineteenth century was also the subject of methodological debates and reforms. In part, this was reflective of similar debates in the broader scientific establishment, including over the role of observation, experimentation, and 'small facts' in the scientific process. For example, navigating the multifaceted terrain of natural historical practice, Lamarck styled himself a *Naturaliste philosophe*, a title that led Burkhardt (1970) to argue that he was chafing against the "over-emphasis in contemporary science upon the importance of facts and facts alone."[394] In this framing, Lamarck's problem was that he insisted on clinging to an outmoded Enlightenment style of naturalism that his peers were eager to dispose of by the turn of the century. Certainly this critique is consonant with the one Charles Lyell offered of Lamarck in his *Principles of Geology*, as well as with the position that Georges Cuvier had similarly staked out to portray Lamarck as being too speculative and lacking positive facts to support his natural-historical ideas.

As I have discussed above in Chapters 2 and 3, however, these and similar arguments were only one side of the picture. Naturalists and savants in the early nineteenth century on all

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[393] See Nye, "Introduction." In: idem., *Crime, Madness, and Politics* (1984), 42–5; and Ian R. Dowbiggin, *Inheriting Madness: Professionalization and Psychiatric Knowledge in Nineteenth-Century France* (Berkeley: University of California Press, 1991), 1–6.

[394] Burkhardt, "Lamarck, Evolution, and the Politics of Science" (1970), 285.

sides of any given issue made claims to be uniquely sensitive to empirical facts and observations; furthermore, there were some naturalists, such as Geoffroy St.-Hilaire, who took the opposite rhetorical approach and praised the value of higher philosophical principles over pure empiricism, suggesting that there was at least some degree of disagreement over the proper methodology in science at this point. And one's claimed fealty to one 'side' of this debate did not necessarily correspond to the naturalist's own way of practicing science in reality. Cuvier's supposedly analytical, empirical science has been contrasted with the more synthetic, philosophical one favored during the Enlightenment.[395] But as Martin Rudwick has pointed out, Cuvier himself used the term 'facts' with nuance, permitting some low-level theorizing as well as the interpretation, or "reading," of fossils in his paleontological work.[396] 'Analytical' and 'synthetic' science were not as disparate as they may first appear.

Similarly, and sometimes simultaneously, debates in medicine in the early nineteenth century included disagreement over the degree to which practitioners should be 'empiricist,' or the virtues of 'physiological medicine.' But the rhetorical flourishes sometimes masked points where the arguments lacked clarity, or where ostensibly opposing positions actually came close to converging. These arguments, while sometimes bordering on abstruse, are worth understanding because of the degree to which disagreements about medical methodology in this period often involved, directly or indirectly, disagreements about Cabanis and sensationalism—and thus, also, principles of Lamarckian ideas. An illustrative case is the physician François-

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[395] See e.g. Appel, *The Cuvier-Geoffroy Debate* (1987), 6–7.

[396] Rudwick, *Georges Cuvier, Fossil Bones, and Geological Catastrophes* (1997); see especially Chs. 10 and 15.

Joseph-Victor Broussais's (1772–1838) criticism of Pinel and the 'empiricist' method in medicine.

Appointed as a surgeon in the navy for much of the 1790s, Broussais relocated to Paris in 1799 and studied under the renowned physician and anatomist Xavier Bichat (1771–1802). Broussais received his MD in 1803 and served again in the army for 11 more years, before taking a position as a professor at the Val-de-Grâce military hospital in Paris in 1814. Broussais then gained popularity for his lectures and writings on the importance of physiology in medicine: breaking with some of his predecessors, he argued that some diseases occurred as a result of a disruption to normal functioning, which in turn could be a complication of overstimulation and inflammation. Virtually any disease state could be chalked up to a physical disturbance, including madness; additionally, the initial cause of the inflammation or irritation could be almost anything, including both internal and external causes.[397] According to Broussais, the advantage of the physiological method over the empirical one was that the latter was limited to pure inductive reasoning, and the accumulation of observational facts; a physiological physician, on the other hand, was to study the organisation and functioning of the body, and the effects that a person's environment had in modifying these.[398] Broussais considered the 'empiricist' physicians to have much in common with 'eclecticists,' who focused on clinical outcomes and

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[397] François-Joseph-Victor Broussais, *De l'irritation et de la folie: ouvrage dans lequel les rapports du physique et du moral sont établis sur les bases de la médecine physiologique* (Paris: Chez Mademoiselle Delaunay, 1828), 441–2.

[398] François-Joseph-Victor Broussais, *Du Prétendu Éclectisme médical* (Paris: Chez Mademoiselle Delaunay, 1829), 9; 55.

might treat patients by trial-and-error, rather than devising physiological theories to explain the underlying causes of disease and dysfunction.[399]

Broussais directed particular criticism at the nosologists, specifically including Pinel, whose work he saw as limited to classifying, rather than treating, diseases.[400] However, and while my intent is not to settle a methodological debate, it is worth examining Pinel's own writings on methodology too. While Pinel certainly made contributions to the field of nosology, and considered the classification of diseases to be useful and important in the practice of medicine, he never claimed that taxonomy or strict empiricism were, on their own, sufficient foundations for clinical practice. Indeed, in his *Nosologie philosophique* (1798)—an authoritative classification of diseases that went through six editions by 1818—he had explicitly sought to differentiate his own method from the "arbitrary comparisons" made by other nosologists.[401] Pinel, an Idéologue, argued that the method of analysis allowed him to go beyond superficial taxonomy and to instead classify diseases based on the nature of their symptoms, or the organic structure of the affected body parts. He compared this method of medical practice to those then followed in natural history, and also implored practicing physicians to keep up their theoretical reading and studies, allowing them to move beyond simple case studies to discover general disease principles.[402]

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[399] François-Joseph-Victor Broussais, *Le catéchisme de la médecine physiologique, ou Dialogues entre un savant et un jeune médecin, élève du professeur Broussais* (Paris: Mademoiselle Delaunay, 1824), 440–6.

[400] See François-Joseph-Victor Broussais, *Mémoire sur l'influence que les travaux des médecins physiologistes ont exercée sur l'état de la médecine en France*. (Paris: Chez Mademoiselle Delaunay, 1832a), 9–11; and idem., *Mémoire sur la philosophie de la médecine* (Paris: Lachevardière, 1832b), 7.

[401] Pinel, *Nosographie philosophique ou La méthode de l'analyse appliquée à la médecine*, T. 1. Paris: J. A. Brosson (1810 [1798]), xcvii.

[402] Ibid. iii, cix, cxiv

Elsewhere, Pinel's general commentary on medical methodology even sounded similar to arguments that Broussais would formulate 30 years later. For example, in 1800 Pinel wrote of an "eternal struggle" between "blind empiricism" and the "legal and regular exercise of medicine," arguing that some practitioners with little formal medical training had succeeded in treating the insane by living among them and speaking with them, whereas rigid empiricists had had no such success.[403] In other words, though he emphasised the importance of nosology and empiricism in medicine, he did not argue for them to the exclusion of all else. In comparison, Broussais approached the problem from a different angle—defending his physiological system, rather than analytical nosology—but, like Pinel, also softened his claims somewhat when he tried to actually describe his recommended method. Likely sensitive to the accusations of 'system-building' I have discussed above in Chapter 3, Broussais asserted that it was important to push the limits of knowledge, but without rushing to build "edifices"—a term savants frequently used to accuse one another of being overly theoretical, such as in Cuvier's *éloge* of Lamarck.[404] Broussais conceded that theorising in medicine, particularly by means of inductive reasoning, had a philosophically weaker evidential basis than simple case studies or direct observations of patients; however, he considered the theoretical work necessary nonetheless in order to progress to a genuine understanding of diseases.[405]

While Pinel's and Broussais's actual methods of practice are beyond the scope of what I mean to discuss here, it is clear from their written works that, at least rhetorically, they likely

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[403] Philippe Pinel, *Traité médico-philosophique sur l'aliénation mentale ou la manie* (Paris: Chez Richard, Caille, & Ravier, 1800), xlii–xlvi.

[404] Broussais, *Mémoire sur la philosophie de la médecine* (1832b), 11–12

[405] Ibid. 15

would have been more in agreement than Broussais suggested in his more polemical arguments. As with the broader scientific debates about 'analytical' and 'synthetic' science, 'physiological' medicine represented merely one more attempt to provide a general methodological account of medicine, but was largely unable to reconcile the "struggle" between empiricism and theory. Even Cabanis, despite being a major influence on Broussais, had had his feet in multiple methodological camps: although he was a critic of what he considered *over-zealous* nosology, he also thought that proper observation would yield a new and elegant nosological classification system; praised Pinel's *Nosographie philosophique*; and in reality generally favored a more empiricist approach to clinical treatment, preferring to focus on the external presentation of diseases rather than on their deeper principles or fundamental causes.[406] Thus, we should be cautious not to over-estimate the actual methodological differences between 'empiricists' and 'Idéologues.' Indeed, as George Rosen remarked, early *idéologie* tended to foster the trend toward empirical investigation in medicine, with Hippocrates himself even invoked as the ostensible forerunner of the analytic method.[407] Broussais and Pinel both argued that successful medical practice required both theory and observation, both comparison of different diseases and careful study of the causes and progression of each one. That neither man could provide a perfect account of when each method should be used is perhaps more indicative of the intractability of the problem than it is of the kind of radical disagreement that Broussais described in his written works.

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[406] Staum, *Cabanis* (1980), 106–8

[407] Rosen, "The Philosophy of Ideology" (1946), 335

Indeed, as Stephen Jacyna has discussed, Broussais by the 1820s was facing criticism that echoed objections made against Cabanis, Pinel, and other Idéologues since the turn of the century: namely, that the monistic principles of Cabanis and his followers represented little more than a reductionist materialism that claimed all spiritual and philosophical inquiry as the domain of the physician-physiologist.[408] The perceived encroachment of physiology into metaphysics prompted opposition from multiple angles. Some philosophes and clergy objected to the idea that human will and moral agency were mere physical phenomena, different to the faculties of non-human animals only in degree of physiological complexity; additionally, since the late eighteenth century medical monism had been perceived as a way for the medical profession to improve its social standing—a potential threat to other élites.[409] Some of these critiques overlapped, as in the case of clergymen who perceived both a moral and a professional threat from Cabanisian physiological ideology.

Thus, without collapsing all distinctions between Broussais's physiological method and that of the nosologists, we should also read Broussais's criticism of his forebears as reflective of the professional and political pressures he was under as a physician who took clear influence from Cabanis and the Idéologues. Broussais was an outspoken anti-clericalist, which was certainly not unique among medical men at the time, and gained him some popularity among the liberal medical press, but also attracted criticism from conservative and Catholic commentators.[410] For example, an 1831 article in *Mélanges occitaniques, recueil politique, religieux, philosophique et littéraire* defending Christian spirituality in both medicine and

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[408] Jacyna, "Medical Science and Moral Science" (1987), 115; 138

[409] Ibid. 116–7

[410] See e.g. ibid., 116

politics named and criticised Broussais along with a handful of Enlightenment materialists and Idéologues: "The immoral philosophy of Helvétius and the d'Holbac [sic] club, that of Locke, of Destutt-Tracy, no longer has disciples; the materialism of Broussais has passed like his medical system … no one today would dare to defend [the sophisms of Cabanis]."[411] The *Mélange* was a royalist review published in Montpellier between 1831 and 1834; that its contributors saw fit to name Broussais along with Tracy, Cabanis, and their Enlightenment influences is indicative of both a legitimate political dispute over physiology and medicine, and of the degree to which *idéologie* had already pervaded much of the French medical mainstream. It should perhaps not come as a surprise, then, that Broussais tried to differentiate his own materialism from some varieties in the broad camp of *idéologie*, despite his own clear intellectual debts to Cabanis. Though the Idéologues were moderate liberals who proffered a libertarian-tinged critique of Robespierre and the early revolutionary years, many of them were also opponents of royalism and of a return to clericalism, and both Napoleon and the Bourbon Restoration administration considered them threats and nuisances on these grounds.[412]

This much makes clear that debates about the proper methodology in medicine, and the broader social and political role that physicians and medical expertise ought to be afforded, were more than just narrow professional disagreements. Expansive visions of how medical knowledge might help the poor, regenerate the nation, or guide political reform tended to be grounded on Cabanisian and monistic theories about the close *rapports* between the moral and the physical, or the reducibility of both to the same fundamental phenomena. The rhetorical battles fought in the

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[411] H.V.V., "Religion." *Mélanges occitaniques, recueil politique, religieux, philosophique et littéraire* 2 (1831), 20.

[412] Jacyna, "Medical Science and Moral Science" (1987), 129

medical presses and the pages of political newspapers sometimes leapt from methodological disputes to policy proposals to broader commentary on 'materialist' or 'spiritualist' positions writ large. Additionally, the physicians and physiologists taking part in such debates had personal and professional ambitions as well as, and often in conjunction with, their ideological and political commitments. Neither Cabanis's name nor his ideas were excised from French medicine in this period, but it is important nonetheless to place medical treatises of the early nineteenth century in context with the conservative and spiritualist doctrines that were gaining popularity in reaction to the turmoil of the revolutionary period—often with support, or at least approval, from both Napoleon and later also the Restoration monarchy.

**Medicine and the state**

As I discussed above in Chapter 1, prior to the Revolution, some physicians—including Pinel—had begun to see political change as necessary to ensure true health in French society.[413] If health was affected by a person's social and economic circumstances, then it followed that political reform ought to benefit people in an immediate physical sense—and that physicians consequently had a responsibility to advocate for prudent political change, not just to treat individual patients. This more social view of medicine had begun to take hold in the eighteenth century, but was initially viewed with suspicion by some in the medical establishment. For example, the establishment in 1778 of the Société Royale de Médecine angered the Paris Faculty of Medicine because the Sociéte's aim was to shield both the population and the nation's livestock from disease—a task that the Paris Faculty had largely ignored, prioritising the

[413] See Nina Rattner Gelbart, "The French Revolution as Medical Event: The Journalistic Gaze." *History of European Ideas* 10.4 (1989), 417–427.

treatment of individual patients and the classification of diseases over such public health initiatives.[414] Thus, the idea that physicians might have social and political responsibilities as a direct result of their professional practices was controversial even from the start, and especially within the medical profession itself.

During the same period in which the Idéologues were expounding upon their philosophical argument for a closer union of medicine and politics, many physicians also grappled with questions about what sort of practice would best serve their professional interests. By the 1810s, the public health reformer François-Emmanuel Fodéré (1764–1835)—discussed more below in Chapter 5—had formulated his argument that a narrow professional focus on the achievements of laboratory science was failing to restore the prestige or popularity of medicine —indeed, it was alienating to much of the population, as people tended to interpret illness through Christian and other sociocultural lenses, and also tended to balk at the higher fees charged by 'scientific' practitioners.[415] The rise of the public health movement was thus a response to multiple tensions: many physicians and reformers did feel a legitimate sense of responsibility for the broader social body and the urban working poor. At the same time, however, the formulation of such a *médecine politique* was also a professional strategy to secure physicians a large, and previously neglected, client base, as well as to position medical men as the mediators of class conflict and the consulting experts in matters of industrial reform.[416] The shift to preventive medicine and the embrace of public health initiatives were not just the

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[414] See Terence D. Murphy, "The French Medical Profession's Perception of its Social Function Between 1776 and 1830." *Medical History* 23 (1979), 260.

[415] Ibid. 269–71

[416] Ibid. 274

outcomes of political arguments, but also occurred as part of the struggle by which French physicians attempted to gain and maintain institutional political power as well as social prestige for their profession.

Thus, the politics of medicine during the early nineteenth century were contentious and often volatile. For example, the physician-politician Clément François Victor Gabriel Prunelle (1777–1853) was asked by the Directory to serve in the Napoleonic invasion in Egypt, as the institutionally powerful liberal Idéologues were at that time generally on decent terms with Napoleon. By 1819, having taken a position at the Paris Faculty of Medicine, Prunelle's fortune had changed: under the Restoration, he was dismissed from his professorship, his ideas on medical education considered too pedagogically liberal and his political sympathies simultaneously suspected of remaining Bonapartist.[417] He settled instead in Lyon, where he became the mayor during the 1830 revolution through a convoluted and "doubly illegal" maneuver, his position confirmed by King Louis-Philippe.[418] It was only a few months later that he was elected to the Chamber of Deputies as a representative of Tour-du-Pin; later, he was appointed inspector of mineral waters at Vichy and then served as the mayor there from 1848 until his death. Following his relocation to Lyon he professed devotion to the July Monarchy, a

[417] Archives Municipales Lyon, "Gabriel Prunelle (1777–1853)." Accessed 22 Oct. 2024. https://www.archives-lyon.fr/pages/gabriel_prunelle

[418] Ibid.

somewhat more liberal—though certainly still monarchical—regime than the Bourbonist Restoration government.[419]

Though generally not considered an Idéologue himself, Prunelle shared an intellectual milieu with them, especially early in his career: in addition to serving, like many of them, in Napoleon's army, he was also appointed under the consulate to oversee the medical library collections at Montpellier by the doctor–politician Jean Antoine Chaptal (1756–1832), and also corresponded on the topic of medical education with Baron Joseph-Marie Degérando (1772–1842), an early anthropologist who, like Lamarck, was an influential member of the Société des observateurs de l'homme. It is therefore worth examining here what the medical ideology Prunelle had allied himself with by the 1810s actually led him to endorse.

In the ouverture to a course on *Médecine-legale* in 1814, Prunelle defined the broader category of *Médecine-politique* as a "middle science between legislation and medicine," a necessary science in his mind because "it is from medicine, and the ideas it furnishes on the nature and the true needs of man, that the legislator borrows the principles of a large number of laws, and it is still medicine which often directs the magistrate in the application of the laws themselves."[420] *Médecine-politique* further subdivided into *Médecine-legale*, which dealt with enlightening the magistrates on various legal matters that necessitated a physician's knowledge (including, but not limited to, testifying in court), and *Police-médicale*, who were to provide the

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[419] See e.g. Gabriel Prunelle, *Discours prononcé à la cérémonie funèbre du Champ-de-Mars, en mémoire des victimes de Juillet* (Lyon: A. Brunet, 1831); in this address Prunelle presented the Restoration monarchy as a European imposition and the July Monarchy as the more democratic choice favored by the French themselves. This was not a unique political reading, especially among those French who considered the European occupation after the Napoleonic Wars to have been particularly humiliating or onerous.

[420] Gabriel Prunelle, *De l'Action de la médecine politique en général et de son objet* (Montpellier: Chez Jean Martel, 1814), 1.

government with the principles of laws and regulations relating to public health.[421] This all followed fairly obviously from basic principles of *idéologie*: if thought and mental states were the products of the physiology, then the sage physician possessed expert knowledge relevant for anyone hoping to govern a functional society. As Cabanis himself had put it, discussing the effects of climatic variation on what he considered to be appropriate or best governance, "This consideration, which is essential for physicians and moral philosophers, is no less so for ideologists and legislators."[422] Legal medicine was a logical extension of the Cabanisian view of physiology, medicine, and the *rapports* between the moral and the physical.

Four years later, in an extract republished from the *Revue médicale* (1818), Prunelle elaborated more on what he meant by *Médecine-politique*, focusing now on public health and population management. Prunelle saw two primary responsibilities for political medicine: keeping people alive longer, and "remedying the evils arising from excess population, or from the rupture of the required equilibrium between consumption and production."[423] Quoting Thomas Malthus (1766–1834), Prunelle explained that a society's wealth and strength grew in direct proportion to the size of its population—but only so long as this population did not exceed the available resources and means of existence.[424] Thus, a famine was not a political problem of resource allocation, but an intractable biological crisis that followed inevitably from an excessive increase in the population. In such cases, it would be responsibility of medical practitioners to take on a role akin to that of a nutritional chemist, developing new food sources and studying

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[421] Ibid. 3

[422] Cabanis, *On the relations* (1802), 513

[423] Prunelle, *De l'Action de la médecine* (1818), 6

[424] Ibid. 4

preparation or processing methods that could extract more sustenance from existing foods.[425] However, Prunelle also argued that disease mortality played a critical role in population management—a role that could potentially be disrupted by, for example, widespread vaccinations.[426]

Explicitly valuing human lives according to their economic exploitation, Prunelle explained that vaccinating individuals over 16 "prevents the ruin of an immense capital" that could be "put to good use," by which he meant "the production of a quantity of labor equal to the quantity of life produced by the vaccine" so that national wealth and means of survival would also be multiplied in accordance with the amount of life saved.[427] While Prunelle did not advocate in this text against vaccination or in favour of openly eugenic political policy, he did claim that China had previously rejected mass vaccination in an effort to control its population size, and that wars fought between "civilised nations" were economically permissible so long as they were fought with a "surplus" of the population and didn't disrupt industry; indeed, war could ultimately contribute to a growth of the population if it was done for conquest, rather than as a tool of extermination.[428] In his economic calculus, human life was worth prolonging and safeguarding through medical means specifically because a longer average lifespan meant more labour to increase the production of various kinds of industry, in turn creating the conditions for further growth of the population and the national wealth.[429] The goal of medicine was therefore,

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[425] Ibid. 46–9

[426] Ibid. 20

[427] Ibid. 23

[428] Ibid. 20; 24

[429] Ibid. 29

or ought to be according to Prunelle, to enrich the owning class and the state by ensuring the labour force was always growing—without outstripping the resources and sustenance that could be provided for them. Indeed, "civilised man" was to exercise restraint over his own reproductive instincts and refrain from producing children he could not provide for, in contrast to "les Arabes": population growth was desirable only insofar as it was one and the same with economic enrichment.[430]

I further explore the obvious economic and biopolitical logic of evolutionary and 'environmentalist' thinking in the French nineteenth century below, in Chapter 5. However, Prunelle warrants discussion in this chapter because he was calling for population management to become part of the remit of the medical establishment more specifically—and because, as a deputy and the mayor of Lyon and Vichy, he also managed to merge his medical qualifications and institutional political power in much the way Cabanis had called for three decades prior. It is also important to note here that Prunelle's early ties to the moderately liberal Idéologues, and his intellectual debts to many of their foundational ideas, did not ensure that his political positions were liberal, republican, or even non-specifically libertarian in the way of many second-generation Idéologues. Rather, having benefitted immensely from Louis-Philippe's support of his illegitimate rise to mayorship in Lyon, Prunelle remained a steadfast defender of the July Monarchy for the rest of his life, meanwhile attempting to suppress a series of revolts among Lyonnais silk workers during his tenure as mayor. And, although his political career was generally occupied by local and regional concerns rather than by the ambitious medical vision suggested in *De l'Action de la médecine sur la population des États*, it is nevertheless important

[430] Ibid. 37–9

to note how liberal medical *idéologie* easily led him to endorse a proto-eugenic position calling for a closer unity of state and medical forces with the precise end goal of more efficiently and profitably exploiting French labor. The shift of medical *idéologie* and environmentalist-evolutionary thinking toward eugenics, racism, and reactionary politics was a broader pattern throughout the long nineteenth century, and will be explored further in Chapter 5; additionally, and also like Prunelle, many public health reformers and physician–politicians throughout the century similarly found that their ambitious early proposals for medico-legal control over the populace were difficult to actualise in law or practice.[431]

Nevertheless, because the medical legacy of Cabanis's work is so germane to the reception of Lamarck throughout the nineteenth century, such rhetoric merits serious evaluation. As I will show further in Chapter 5, the biopolitical and eugenic aims of physicians like Prunelle were not incidental elements of either their Cabanisian or Lamarckian influences—rather, they were the natural outgrowth of medical and natural-historical ideas grounded in political liberalism and concern for the wealth and global dominance of the French nation. The specific liberal-sensationalist medical milieu in which Lamarck's and Cabanis's ideas were propagated during the nineteenth century—and which, indeed, Cabanis in particular bore some responsibility for founding—was populated by physicians and naturalists who had specific political goals and professional interests; this is critical to bear in mind when evaluating the reception to and consequences of Lamarckian evolutionary ideas.

[431] Evidenced by, e.g., the comparative restraint of the landmark public health laws of 1848 and 1902.

**Social sciences and population thinking**

Another important internal dynamic in the medical profession during the nineteenth century was the close relationship between practicing doctors, public health reformers, and those academicians and men of science interested in the nascent 'social sciences,' particularly ethnology and anthropology. Though this trend was not wholly synonymous with, or reducible to, the shift toward public health concerns, it did entail a similar and overlapping medical orientation toward treatment of a whole social body, rather than just an individual patient. As social-scientifically inflected physicians saw it, the medical art was not just to heal particular patients but to cultivate the happiness and perfection of the whole human species.

Thus, as Robert Nye and Elizabeth A. Williams have discussed, the medical philosophy of the Idéologues, their influences from both Paris and Montpellier,[432] and the increasingly expansive 'social' view of medicine all birthed the tradition that Williams has called 'anthropological medicine' over the first half of the nineteenth century.[433] Williams identified four major characteristics of this tradition: a holistic view of medicine and personhood; the belief in intimate rapports between the moral and the physical; a social (eventually 'anthropological') construction of medicine; and sustained interest in discerning human biological 'types.'[434] As Williams and Nye have each made clear, French medicine at the time had a broad practical scope, and 'anthropological medicine' was situated at the crossroads of medicine and what would only much later become distinct 'social sciences.' This disciplinary splintering was in turn a

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[432] On the legacy of 'Montpellier vitalism' and the relations between the Paris and Montpellier medical schools, see Elizabeth A. Williams,"Conclusion." In: *A Cultural History of Medical Vitalism in Enlightenment Montpellier* (London: Ashgate, 2003).

[433] Williams, *The Physical and the Moral* (1994), 1–2.

[434] Ibid. 8–9

consequence of both institutional and professional changes, and a longer process by which medicine's aims and scope changed. As Dora Weiner has pointed out, the medical profession in the revolutionary and postrevolutionary years showed something of a conflicted character because practitioners were often caught between multiple distinct goals: the treatment of current diseases (therapeutic medicine), the prevention of potential future diseases (preventive medicine, which would later come to be known as hygiene), and the education of the citizenry in health maintenance.[435] The trend toward the anthropological—the 'science of man'—that Williams discussed was, in some ways, a more pronounced version of these latter two tendencies: anthropological medicine expanded the social remit of medicine to encompass study of the whole species, with the goal to eventually arrive at more specific knowledge of the individual.

Indeed, this anthropological tilt in medicine occurred in the context of a rising interest in the 'science of man' more broadly—an "anthropological perspective" that gained prominence in the late eighteenth and early nineteenth centuries as both naturalists and the French state became increasingly interested in studying populations and large groups of people in order to understand individuals, rather than the other way around.[436] The historian Joshua Cole has called this phenomenon the "discovery of population"—a new understanding of the French people as aggregated groups, whom officials could study as collectives with shared interests and obligations to the whole nation.[437] One of the key tools that officials used in order to make such observations at the aggregate level was statistics: even before statistical studies could produce

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[435] Weiner, *The Citizen-Patient* (2002), 10

[436] William Max Nelson, "Colonizing France" (2013), 75.

[437] Joshua Cole, *The Power of Large Numbers: Population, Politics, and Gender in Nineteenth-Century France* (Ithaca, N.Y.: Cornell University Press, 2018), 212.

reliable results, "people became excited … because of the powerful significance attributed to numbers as signs of precision and rigor in the face of seemingly impenetrable complexity."[438] Statistical studies aimed to capture data on a wide variety of population questions, from social and cultural practices to disease risk and weather patterns; by the turn of the nineteenth century "moral statistics" even attempted to assess more nebulous characteristics like social cohesion and happiness.[439] Those studying in the nascent social sciences had particular interest in rural and peasant populations, which has led William Max Nelson to suggest that such "internal anthropology" within France was informed by the "external anthropology" performed in studies of colonised, indigenous, and other foreign populations; of early censuses, he has argued that "The colonies were laboratories for the development of these biopolitical tools."[440] The uptake of such methods and tools in the medical world was not without controversy: although statistical research was critical to many public health studies, such as influential studies of differential mortality that emerged after statistical research on the 1832 cholera epidemic, some doctors were also disturbed by the deterministic implications of social statistics, and by the 1830s many objected, on empiricist grounds, to the tendency for statistics to flatten individual complexity into aggregate groups.[441]

Additionally, and as Elizabeth Williams has pointed out, the medical-anthropological 'science of man' was not wholly synonymous with the 'natural history of man'—this latter was

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[438] Idem., "The chaos of particular facts: statistics, medicine and the social body in early 19th-century France." *History of the Human Sciences* 7.3 (Aug. 1994), 3.

[439] On moral statistics, see Carolina Armenteros, "From Human Nature to Normal Humanity: Joseph de Maistre, Rousseau, and the Origins of Moral Statistics." *Journal of the History of Ideas* 68.1 (Jan. 2007), 107–130.

[440] Nelson, "Colonizing France" (2013), 76; 83

[441] Cole, *The Power of Large Numbers* (2018), 84–5; 114; 212

an area of inquiry more immediately linked to the professional work of naturalists such as Lamarck.[442] However, and especially following the early decades of the nineteenth century in which public health and hygiene became more prominent and influential areas of inquiry, medical anthropology also had roots in natural-historical studies of humanity. Much as Lamarck owed an intellectual debt to Cabanis, a physician, so did many physicians write on topics germane to natural history and theories of evolution—and many cited Lamarck when they did so.

For example, Auguste Debay (1802–1890) was a military doctor in colonial Algeria who wrote extensively on beauty, hygiene, and sexuality from the 1840s onward after he returned to France. Politically liberal and with staunch anti-clerical beliefs, Debay wrote mainly for a popular audience, and while much of his work focused on disseminating medical advice on various personal hygiene practices and beauty rituals, he also had an interest in natural history and human evolution. In a passage from his *Histoire des métamorphoses humaines et des monstruosités* (1845) on the origins of the human species, Debay cited Lamarck to support his claim that the orangutan, which he considered the most elevated and human-like animal, shared "striking similarities" anatomically with the Khoekhoe, whom he referred to by the term "Hottentot."[443] To support his argument that the Khoekhoe had been the first humans to evolve—and therefore were also the lowest humans in terms of organisational complexity and development—Debay explained that Lamarck's theory of habitual actions leading to physiological changes, what others would later call the 'use-disuse principle,' accounted for those ways in which the Khoekhoe differed anatomically from the orangutan, while their

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[442] Williams, *The Physical and the Moral* (1994), 18

[443] Auguste Debay, *Histoire des métamorphoses humaines et des monstruosités: stérilité; impuissance; procréation des sexes; calligénésie* (Paris: Moquet, 1845), 36–7.

similarities were easily observable. He also proposed an experiment involving removal of a set of membraneous sacs found beside the larynx of the orangutan, which he thought would allow the apes to speak and thus provide further evidence that they were the evolutionary ancestors of humans.[444]

As George Stocking has pointed out, the anthropological and ethnological societies of the 1840s, when Debay's treatise was published, were hardly the first in France to arrive at an interest in race in conjunction with the study of natural history. Indeed, Stocking's particular case study, the Société des Observateurs de l'Homme, was founded in 1800, included Lamarck as a member, and engaged in anthropological observation of a broad range of human behaviors and characteristics, including studies of the physical characteristics considered to comprise distinct races.[445] However, naturalists predominantly comprised the Société's membership; though it did include a few physicians, such as Pinel and Cabanis, in 1800 the 'study of man' was generally considered to be more distinct from medicine than it would be several decades later. Thus, Debay's 1845 treatise began with general remarks on the origins of life itself, and then on the evolution of human beings, before shifting toward his more oft-tread ground: reproduction and reproductive medicine.

Nor was Debay the only physician in this period whose writing cited Lamarck on anthropological points. The physician-theologian Marie-Antoine François (Francis) Devay (1813–1863), who spent much of his career in Lyon and who espoused the vitalist doctrines of the Montpellier school, wrote primarily for medical journals, such as the *Gazette médicale de*

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[444] Ibid. 37–8

[445] George Stocking, "French Anthropology in 1800." In: Stocking, George W. (ed.), *Race, Culture, and Evolution: Essays in the History of Anthropology* (Chicago: University of Chicago Press, 1982), 17.

*Lyon*; however, he did also cover more popular topics in hygiene in several monographs, and had a particular interest in marital hygiene and reproduction, including advising heavily against consanguinous coupling.[446] In one of his hygienic treatises, purporting to offer medical expertise on the perfecting of the human species in the context of modern civilisation, Devay made a similar linkage as the Debay text above: discussing the indigenous Quichua peoples of South America,[447] he argued that they had larger chests and higher lung capacities than Europeans, and cited Lamarck's *Philosophie zoologique* (1809) to support the claim that this was a habituated change they had undergone as a result of living at higher elevations.[448] Furthermore, Devay's citation of Lamarck also argued that his work (and that of Geoffroy) supported the claim that habitually mediated alterations to the physiology were "capable of fashioning an entire race, that is to say of giving it a permanent character, transmissible by way of heredity."[449] He then proceeded to cite Cabanis on 'acquired temperaments,' arguing that various "physical and moral modifiers" exerted pronounced effects on the constitution, temperament, and physiology of human beings.[450] Thus, like Debay, Devay also considered Lamarckian evolutionary tenets to be foundational to the medical advice he offered on hygiene, health, and reproduction. The anthropological tradition in medicine was also, often, a natural-historical one, and invoked

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[446] François Martine et Ramousse Raymond, "Devay Francis ou Francisque (Marie-Antoine-François) (1813–1863)." *Dictionnaire historique des membres de la société linnéenne de Lyon et des sociétés Physiophile de Lyon, d'études scientifiques de Lyon, botanique de Lyon et d'anthropologie de Lyon réunies* (2007). https://www.linneenne-lyon.org/depot6/6-3598.pdf. Accessed 4 November 2024.

[447] Predominantly, but not exclusively, native to Peru

[448] Marie-Antoine François Devay, *Hygiène des familles, ou Du perfectionnement physique et moral de l'homme: considéré particulièrement dans ses rapports avec l'éducation et les besoins de la civilisation moderne*, T. 1 (Paris & Lyon: Dorier, 1846), 226–8.

[449] Ibid. 228

[450] Ibid. 229

Lamarck's name and ideas to explain not just the origins of the human species in general, but also racialised and otherwise remarked-upon physiological changes.

Though these two texts are of particular relevance to this dissertation because of the relationship between Lamarckian biology and French scientific notions of race (discussed more below in Chapter 5), a number of more minor citations of Lamarck from the first few decades of the nineteenth century offer further evidence that his work was received as influential in medical circles specifically. For example, in an 1837 treatise, Sébastien Antoine Turck (1796–??), credited on the cover as a physician at the Strasbourg Faculty of Medicine, argued that physics and chemistry had recently proven themselves useful to medicine, as they supplanted vitalist properties with the knowable and predictable laws of inorganic matter. Turck named, as the heads of this "happy revolution" and second only to Luigi Galvani (1737–1798) himself, Lamarck and the chemist Antoine Fourcroy (1755–1809).[451] An 1827 hygienic treatise by the otherwise obscure physician François Simon (1759–??) cited Lamarck's ideas about the effect of habitual actions on the physiology to support the idea that people would develop markedly different physiologies over time in accordance with the specific physical demands of their jobs.[452] A sale catalog for the medical bookshop of publisher Germer Baillière (1807–1859), appended to an 1834 medical treatise by the Paris chair of clinical medicine Auguste François Chomel (1788–1858), listed both *Philosophie zoologique* and Lamarck's later work, *Système*

[451] Sébastien Antoine Turck, *Traité de la goutte et des maladies goutteuses* (Paris: Béchet, 1837), 512.

[452] François Simon, *Traité d'hygiène appliquée à l'éducation de la jeunesse* (Paris: Villeret, 1827), 310.

*analytique* (1820); Germer Baillière was also the brother of J.B. Baillière, who himself published many of Lamarck's major works.[453]

**Lamarck in the medical literature**

Even early in the nineteenth century, the primary evidence supports the idea that significant portions of Lamarck's learned audience viewed his work as foundational for, or even a direct contribution to, medical science. In 1802 the hygienist journal *Conservateur de la santé* quoted Lamarck's remarks on the medical utility of his meteorological almanacs (discussed more above in Chapter 1) in an article by two physicians—also the journal's editors—on the relationship between human health and atmospheric conditions.[454] And a listing for *Philosophie zoologique* in 1809 in the *Journal de bibliographie médicale* only alluded to Lamarck's ideas about species transformation, glossing the book mostly as a contribution to taxonomy and physiology and concluding that "his physiological views can only contribute to the progress of the science of man."[455] Certainly it is not surprising that a savant with Lamarck's institutional positions had his work reviewed or cited in a range of publications, during his life as well as following his death. Still, the frequency with which his name appeared in medical publications from the turn of the century onward is indicative of both the close relationship between medicine and the nascent life sciences, and too of Lamarck's particular position as a naturalist whose work was nevertheless quite germane to medical science. While his major published works were not

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[453] Auguste François Chomel, appendix to *Leçons de clinique médicale: faites à l'Hôtel-Dieu de Paris* (Paris: Germer Baillière (1834), 21.

[454] François-Philippe Bellay & Pierre Brion, "Des rapports de la Météorologie avec la santé des hommes." *Le Conservateur de la santé* 4.24 (30 vendémiaire an 10), 188.

[455] *Journal de bibliographie médicale* 11 (Novembre 1809), 337–40.

addressed to a primarily medical audience, he did name physicians as one potential audience in his meteorological almanacs, and spoke directly to medical students in a course lecture in 1809; he also personally treated some number of patients suffering psychological disturbances (discussed further in Chapters 1, 2).

It should therefore come as no surprise that Lamarck was also cited to support a medical-hygienic practice that remained popular in France throughout the nineteenth century: gymnastic exercise. As Sun-Young Park has discussed in *Ideals of the Body* (2018), the postrevolutionary decades saw a surge of interest in the salubrious benefits of exercise and outdoor activity, both among Parisian establishment public health champions and among popular audiences. Attempts to revive the institution of the grand public gymnasium were one culmination of this trend, leading to ambitious architectural proposals in the 1840s and 1850s for communal gymnasiums —spaces "devoted to the physical and moral betterment of modern society."[456] Gymnastics and sports culture were conceived as "regenerative" forces, "rebuilding the greater social body through the individual citizen's body."[457] In this sense, the growing interest in gymnastics—particularly among the wealthy—was merely one particular manifestation of the liberal-individualist attitude that had also characterised revolutionary and early nineteenth-century efforts to reform France's hospital system, wherein reformers emphasised that it was a citizen's own duty to maintain individual and family health.[458] Individual interventions and preventive

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[456] Sun-Young Park, *Ideals of the Body: Architecture, Urbanism, and Hygiene in Postrevolutionary Paris* (Pittsburgh, P.A.: University of Pittsburgh Press, 2018), 277.

[457] Ibid. 282

[458] See eg. Weiner, *The Citizen-Patient* (2002), 317.

practices, like participation in sport and other salubrious movement, were thus configured as responsibilities of the upstanding public.

To be sure, the relationship between medicine and exercise for much of the nineteenth century was somewhat fractured: generally physicians occupied a professional niche that was distinct from that of popular champions of gymnastics and other exercise. Cooperation between these types of public health reformers and credentialed medical professionals therefore occurred piecemeal, and with a great deal of local variation.[459] However, this is not to say that medical discourses were unimportant in the gymnastics movement. Indeed, after an early phase in which gymnastics was justified largely by appeal to Platonic and Rousseauvian notions of the mind–body connection, the physician Charles Londe (1795–1862) published an influential 1821 treatise (expanding on similar arguments from his 1819 thesis) in which he sought to bring gymnastics into the medical mainstream by re-founding it on physiological principles, and sought to investigate its effects on the organs and their faculties, functions, and alteration.[460] Londe's work formed much of the basis for the 'medical and orthopedic' gymnastics practiced as part of the method of Colonel Francisco Amoros (1770–1848)—one of the most influential advocates of gymnastic education in France at the time, and director from 1820–1839 of a 2,000-member public and military gymnasium inaugurated in May of 1820 by Ministerial decree.[461]

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[459] Jacques Defrance, Pascal Brier, & Taieb El Boujjoufi, "Transformations des relations entre médecine et activités physiques du début du XIXe siècle au début du XXe siècle en France." *Gesnerus* 70.1 (2013), 89.

[460] See e.g. Gretchen Finney, "Vocal Exercise and Nineteenth-Century Hygiene in France." *Clio Medica* 12.2/3 (1977), 150.

[461] See Saint-Martin Jean & Michaël Attali, "The Joinville School and the Institutionalization of a French-Style Physical Education, 1852–1939." *The International Journal of the History of Sport* 32.6 (May 2015), 2–3.

Furthermore, medical and physiological justifications for the importance of gymnastics were frequently based on the Lamarckian notion that exercising an organ would strengthen it by habitual use, an idea propagated in the influential 1821–22 *Cours élémentaire d'hygiène* by Léon-Louis Rostan (1790–1866), who made his medical career as a well-known critic of vitalism and chair of clinical medicine at the Hôtel-Dieu in Paris.[462] By the late nineteenth century, sport and gymnastics were considered promising in staving off degeneration, again by a Lamarckian logic: although an insalubrious environment had wreaked havoc on the French nation, particularly on its afflicted masses of urban poor, hygienic reformers could reverse this effect by altering the environmental factors, and sporting culture was one means of doing so.[463]

Particularly resonant following the French defeat in the Franco-Prussian war, this particular manifestation of Lamarckian thinking appealed to both lay and professional hygienic reformers who perceived the populace—and the military—as lapsing into weakness, impotence, and constitutional disease. It also speaks to the lasting legacy of Cabanis: as it was largely under the Third Republic that physicians were able to solidify the kind of national political influence Cabanis had called for them to have, it should perhaps be no surprise that medical-gymnastic discourses of the time also invoked the notions of perfectibility and habitual alteration that both he and Lamarck had espoused.[464] Though both Lamarck and Cabanis also thought that physiological changes mediated by habit would be at least somewhat transmissible by

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[462] On Lamarckian thinking in gymnastic practice, see Finney, "Vocal Exercise" (1977), 153.

[463] Nye, *Crime, Madness, and Politics in Modern France* (1984), 321

[464] For example, see Cabanis, *Rapports* (1802), 366; and Lamarck, *Zoological Philosophy* (1809c [1914]), 347.

reproduction,[465] advocates of gymnastics and sport culture also used their ideas to emphasise the malleability of an individual over the course of their own life, including the possibility that proper physical exercise could reverse the very earliest stages of degeneration if prescribed properly.[466]

Indeed, hygienic texts on gymnastics throughout the nineteenth century often followed the Lamarckian and Cabanisian position that organic dispositions, temperaments, and tendencies could be passed down from parents to offspring by reproduction—but simply inheriting these tendencies did not automatically mean the offspring would display the same behaviours, or even physiology, as the parent. The individual's development still depended on certain triggering causes, generally environmental ones—preserving a role for both inheritance and environmental influence in the appearance of pathologies as well as positive traits. For example, Pierre Foissac (1801–1886), a hygienist–physician who served as deputy mayor of the 1st arrondissement and founded its Société médicale, wrote an 1838 thesis on gymnastics in competition for the chair of hygiene at the Paris faculty of medicine. In the thesis, Foissac argued that organic dispositions were innate, and transmitted by generation; however, motion could still change the organisation, a claim he cited Lamarck as having made before him (though, as Foissac noted, Lamarck had invoked "this incontestable principle" more ambitiously, to explain the origins of entire species).[467] As Carlos López-Beltrán has pointed out, such a belief in the transmissibility of "latent constitutional causal influences of some kind" predated Lamarck, having appeared in

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[465] Cabanis, *Rapports* (1802), 459; Lamarck, *Zoological Philosophy* (1809c [1914]), 339

[466] Nye, *Crime, Madness, and Politics in Modern France* (1984), 321

[467] Pierre Foissac, *De la gymnastique des anciens, comparée avec celle des modernes, sous le rapport de l'hygiène* (Paris: J.B. Baillière, 1838), 73.

Diderot and D'Alembert's eighteenth-century encyclopedias as French savants were becoming more interested in hereditary transmission of various maladies—though without having solidified a belief in what biological inheritance was or how it occurred.[468] Foissac also considered different types of exercise to have different effects on the body, and thought these would be furthermore modified by factors like age, sex, various idiosyncrasies,[469] and climate, this last a topic he wrote more on and considered to be intimately linked to human moral and physical health.[470]

By mid-century, gymnastics was a popular enough element of hygienic medicine that it was explicitly listed in the title of one of Auguste Debay's treatises, this one focusing especially on female beauty. Debay's argument was that gymnastics was an important hygienic, or preventive, practice because habitual exercise of the body would strengthen muscles, organs, and tissues—and to support his position, he explained that Lamarck's work had already established the physiological effects of habitual movement.[471] In both Foissac's treatise and Debay's, then, gymnastic exercise altered bodies at the individual level, and therefore a gymnastic program had to be undertaken as part of an individual's commitment to maintain their own health.

However, it is important to note that these individual choices, in the aggregate, had larger implications for the social body and in scientific discourses of race. Foissac discussed Spartan gymnastics as a way of maintaining and improving human racial stock in the way that

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[468] López-Beltrán, "Forging Heredity" (1994), 227; 231–2

[469] A term generally used in hygienic literature to refer to individual variations in physiology or disposition that a given author considered neither harmful nor beneficial.

[470] See Foissac, *De la gymnastique des anciens* (1838), 44.

[471] Auguste Debay, *Hygiène générale de la beauté humaine, spécialement chez la femme, de son perfectionnement, de sa conservation et des moyens de prévenir ou de combattre sa dégradation: alimentation, nutrition localisée, gymnastique, physiognomonie* (Paris: Moquet, 1851), 197–8.

domestication and selective breeding was intended to do for non-human animals; he also cited a nineteenth-century experiment reported by a French explorer-naturalist in Timor, which had supposedly demonstrated that the native population was on average weaker than other racial groups, a result Foissac blamed on poor nutrition and a lack of consistent physical exercise in the island's hot climate.[472] He also considered the relative unpopularity of modern gymnastics to be linked to general decline in civil and social life.[473] And Debay began his chapter on gymnastics by asserting its role in the training of a litany of ancient Greek "extraordinary men," tracing a kind of medical lineage from "heroic times" and mythologized figures like Hercules and Theseus all the way up to modern gymnastic champions including Colonel Amoros.[474]

Of course, as this passage suggests, gymnastics was not an entirely new medical recommendation in France by the 1830s. Exercise in general was an established salubrious practice, especially when combined with ideas about the benefits of fresh air. However, the Foissac and Debay texts advanced the particular Lamarckian physiological argument that habitual use of a body part would strengthen it; by contrast, earlier texts on gymnastics had often framed their arguments differently. For example, an 1819 medical dissertation submitted to the Paris Faculty of Medicine by a Louis-Xavier-Auguste Lafayolle de la Bruyère argued that physical exercise strengthened the body and protected from diseases—but also noted that too much exercise could be overly violent and deleterious, particularly for young women.[475]

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[472] Foissac, *De la gymnastique des anciens* (1838,) 15; 74

[473] Ibid. 19

[474] Debay, *Hygiène générale de la beauté humaine* (1851), 198–203

[475] Louis-Xavier-Auguste de la Bruyère, *L'Éducation, cause occasionnelle ou prédisposante de la pluparte des maladies, surtout de celles des premiers âges* (Paris: Didot Jeune, 1819), 28; 34–6.

Bruyère's remarks were grounded in physiological theories that prized moderation, warning of the dangers of overstimulation as well as understimulation. In contrast, for Debay and Foissac, writing several decades later, more exercise of a muscle or organ was generally a means of strengthening it.

Neither Lamarck nor the subsequent writers who cited him would have argued that more exercise was *always* a good thing; for example, both Debay and Foissac distinguished between 'medical' and 'athletic' gymnastics, and noted that the latter could cause injury, whereas the former was a therapeutic practice that followed medical expertise to benefit the patient.[476] This was a common distinction in hygienic texts, including such Lamarckian ones—which is to say that these authors certainly believed there could be such a thing as too much exercise. Nevertheless, there was still a stronger emphasis, in the Lamarckian-inflected texts, on the benefits of strengthening organs and tissues by habitual use, whereas physiological ideas more popular in the late eighteenth and early nineteenth centuries tended to put more weight on the idea that both underuse and overuse could have detrimental effects—with the latter causing fatigue and desensitisation (discussed briefly above in Chapters 1 and 3).

As with many nineteenth-century citations of Lamarck, those pertaining to gymnastic exercise and physical education are also indicative of a broader sea-change in medical and naturalist discourses, drawing in large part from Cabanis's ideas. After all, even seven years before Lamarck's *Zoologie philosophique* was published, Cabanis had written of the human body as a production of nature that could nevertheless be modified, corrected, and perfected by the art of medical intervention and human ingenuity. "This is the work of education, which is, properly

[476] See e.g. Foissac, *De la gymnastique des anciens* (1838), 90

speaking, only the art of impressions and habits," he wrote, adding that education came in two parts, the first of which was "that which acts directly on the physique."[477] Thus, it is critical to understand later citations of Lamarck, such as on the subject of gymnastics, as part of a larger shift in medical discourses toward a focus on physiological malleability, the importance of habitual actions, and the close rapports between the mental and the physical. In his own lifetime, Lamarck benefitted from Cabanis's writings directly, citing them frequently and building off the sensationalist ideas contained within; however, even decades after his death, Lamarck's legacy was also tied indelibly to that of Cabanis, and it was in part the broader embrace of Cabanisian ideas in medical circles that made Lamarck's writings attractive and influential long after his own death.

**Concluding remarks**

As I have shown in this chapter, understanding the legacy of Lamarckian ideas requires careful attention to the medical context in nineteenth-century France. While Lamarck himself practiced medicine only in a very limited capacity, and has been largely remembered in the historical record as a botanist, taxonomist, and evolutionary biologist, his conceptions of human physiology and of species evolution were grounded in Cabanis's medical theories from the beginning. From his remarks on the relationship between the moral and the physical, to his focus on the effects of environmental factors and habitual behaviors on the physiology, Lamarck was heavily indebted to Cabanis's work from the beginning. As Cabanis himself put it, "In the same way as natural history requires a sound physical geography, the science of man requires a sound

[477] Cabanis, *Rapports* (1802), 69

medical geography."[478] Cabanis argued that medical knowledge was the necessary foundation for any study of humanity, whether in anthropology, psychology, or political science; Lamarck's evolutionary arguments married some of the tenets of Cabanisian physiology with a natural-historical argument to offer a theory of species evolution as well as a more general conception of how organised matter could change and adapt over time.

Thus, it should come as no surprise that the medical literature in the decades after Lamarck's death proves such a rich source of both direct citations of his work, and indirect uptake of many of his ideas. In some respects, Lamarck's name was useful for physicians who had aspirations of upward professional mobility: medicine underwent a process of professionalisation during the nineteenth century, and was generally seen as much more prestigious and respectable by the end of the century than the beginning. Thus, in many of the texts and treatises I have cited in this chapter, citing Lamarck's name was useful for authors in more than one way. In addition to the genuine intellectual influence Lamarck exerted over many medical writers, his reputation was also considerable at this point. Though there were certainly powerful savants who disagreed with, or sometimes even mocked, his theory of species transformation, Lamarck had retained a valuable institutional position at the Muséum until his death, and his work as a taxonomist and invertebrate zoologist was consistently respected. Additionally, and as I have shown in Chapters 1 and 2, it is not the case that his evolutionary ideas were universally rejected. Species transformation was a legitimate subject of debate among French naturalists, both during Lamarck's lifetime and in the decades after, and Lamarck's ideas certainly had their defenders; even critics sometimes agreed to parts of his theory, or agreed that

[478] Ibid. 492

his idea of physiological change over time was viable and only disagreed that it could go far enough to create a new species.

For physicians, the professional stakes here were particularly stark. On a Lamarckian theory of living matter, bodies were always malleable and in flux—and were inevitably altered and shaped by environmental conditions, from the weather to the mode of governance to the daily labour one engaged in. Thus, following both Lamarck and Cabanis, physicians and medical reformers argued that their expert knowledge of bodies and physiology was critical for any functional and progressing society. If France wanted to be a nation of healthy, profitable workers with a robust social and civic life, then, on this line of logic, political leaders ought to consult with—or indeed perhaps themselves be—medical experts. The legacy of Lamarckian biology, then, is inextricable from the rising status of medicine in the nineteenth century, as well from as the debates within medical circles over proper methodology, clinical practice, and the philosophical foundations of the discipline. As I have shown above, medicine in this period gained an ever wider social remit, culminating in the social-scientific approach that Elizabeth Williams called "anthropological medicine" as well as in individual therapeutic recommendations such as gymnastic exercise.

Additionally, I have shown that various medical sources in the early-to-mid nineteenth century considered Lamarck to be part of their intellectual world, at least enough to review or cite his works, or to list him as a foundational medical thinker. While it would be a mistake to assume that all such citations indicate a deep or ongoing engagement with the details of his work, they do indicate that Lamarckian ideas were understood to be germane to medicine during this time. In secondary historical literature, Lamarck has often been treated as a precursor to

Darwin, removing him from such a medical context to relocate him in a strictly biological and natural-historical narrative. While these contexts are certainly also relevant to any evaluation of Lamarck's work, in the earlier French context it is clear that much of the debate about the malleability of both individual bodies and entire species was medical in nature.

In this chapter, I have focused on physicians who primarily wrote about, or practiced on, individual patients. This form of medicine was a dynamic one in the French nineteenth century, as reforms to hospital and clinical medicine that began in the late eighteenth century and revolutionary decade dramatically changed expectations about physicians' duties to their patients, and to society at large. However, as medicine became more socially minded, and physicians sought to care for entire the entire social body or nation, another important change was the rise of 'social hygiene' and the public health movement. As I shall show in the next and final chapter, the public health and hygiene context was another crucial one for Lamarckian ideas and their legacy in the nineteenth century—and it was in this context that reformers and politicians were able to make an even stronger argument for the value of medical expertise in proper governance. The legacy of Lamarckism extended far beyond naturalists' debates over the 'species question.' Rather, by tracing Lamarck's ideas through the century after his death, we shall see that they formed a critical part of the scientific justification for French colonial policy, conceptions of race, and what Michel Foucault called *biopolitics*.

## Chapter 5: Social hygiene and Lamarckian biopolitics

In twenty-first century parlance, "hygiene" typically refers to either one's personal grooming habits, or standards of cleanliness meant to control the spread of infectious diseases. Historically, however, the term has encompassed a much broader set of attitudes and practices aimed at various forms of social and personal health and wellness. In particular, in nineteenth-century France, some hygienists did work in medical contexts—but others focused on urban reform, architecture, colonial administration, environmental management, and more. Comprising the broader social hygiene movement, these seemingly disparate efforts were united by their common aims: to control, and eventually improve upon, the bodies of the French populace by means of scientific and medical management. While some of the rhetoric associated with social hygiene was continuous with the sorts of utopian social claims favored in the late Enlightenment, hygienic management was also embraced as a way of staving off racial and biological degeneration.

The nebulous, and yet urgent, nature of such aims meant that virtually any aspect of daily living could be positioned as being of great importance to the national future. Hygiene in popular practice and parlance should therefore be understood as extending far beyond the bounds of its academic manifestation. Indeed, the expansiveness of the category of 'social hygiene' beyond the academic discipline of hygiene is evidenced by the fact that, after about 1900, hygiene generally faded as a discipline from the academy—yet social hygiene was more widely practiced than ever, and continued to be the subject of popular debate and discussion. This much suggests that there is a significant mismatch between 'hygiene,' understood as a social movement in the nineteenth century, and the more narrow academic discipline bearing the same name. Indeed, in the

historical literature, the social hygiene movement has found homes in numerous sub-disciplines, including architectural, urban, social, medical, and cultural history.

The historian's need to contend with both their own and actors' categories has meant that the secondary literature on French hygiene of the nineteenth century sometimes struggles to accurately characterise the scope of its subjects' interests and political activities. For example, in one of the earliest English-language surveys of the French hygiene movement in the first half of the nineteenth century, Erwin Ackerknecht suggested that the years around 1848 represent the "starting point of modern *hygiene* … or of *preventive medicine*, as we now usually call it."[479] Certainly such a definition of hygiene would have been familiar to many of Ackerknecht's subjects: for example, the paper remarks on a two-volume treatise by Léon Louis Rostan (1790–1866), published in 1822, which differentiated hygiene from therapeutic medicine by asserting that the former dealt with the preservation of health, the latter with the treatment of disease.[480] However, like the vast majority of authors Ackerknecht surveyed, Rostan was a physician (indeed, he was a disciple of the noted alienist Philippe Pinel); his proffered definition of hygiene was both shaped and limited by his professional interests, and similar claims to his were, understandably, in vogue with doctors who often stood to benefit from the shoring up of a hygienic specialisation. On the other hand, treatises and pamphlets aimed at a wider public audience, as well as various public policy concerns, reveal the language and practice of hygiene in areas transcending the bounds of what we would now identify as medicine, preventive or otherwise. By the end of the nineteenth century, social hygiene was understood to encompass

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[479] Erwin Ackerknecht, "Hygiene in France, 1815–1848." *Bulletin of the History of Medicine* XXII.2 (March–April 1948), 117.

[480] Léon Louis Rostan, *Cours élémentaire d'hygiène*, T. 1 (Paris: Chez Béchet, 1822), 1.

virtually any effort to improve social conditions, from the prevalence of alcoholism and 'perverted' sexual behavior, to crime, to racial degeneration and the supposedly declining national birthrate (a recurring bee in the bonnet of French social reformers since the eighteenth century[481]). In the French context, many such national and social improvements were proposed to take place through the careful management and control of the urban milieu, rather than through overt medico-legal efforts to prevent the 'unfit' from reproducing, as in English-style formulations of eugenic policy.[482]

It is not my intention here to suggest that hygiene in the nineteenth century ought to be understood as entirely distinct from the medical profession. Rather, my contention is that it was, especially in its 'social' form, a broader master category that included not just medical practices and encounters, but also aspects of public policy, colonial administration, architectural and urban design, and other social reform efforts. Legislators and reformers often made their appeals in medicalised terms, construing health as a national good that could be protected through proper management of people's daily environments and habits. This much suggests that social hygiene, while frequently justified with medico-scientific claims, was more than just a branch of medicine; instead it represented an incursion of medical authority into various reformist efforts in nineteenth-century France, as well as the increasing affinity between medical and governmental ambitions for national improvement.

Lecturing at the Collège de France on 17 March 1976, Michel Foucault argued that one of the characteristic developments of the nineteenth century was the assertion of state control

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[481] See e.g. Nye, *Crime, Madness, and Politics in Modern France* (2014).

[482] For example, Gérard Jorland has discussed this distinction in regards to Italian versus French discourses on criminal persons and behavior. See Jorland, *Une société à soigner* (Gallimard: 2010), 156.

over biological phenomena.[483] By this Foucault did not mean direct interference into individual bodies; indeed that was a form of discipline whose origins he dated back several centuries. Rather, the nineteenth-century innovation was a new type of sovereignty wherein the state took an explicit interest in the promotion and management of living bodies en masse—at the population level. As the human population increased and capitalist production became increasingly industrial, the French state needed to ensure it had a large enough—and healthy enough—citizenry to produce national wealth, staff the military, and reproduce the next generation. Thus, Foucault unified such seemingly disparate social technologies as demography, social statistics, natalist policy, and the management of infectious diseases under the schema of biopolitics—a state orientation toward population management. This also included control over the geographical, climatic, or hydrographic environment, insofar as they affected human health: thus, biopolitics is conceptually capable of linking the overtly medical efforts of figures such as Rostan with the various other reformist aims of the social hygiene movement, such as attempts to control human bodies by altering their built and urban environments. In such efforts, the broader goal was to create the social and biological conditions to ensure a human population that was thriving according to state standards of health—thus turning hygiene into an operating principle of governance. That is, biopolitics entailed the conversion of desirable biological characteristics (health) into economic capital and—what ultimately comes to the same thing—military power for the state; in this process hygiene functioned as a master category by which to semantically unify and scientifically assess the various state efforts to promote health.

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[483] Michel Foucault, "Lecture eleven." In: idem., ed. by Mauro Bertani & Alessandro Fontana, "*Society Must Be Defended." Lectures at the Collège de France, 1975–76*, translated by David Macey (New York: Picador, 1997), 239–40.

Crucially, for Foucault biopolitics did not only promote life. Indeed, he argued that racism—or, perhaps more accurately, the social process of racialisation—was a way of introducing a break between "what must live and what must die".[484] By construing certain individuals or populations as biological threats, the state could justify the business of killing on the grounds that eliminating the unfit was not only morally permissible, but actually an imperative in order to protect the rest of the population. Such biological discourses could be applied to the disabled, the poor, criminals, native populations in the colonies, and others who were considered abnormal or degenerated in some way. According to Foucault, this logic was how the state reconciled the tension of simultaneously promoting life and killing its enemies: these enemies were now conceived as biological threats, in accordance with an "evolutionary" logic of biological racial hierarchy and the corresponding necessity to eliminate the unfit.[485]

Understanding the relationship between biopolitics, racism, and evolutionary thought is critical for this study of Lamarck's legacy for numerous reasons, including that a precise accounting of the French state's population management and evolutionary ideas elucidates the ways in which evolutionary racism in the French context has long shared overlapping characteristics with its Anglophone counterparts. For example, writing on the Albert Sarraut, who served as the Governor-General of French Indochina in the 1910s and later as Prime Minister under the Third Republic, historian Clifford Rosenberg noted that Sarraut and many of his contemporaries overtly rejected the idea of immutable racial differences, a more popular concept in the US; nevertheless, French scientific racisms still included biological as well as

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[484] Ibid. 255

[485] Ibid. 257

environmental and cultural arguments.[486] Sarraut's racism was strongly influenced by the French tradition of Lamarckian thought, and this did not conflict with, but bolstered, his racist politics—for example, his view that colonial subjects bore hardly any physiological similarity to white metropolitan French, and were unfit to be granted French citizenship due to the degenerating effects of their hereditary lines and environmental conditions.[487]

This much suggests that the legacy of Lamarckian thought throughout the long nineteenth century must be evaluated with reference not just to debates in evolutionary biology, but also to pressing political questions. Sarraut and his political peers, for example, generally did support immigration into France, recognising pragmatically that immigrant labor was a necessity for the French economy; simultaneously, they used Lamarckian arguments about biological malleability to bolster their beliefs in racial hierarchy and to argue against granting citizenship to colonial subjects and immigrants, creating a perpetual underclass of easily exploitable labour.[488] While my study begins some 100 years earlier, at the turn of the nineteenth century, similar and overlapping concerns about the national economy and the health of the population also characterise Lamarckian and evolutionary writings from Lamarck's lifetime onward. For example, in Louis Robert's 1801 treatise on *méganthropogénésie* (discussed briefly above in Chapter 1), the rhetorical appeal quite explicitly hinged on the promise that physiological malleability and the controlled 'breeding' of human beings could create a nation of beautiful,

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[486] Clifford Rosenberg, "Albert Sarraut and Republican Racial Thought." In: Herrick Chapman & Laura L. Frader (eds.), *Race in France: Interdisciplinary Perspectivs on the Politics of Difference* (New York: Berghahn Books, 2004), 38.

[487] Ibid. 43

[488] Ibid.

strong, and biologically superior people.[489] Hygienic texts aimed at a more professional audience also connected tenets of Lamarckian thought with concerns about the health and productivity of various laborers. Lamarck's own writing acknowledged the possibility that both desirable and undesirable characteristics could be habitually reinforced and passed down by reproduction;[490] later hygienic texts built on such ideas to argue, for example, that Lamarckian mechanisms could account for the appearance of physiological and biological distinctions between people who worked in different professions, as in an 1827 treatise on hygiene and education.[491] Lamarckian evolutionary change could be harnessed to create a labouring class more well-suited to the work needed for a globally dominant French nation; however, and as this treatise pointed out, habitual changes incurred during the performance of repetitive labor also carried the risk of weakening the body or reinforcing undesirable biological traits. That is, the propagation of Lamarckian ideas occurred in the context of broader hygienic concerns about how to create, manage, and maintain a fit population and workforce.

Previous literature has certainly not remained entirely uninterested in this aspect of Lamarckian biology. For example, Peter J. Bowler has long argued that one reason Lamarckian biology was popular around the turn of the twentieth century was its "broader philosophical implications," particularly a "hopeful vision" of a natural world composed of organisms with the power to purposively and creatively direct their own evolution.[492] Bowler considered Lamarck

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[489] Robert, *Essai sur la mégalanthropogénésie* (1801), 21

[490] See Ch. 2 above

[491] Simon, *Traité d'hygiène apliquée* (1827), 310

[492] Peter J. Bowler, *Evolution: The History of an Idea, Revised Edition* (Berkeley, C.A.: University of California Press, 1989 [1983]), 258.

an Enlightenment philosophe with one foot planted firmly in the eighteenth century, manifesting in a progressivist vision of nature[493] that eventually culminated in open eugenic arguments.[494] However, Bowler's understanding of eugenic evolutionism focused more on changes to individual organisms than on the massifying politics Foucault analysed; furthermore, and somewhat like Paul Lawrence Farber (discussed further below), Bowler problematised the politics of Lamarckian ideas to an extent he did not generally apply to Darwinian ones, often arguing instead for a greater independence of Darwinian thinking from Malthusian and Smithian laissez-faire than the secondary literature had previously suggested.[495] While it is not within my purview here to cross-examine the literature on Darwin, it is important to note that Lamarckian biology was never an anomalous example of scientific theory tainted by political ideology; rather, any scientific theory ought to be analysed as both a product of its political and ideological context, and as a potential constitutive factor in any subsequent such developments. If Lamarckism appeared to a certain contingent of Third Republic liberals as conducive to carrying their prior political and biopolitical commitments, this was surely also a reflection of the simple fact that Lamarckism remained a powerful and popular scientific position in France in the last three decades of the nineteenth century, and thus formed a part of the rhetorical smorgasbord readily available to virtually anyone seeking to naturalise any particular political position.

As Foucault recognised, state efforts to control and cultivate the bodies of their citizens were grounded in practical, economic concerns. Although the nineteenth century was certainly

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[493] Idem., "Evolutionism in the Enlightenment." *History of Science* xii (1974), 159–183.

[494] See e.g. idem., "E.W. McBride's Lamarckian Eugenics and its Implications for the Social Construction of Scientific Knowledge." *Annals of Science* 41 (1984), 245–6.

[495] See e.g. idem., *Evolution: The History of an Idea* (1989 [1983]), 102–103; 173–174.

not the first time that sovereign powers noticed the necessity of labour and labourers in the creation of wealth, it was a century in which two major changes marked the exercise of power over the human body. First was what Foucault referred to as a "massifying" tendency, the treatment of the populace not as a series of individual bodies to be disciplined but as "a global mass that is affected by overall processes characteristic of birth, death, production, illness, and so on"—the beginning of an interest in *society* as a singular mass to be studied and quantified by, for instance, vital statistics.[496]

Second, there was the shift away from technologies of punishment and toward the promotion and enforcement of health—what Foucault summarised as the sovereign's "power to make live and let die."[497] In France specifically, this is evidenced by the increasing social and political regard for the epistemological authority of science and scientific medicine. Medicine was not only a technology of individual therapeutics, but one of governance; the population and its health were of concern to the nation-state because they were considered the foundation upon which national wealth and strength depended. And social hygiene functioned as a 'master category,'[498] containing diverse and varied efforts to promote health and prevent disease, and thus to ensure a maximally profitable and productive society. Even during Lamarck's lifetime, the dual medical and political roles held by men like Cabanis, and the medical concerns of the Idéologues—discussed above in Chapter 1—indicate the increasingly close relationship between

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[496] Foucault, "Lecture eleven" (1997), 242–3

[497] Ibid. 241

[498] By 'master category' I mean to draw attention to the fact that the social hygiene movement encompassed many different strategies and tactics for promoting health and well-being, and reflected social and moral concerns more than a single scientific or technical definition of 'health.' That is, the notion of 'hygiene' was a general term that could be invoked to justify state and medical intervention into virtually any aspect of social life; it was largely a political category and not a technical one.

governance and medicine, and the consolidating state's efforts to use medical and hygienic methods to achieve its political and economic ends.

In this chapter, I explore the place of, and consequences for, Lamarckism in this scheme, tracing the logic of social hygiene across disparate fields of operation and historical sub-disciplines. Within the history of science, there has historically been a tendency to make use of the academic disciplines as they exist today in order to understand past science. While this approach is not always inappropriate, in the case of hygiene in the nineteenth century it risks fracturing a broad social movement into many disparate academic disciplines, missing the overall operating logic and presenting instead a number of disconnected applied instances. What unified all of the hygienic reforms discussed in this chapter was not simply a concern about 'cleanliness;' instead, such rhetoric should be seen as a part of the larger biological and scientific management of the population that guided technologies of power in nineteenth-century France, and I emphasise the importance of Lamarckian evolutionary theory in this form of governance. For example, consider a minor reference in an 1849 treatise by the physician–politician Charles Robin (1821–1885) that credited Lamarck and Geoffroy as the first to sketch out "the study of the complex environments in which we live … [a study on which] the art of hygiene is founded."[499] Robin, who the previous year had coined the term *mésologie* to describe the study of the relationship between human beings and their milieu, was not alone in considering Lamarck's work foundational to such studies. As detailed in Chapter 1, Lamarck wrote in the context of debates that already linked together ideas about biological melioration, politics, and

[499] Charles Robin, *Du microscope et des injections dans leurs applications à l'anatomie et à la pathologie: suivi d'une classification des sciences fondamentales, de celle de la biologie et de l'anatomie en particulier* (Paris: J.-B. Baillière, 1849), LVII.

national wealth; in the century following his death, these concerns only intensified in France, and public health reformers harnessed Lamarckian studies of the relationship between bodies and environments to explicitly political ends.

For the physicians, urban reformers, engineers, naturalists, and colonial administrators who were part of the broadly defined social hygiene movement, it was always clear that hygiene had a much more expansive remit than mere personal grooming or infectious disease control. Hygiene represented an attempt to create the social and environmental conditions necessary for a biologically renewed and vigorous population—an evolutionary logic that demanded both the elimination of biological threats and the promotion of physical and moral health. Placing the social hygiene movement within a broader biopolitical context foregrounds this logic and emphasises historical actors' conceptions of health and well-being at a population level, rather than acceding to the much narrower academic disciplinary definitions of hygiene that dominate today. Recovering hygiene as an actors' category thus elucidates the place and importance of Lamarckian thinking in the biological and political debates of nineteenth-century France.

Thus, this chapter begins with an analysis of Lamarckian ideas in nine treatises on hygiene dated between 1818 and 1837—from the tail end of Lamarck's publishing career up through the decade following his death. Next, I explore the overlapping ideas and connections between such treatises on hygiene, and the ideology used to justify French colonial endeavors throughout the nineteenth century. In particular, and following Michael Osborne's work, I argue that environmental and climatic medical theories did not entirely vanish over the course of the nineteenth century, or even after the publication of Pasteurian bacteriological theories; rather, ideas about the importance of the environmental conditions in the maintenance of health

persisted in French discourse, particularly in discussions about the ostensibly degraded or insalubrious conditions of the colonies. Next, I cover some of the more overtly evolutionary debates in which Lamarck's name or ideas were invoked. I show that in these contexts, too, the biological disputes were continuous with political concerns about the strength of the French empire, its *mission civilisatrice*, and the possibility that human acclimatisation to new, especially hot, environments might represent racial degeneration and thus constitute an urgent threat to the national biological stock. Finally, I briefly discuss criminology and architectural design, showing how these two endeavours were shaped and guided by principles of social hygiene and biopolitics during the nineteenth century.

**Hygiene, occupational health, and habituation**

In his MD thesis submitted to the Paris Faculty of Medicine on 24 August 1818, Louis-Antoine Desmoulins, later known primarily as an anatomist, sought to present a systematic understanding of hygiene "deduced from the laws of physiology, and applied to the physical and moral perfection of man."[500] Much of the 26-page thesis was essentially a restatement of Cabanisian principles; based on the text, it seems unlikely that Desmoulins was directly reading very much Lamarck at the time. However, the overlap between Lamarck's and Cabanis's ideas still means that this is a useful text for tracking some of the reception of Lamarckian ideas.

For example, trying to systematise hygiene in a manner similar to physiology, Desmoulins proposed that the hygienic study of influences on the bodily economy admitted of

[500] Louis-Antoine Desmoulins, *Exposition des motifs d'un nouveau système d'hygiène, déduit des lois de la physiologie, et appliqué au perfectionnement physique et moral de l'homme* (Paris: Didot Jeune, 1818), cover.

three main orders: first, external influences that directly altered the function of the skin and lungs, namely, the air and the climate; second, the influence of human actions that restricted or altered the first-class factors, such as dwellings and clothing; and third, diet.[501] Within the second class, Desmoulins further distinguished between actions that were taken under the auspices of the will, with intellectual determination, and those that simply followed the affections and passions.[502] This text, then, while relatively minor, is a useful case to examine the perpetuation of Lamarck's and Cabanis's ideas about how voluntary human actions could alter the body physiologically.

Whereas Lamarck did not generally consider environmental factors to act directly on the human body—for him, the effects of the environment were mediated by an animal's needs and the habitual actions it took to satisfy those needs—Desmoulins did consider the climate and airs to directly cause certain physiological changes. However, the divergence with Lamarck on this point was perhaps narrower than it may first appear; Desmoulins also believed that many physiological changes were mediated by willed or sensitive actions, and that the sensitive organs and faculties in turn were also affected by climatic factors such as heat or humidity.[503] Thus, physiological changes occurred through a complex interplay of environment and body, where the external environment shaped the physiology but these alterations could in turn result in a being capable of acting in different and even willed ways. Furthermore, and like both Lamarck and Cabanis, Desmoulins added in his consideration of the second class of influences that

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[501] Ibid. 7

[502] Ibid. 8

[503] Ibid. 15–16

> by combining the numerous causes that modify the composition of the organs, one could improve the physical and moral faculties of man by readying those organic dispositions most favorable to the needs of his constitution, and preventing on the other hand the development of those which are contrary to them.[504]

Thus, in a relatively early text (Lamarck was still two years out from publishing his final major work; Cabanis had died only a decade prior) we can see that Lamarckian-Cabanisian ideas about the possibility of willed organic change were already being situated as concerns pertaining to the study of hygiene, and that this intellectual move was at least mainstream enough to be acceptable to the Paris Faculty of Medicine. Indeed, the synthesis of such remarks with a belief in some degree of climatic determinism represented by this point a relatively common viewpoint among many naturalists, particularly those with an interest in the classification and formation of human 'races' over time (see Chapter 1).

To elucidate the economic nature of such a notion of ameliorating the human body, it is helpful to examine several hygienic treatises that applied the physiological principles to occupational studies. For example, in an 1826 hygiene manual, pharmacist and editor of the *Journal de pharmacie* Joseph Briand (17??–18??) included a 20-page section detailing his hygienic recommendations to workers according to their occupation. His advice focused on dietary guidelines—where he generally considered it important to balance out the conditions a worker might be exposed to on the job by recommending foods with opposite qualities according to semi-humoral principles—and protective equipment like clothing, face masks, ventilation, or personal medical devices (e.g. hernia belts, compression stockings).[505]

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[504] Ibid. 17

[505] Joseph Briand, *Manuel complet d'hygiène, ou Traité des moyens de conserver sa santé* (Paris: J.-S. Chaudé, 1826), 638–656.

While Briand did not directly cite Lamarck, he did name L.L. Rostan and the famed physician Jean Noël Hallé (1754–1822) among his influences; additionally, his remarks on occupational health indicate a pronounced concern about the relationship between bodies and environments, and the the implications of the milieu for human health. For example, he wrote that workers exposed to extreme heat, such as glassblowers or blacksmiths, would become thin and pale as a result, and needed to be careful not to shock their bodies by exposure to excessively cold drinks or chilly airs.[506] Those who worked in high humidity, like laundresses and fishermen, had special instructions to keep their bodies protected and dry; agricultural workers who experienced significant climate shifts on the job were to wear protective clothing that mitigated as much as possible the effects of such variations.[507]

The occupational guidance that Briand offered indicates multiple knowledge systems he was likely drawing from. Some recommendations, like his prescription of hernia belts to those engaged in hard labor, would have been standard clinical advice, where the only difference was that Briand generally suggested them more prophylactically than a physician in a clinical context might; this was consistent with the stated aim of hygiene to prevent disease, not just to treat it. A few of Briand's remarks also suggest overtly moralistic origins, such as his note that workers engaged in frequent horse-riding ought to be equipped with devices to prevent genital stimulation, or his assertion that auctioneers were particularly prone to vocal fatigue not just because of their shouting but because of their intemperance.[508] Additionally, some of his advice represented contingent social norms as empirical medical truths, such as his assumption that

[506] Ibid. 647

[507] Ibid. 652

[508] Ibid. 649, 652

women suffered less than men in sedentary occupations, because their "chatter and noisy gaiety" functioned as a form of exercise that would keep their bodies healthy even in cramped, uncomfortable indoor conditions.[509]

Briand was also clearly steeped in humoral and Hippocratic thinking, not just in his dietetic recommendations but also in his remarks about the insalubrious vapors that workers might be exposed to, such as marsh emanations, sewer gases, or the odors coming from slaughterhouses or butchery stalls. Even doctors and surgeons were to take special precautions, as the airs coming from a diseased body or a corpse might pose a threat. Briand did not endorse the position that miasmas were a sole explanation for disease—for example, he stated explicitly that the occupational danger to workers did not always correspond to the strength of a bad smell, and he considered aromatics useless for mitigating any such danger.[510] Nevertheless, he did consider airs to be capable of posing a threat to health, and recommended measures like ventilation, dietetic treatment, the use of candles to check air quality, and emetics in the case of heavy exposure. As Michael Osborne has pointed out, the persistence of Hippocratic thinking in French medical practice through the nineteenth century, and even into the twentieth, represented an amorphous tradition that, in actuality, sometimes had little to do with Hippocrates's own doctrines.[511] Briand, then, was hardly alone in marrying elements of Hippocratic climatic thinking with his other medical and hygienic influences throughout this treatise; indeed,

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[509] Ibid. 650

[510] Ibid. 642

[511] See Michael A. Osborne, "Resurrecting Hippocrates: Hygienic Sciences and the French Scientific Expeditions to Egypt, Morea and Algeria." In: David Arnold (ed.), *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500-1900* (Amsterdam: Editions Rodopi B. V., 1996), 80; and idem. & Richard Fogarty, "Medical Climatology in France: The Persistence of Neo-Hippocratic Ideas in the First Half of the Twentieth Century." *Bulletin of the History of Medicine* 86.4 (Dec. 2012), 544.

Lamarck's work indicated a similar mélange of influences (see Chapter 1), and he and Briand were embedded in some of the same intellectual context despite their different professions.

Occupational health is of particular interest in this dissertation because of its clear connection to economic interests: attending to the hygienic and prophylactic practices of workers was important because of the value of the work itself to a flourishing society trying to grow its national wealth. Jobs like agricultural cultivation and animal slaughter generated commodities that were also necessary for bodily survival; sewer workers kept the city acceptably clean; craftsmen manufactured commodities that were profitable, useful, or both. Without workers, neither life nor wealth could continue to be produced; occupational health was thus a potent application of hygienic principles to an essentially economic quest.

Indeed, although Briand's treatise was by no means limited to discussion of workers, it is worth noting that he opened it with a discussion of death in order to justify the importance of studying hygiene. Man was, according to Briand, born uniquely vulnerable: "Unable to use his limbs, still deprived of his senses, the newborn has not yet opened his eyes to the light when already, by his wails, he pleads for the necessary help in his fragile existence. … above all, our prejudices and errors surround him with pain and danger."[512] Hygiene was, for Briand, the necessary scientific corrective to errors—from newborn swaddling to gas inhalation—that would shorten man's life, or bring on disease or disability. The appeal in the very first pages surely also relied on provoking an emotional reaction to the idea of infant death—but fundamentally the whole treatise was animated by the promise that the preventive measures of hygienic science were the key to creating a populace that could enjoy long, productive, prosperous lives.

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[512] Briand, *Manuel complet d'hygiène* (1826), 1

Lamarckian ideas were certainly not the only ones to surface in studies of occupational health, but the intellectual stature of Lamarck as well, as his influences, meant that many such hygienic treatises did engage with, cite, or develop his ideas about health, the body, and the environment.

Born in 1790, Alexandre-Jean-Baptiste Parent-Duchâtelet was one of the leading public health reformers of Paris from about 1821 until his death in 1836. Parent was one of the most active members of the Paris health council, a position from which he investigated cholera, prostitution, the sewer system, and other major threats to the city's health and hygiene. Parent's methodology prized empirical data: extensive interviews with workers on the job, firsthand visits to the sites he investigated, and any archival documentation and statistical data he could find.[513] However, this did not mean that his work was devoid of prior theoretical commitments.

For example, in his seminal 1824 treatise on the Parisian sewers, Parent interviewed sewer workers and collected statistics on their medical complaints and disease incidence, concluding that the odors in the sewers, while unpleasant, were not the cause of epidemic diseases. Indeed, having experienced negative bodily effects himself in the sewers, he argued that this was not due to the smell but to the chemical composition of the air, and included an analysis showing a lower proportion of oxygen than in surface air—which must, he said, negatively affect respiration.[514] This position on odours he defended throughout his career; for example, he made similar observations in his 1832 treatise on Montfaucon's horsebutchery yards —whose stench was so notorious that their presence deterred bourgeois Parisians from summering nearby—as well as in his posthumously published *Hygiene publique* (1836), a

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[513] See e.g. Ann La Berge, "A. J. B. Parent-Duchâtelet: Hygienist of Paris, 1821–1836." *Clio Medica* 12.4 (1977), 281.

[514] Alexandre-Jean-Baptiste Parent-Duchâtelet, *Essai sur les cloaques ou égouts de la ville de Paris envisagés sous le rapport de l'hygiène publique* (Paris: Crevot, 1824), 222–3 n. 30.

collection of his reports on occupational health and hygiene. As Ann La Berge noted, this represented a divergence from popularly accepted miasmatic theories of disease etiology.[515] That is, although Parent was not specifically investigating the question of disease causation, his empirical evidence consistently contradicted the idea that smells in themselves were sickening people, and he deferred to the weight of this evidence.

However, Parent did still concur with some other medical theories often associated with miasma theory, such as ideas about humoral and climatic factors in disease, habituation, and acclimatisation. For example, and apart from the asphyxiating effect of deoxygenated air, he did consider the sewer airs to be harmful to those with certain diseases, in particular venereal afflictions. This effect he said lacked explanation, but he speculated that it might have something to do with the exposure to damp and cold conditions, "contrary as we know to venereal affections."[516] My intention in pointing out this passage is not to condemn Parent for his endorsement of a semi-humoral theory of disease—such ideas were common, accepted, and systematically developed in his intellectual context—but to draw attention to some of the points at which his own theoretical assumptions trumped the available empirical evidence, or had to be synthesised with it. Venereal diseases were particularly ripe ground for such assumptions, partially because of their morally contested status. In an endnote, Parent suggested that the prevalence of lifelong venereal afflictions could be explained not just by exposure to insalubrious airs, but also to a disinterest among the afflicted in ridding themselves of the illnesses.[517] Here and elsewhere, Parent reproduced popular ideas about disease as a product of individual moral

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[515] La Berge, "A.J.B. Parent-Duchâtelet" (1977), 284

[516] Parent, *Essai sur les cloaques* (1824), 132

[517] Ibid. 227 n. 34

weakness, both moral and physical, and integrated such assumptions into his analysis of the empirical evidence he had collected.

Parent cited one case study of a 25-year-old worker who died after exposure to the sewer airs, and attributed his death to his "weak and delicate" nature, a preexisting acute illness, and the fact that he "had long since given himself over to disorders of libertinism."[518] Elsewhere he reiterated that a worker's temperament and general health status had great effects on the degree to which he would be expected to tolerate and acclimate to the unpleasant sewer air, citing venereal diseases and alcoholism as particularly dangerous preexisting conditions and noting that both were common among the working classes. It was thus important, he wrote, to select sewer workers from a population that was not only well-fed, but also married, as this would reduce moral laxity among the workforce; additionally, making the profession more prestigious would attract men of higher social stature and ensure there were always robust and healthy alternates on hand, should someone sicken.[519] This was, then, something of a double-edged defense of improvements in working conditions; Parent's embrace of labor reforms was limited by design, and came with a heavy dose of moralisation that rhetorically positioned the working class as a hotbed of filth, disease, and socially destabilising behaviour. His prior theoretical commitments on this front coloured his remarks on disease, poverty, and occupational health; however sincere his aspirations to a purely empirical sociology, his work was ideologically loaded.

Such a tension was hardly new or unique for the nascent field of public health. As La Berge has pointed out, hygienists and public health reformers in the early nineteenth century

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[518] Ibid. 138

[519] Ibid. 200–202

often sought to diagnose massive social problems, but far more rarely managed to cure them.[520] Working in a political and intellectual context in which the authority of scientific methodology was increasingly respected, hygienists tended to position themselves as the scientific advisors to technocrats and engineers who would redress social ills by technological means; hygienic treatises tended to be tacitly or explicitly ideologically liberal, in that they sought not to question the basic economic structures of capitalist industrialisation but to ameliorate some of its discomforts so it could proceed unhindered.[521] Indeed, assessment of the progress of sanitary and hygienic reforms often functioned as an indicator for the progress of 'civilisation' more generally.

By the 1820s and 1830s, reformers were aware of economic critiques of industrialisation and laissez-faire policies, but investigations into the conditions of the working classes—such as those conducted by the social epidemiologist Louis-René Villermé (1782–1863) and a Dr. Thouvenin, a factory inspector at Lille—tended to downplay the seriousness of workers' concerns, and in general concerns about salaries, poor working conditions, and child labor did not undercut the consensus that industrialisation was good for workers overall.[522] In his monograph on the rhetoric of contagionism as a technology of governance, Andrew Aisenberg argued that the ameliorative solutions favored by reformers like Villermé—who is also listed in

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[520] Ann La Berge, *Mission and Method: The Early Nineteenth-Century French Public Health Movement* (Cambridge, UK: Cambridge University Press, 1992), 4.

[521] See William Coleman, *Death is a social disease: public health and political economy in early industrial France* (Madison, W.I.: University of Wisconsin Press, 1982), xix.

[522] La Berge, *Mission and Method* (1992), 159–69; see also Coleman, *Death is a social disease* (1982); Arthur L. Dunham, "Industrial Life and Labor in France 1815–1848." *The Journal of Economic History* 3.2 (Nov. 1943), 117; and David Barnes, *The Making of a Social Disease: Tuberculosis in Nineteenth-Century France* (University of California Press, 1995), 32.

the register of Lamarck's students for the year 1799[523]—used the concept of contagion as a metaphor providing "a link between the explanations of disease and poverty that was informed by the imperative of government regulation" and invoked immorality itself as a social disease leading to poverty.[524] Proposed reforms aimed not at challenging the economic operating logic that created the oppposing classes of bourgeois and proletarian, but instead sought to ensure the embourgeoisement of certain few deserving, and morally reformed, workers.[525] By the 1830s, sanitary reformers including Parent could, and did, envision a radical technological transformation of Parisian water and sanitation facilities; however, the political parameters even of these more radical proposals remained constrained by a generally favorable outlook on industrial capitalism.[526] This economic logic was consistent with, for example, the economic calculus laid out in the 1810s by Gabriel Prunelle, the physician-politician discussed above in Chapter 4, who served as the mayor of both Lyon and Vichy. For Prunelle, the value of a life saved by medical intervention (for instance, vaccination) was equivalent to that person's economic contributions to the nation's wealth and industrial output; this was a relatively early example of medical writing that explicitly configured the human population as an economic resource and medical professionals as those educated experts responsible for maintaining this resource in service of the national economic interest.

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[523] Corsi & Bange, "Chronologie de la vie de Jean-Baptiste Lamarck." *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed August 2024. https://redi.imss.fi.it/lamarck/chronologie/

[524] Andrew Aisenberg, *Contagion: Disease, Government, and the "Social Question" in Nineteenth-Century France* (Stanford: Stanford University Press, 1999), 28–9.

[525] La Berge, *Mission and Method* (1992), 180; see also Dunham, "Industrial Life and Labor" (1943), 119.

[526] See La Berge, *Mission and Method* (1992), 238.

It is with reference to this context that we should read Parent's loosely Lamarckian remarks on the habituation and acclimatisation of workers to their occupational conditions. Despite his conviction that acclimatisation to the sewer air was primarily a matter of comfort and did not generally affect illness incidence in such workers,[527] Parent conceded in other ways to the notion that a worker's body could be well- or ill-suited to specific working conditions, and that such body–environment consonance could be cultivated over time. For example, writing about tobacco processing workers who experienced adverse health effects in certain positions, Parent speculated that with more "courage and perseverance" their "indispositions" would have resolved, and that the slim minority of workers who failed to acclimate to their occupational conditions were generally lazy.[528] Like the 25-year-old sewerman who perished of asphyxiation, then, these workers were presumed to be morally condemnable by virtue of their occupational health complaints. Discourses of acclimatisation (Parent dismissed theories of hereditary resistance to occupational dangers[529]) functioned as justifications both for exposing seasoned workers to potentially dangerous conditions, and as moral condemnations of those who couldn't or wouldn't work in such conditions.

In his lectures given at the Strasbourg faculty of medicine between 1822 and 1824, the forensic physician François-Emmanuel Fodéré (1764–1835) cited Parent's investigations at Montfaucon, the notorious Paris city dump, to argue that workers there were accustomed to the

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[527] See e.g. A.J.B. Parent-Duchâtelet, *Hygiène publique*, *ou Mémoires sur les questions les plus importantes d'hygiène appliquée aux professions et aux travaux d'utilité publique*, Vol. 1 (Paris: J.-B. Baillière, 1836), 348.

[528] Parent, *Hygiène publique*, Vol. 2 (1836), 575.

[529] A.J.B. Parent-Duchâtelet, *Les Chantiers d'écarrissage* [sic] *de la ville de Paris envisagés sous le rapport de l'hygiène publique* (Paris: E. Crochard, 1832), 139–140.

insalubrious fumes of the horsebutchery yards and had therefore built up a physiological shield against the worst diseases that might strike someone without their habituation.[530] However, Fodéré—who had served in one of the French Revolutionary armies, before being appointed professor of medical jurisprudence at Strasbourg in 1814—echoed Parent's assertion that such workers did not enjoy full health; the constant exposure to noxious fumes numbed and stupefied them. There is a clear echo in these remarks of concerns raised nearly 20 years earlier by both Cabanis and Lamarck about the physiological effects of habitual work; however, while Lamarck's remarks concluded with general exhortations for individuals to seek out variation in their sensory stimuli and daily habits,[531] Parent's treatises were not just investigations of the workers he spoke to, but ultimately also defenses of the industries employing them. If existing working conditions were not inherently detrimental to workers' health, then there was little threat posed by occupation health treatises to the sorts of economic and comfort-producing activities being carried out by sewer workers, butchers, blacksmiths, tobacco processors, and so forth. Indeed, Parent's recommendations emphasised threats to health that came from circumstances at home—poor diet, lack of a sufficient personal hygiene regime, and so forth—over the idea that working conditions or occupational exposures posed any direct, inherent medical risk.[532] Whatever Parent's personal intentions in writing such passages, the effect was to marshal a Lamarckian idea of habituation to justify the idea that workers could handle even occupational

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[530] François-Emmanuel Fodéré, *Leçons sur les épidémies et l'hygiène publique*, T. 3. (Paris: F.G. Levrault, 1824), 436–7.

[531] See Chs. 1 and 3 above & Lamarck, *Zoological Philosophy* (1809c [1914]), 390–404.

[532] See e.g. Parent, *Hygiène publique*, Vol. 2 (1836), 582–585

conditions that would pose a danger to the average person—and that those workers who failed to thrive in such conditions were at fault for their own suffering.

Furthermore, the idea that workers were habituated to their working conditions extended to claims that it was actually in their best interest to remain in such environments. For example, in his passage on the health of the Montfaucon workers, Fodéré analogized them to "savage tribes whose ordinary food consisted of rotted fish, [who] were recognized as the most stupid, the most bellicose, and the least advanced in civilisation."[533] Thus, the reported stupefaction and numbness of the Montfaucon workers was gauged against the benchmark of a colonialist discursive construction of primitive and uncivilised peoples. Fodéré went on to assert that in both such cases, losing their habituation to their ordinary atmosphere would endanger them all the more because, upon reentering 'normal' conditions, they would become newly "susceptible to [their] dire influence, and the putrid fever [would] immediately take on a more violently malignant character in them."[534] While Fodéré did not explicitly extend this idea to make specific labour policy recommendations, it is not hard to imagine the utility of this notion of habituation to the employers of such 'habituated' workers.

Indeed, paid laborers were not the only people who stood to lose from such a discourse: for example, it was a common assertion among hygienists and public health reformers, including L.L. Rostan and the otherwise obscure physician François Simon (1759–??),[535] that prisoners would acclimate to the confined and often rank air in various forms of institutional

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[533] Fodéré, *Leçons sur les épidémies*, T. 3 (1824), 437

[534] Ibid.

[535] Credited on the cover of *Traité d'hygiène appliquée* only as "Dr. Simon (de Metz)."

confinement.[536] In Simon's treatise, this assertion appeared in conjunction with his remarks on the physiological distinctions that different forms of physical labor would eventually impress upon workers' bodies, and Simon also stated that prisoners would actually become unable to tolerate open air after habituating to their dank cells. Four years after Simon's treatise, Cuvier would even make a similar remark about Lamarck's own daughter, whom he said had been confined indoors for so long caring for her blind and ailing father that when he at last died, "she was incommoded by the free air, the use of which had been so long unfamiliar to her."[537]

Another topic that proved ripe for ideas of hyperlocal and climate-mediated racialisation was prostitution—perhaps unsurprisingly, given its contested moral and legal status throughout the nineteenth century.[538] For example, in his seminal 1836 treatise on Parisian prostitutes, Parent collected data on their physical characteristics, including hair and eye colour, under the assumption that these characteristics would correlate to the women's specific cities and regions of origin across France. Even when his empirical data yielded no such significant correlations, Parent suggested that the results may have simply been confounded by the fact that working women tended to come from uniformly lower social classes; perhaps a more comprehensive future study would point to the sorts of local racial differences he had expected to find.[539] Even the weight of his own observations could not entirely shake his assumptions about the role of

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[536] Rostan, *Cours élémentaire* (1822), 170; Simon, *Traité d'hygiène appliquée* (1827), 309–10

[537] Georges Cuvier, "Elegy of Lamarck," translated by Robert Jameson. *Edinburgh New Philosophical Journal* XX (Jan. 1836), 1–22. Digitized by David Clifford at https://victorianweb.org/science/science_texts/cuvier/cuvier_on_lamarck.htm.

[538] See e.g. Alain Corbin, *Women for Hire: Prostitution and Sexuality in France after 1850*, translated by Alan Sheridan (Cambridge, M.A.: Harvard University Press, 1996).

[539] A.J.B. Parent-Duchâtelet, *De la prostitution dans la ville de Paris, considérée sous le rapport de l'hygiène publique, de la morale et de l'administration : ouvrage appuyé de documens statistiques puisés dans les archives de la Préfecture de police*, T. 1 (Paris: J.-B. Baillière, 1836), 201–3.

climatic factors in physiological and phenotypic variation. Parent did argue that prostitutes provided a counter-example to the commonly held medical belief that any profession requiring constant use of a specific body part would alter that part: working women's genitals were in general not enlarged, and even in several case studies where he did record "overdeveloped" clitorises, he stated that they did not display overactive sexual appetites and that, like most prostitutes, they tended to enter the profession out of economic need rather than sexual intemperance.[540]

However, the idea that paid sex could habituate the body in nefarious ways did not end with concerns about the prostitutes themselves; for example, in their 1837 *Physiologie de l'espèce*, physiologist Gabriel Grimaud de Caux (1800–1881) and physician Gaspard Joseph Martin Saint-Ange (1803–1888) described a particular form of infertility that they believed prostitutes induced in their clients order to avoid pregnancy. Under the guise of increasing sexual pleasure, they would press around the pubic mound in a particular way that would eventually result in the urethra contracting an incurable habit of contracting in a backwards direction, preventing insemination.[541] Whatever the plausibility of this mechanism from a physiological perspective, it should not be surprising that prostitution was blamed as a cause of infertility. Political and medical commentators had long worried about the spectre of depopulation (see Chapter 1), and as Alain Corbin has shown, prostitution occupied a conflicted discursive position, considered simultaneously as a critical piece of social infrastructure purging the city of men's unmet sexual needs and as a consequent vector for the spread of venereal diseases and

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[540] Ibid. 214–222

[541] Gabriel Grimaud de Caux & Gaspard Joseph Martin Saint-Ange, *Physiologie de l'espèce, histoire de la génération de l'homme* (Paris: H. Cousin, 1837), 337–9.

other forms of immorality.[542] Thus, the idea that prostitutes might be inducing specific physiological changes in French men during their sexual encounters depended on invoking 'habituation' as an artificial and deleterious alteration of human biological functioning. Indeed, while de Caux and Saint-Ange's *Physiologie de l'espèce* was not a particularly salacious text, writing about human reproduction and sexual mores was a reliable way to draw readers' attention and bolster sales; reformers who wrote, for example, the 'breeding' treatises popular during the Napoleonic years frequently used such tactics to make their works splashier and more popular.[543] Saint-Ange seems to have written primarily on the reproduction of non-human vertebrate animals, but de Caux worked as a journalist in addition to writing medical treatises; his biography is obscure, but it is at least plausible that the link he drew between prostitution and infertility was both reflective of his personal morals, and served as a way of increasing interest in his written work.

**Race, climate, and the colonial connection**

This much makes clear that Lamarckian ideas of biological malleability and habituation were not inherently liberal and certainly were not liberatory; although Lamarck himself expressed that it would be socially beneficial to avoid overly repetitive life-styles and habits, the cases of prisoners and various types of workers demonstrate that discourses of habituation and acclimatisation could just as easily be marshalled to defend confinement, monotonous workday routines, or the restriction of individual liberties when politically useful. And French colonial

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[542] Corbin, *Women for Hire* (1996); see esp. Chs. 1, 2. On the idea of prostitution as serving a social excremental function see esp. pp. 4, 53.

[543] See e.g. Quinlan, "Heredity, reproduction, and perfectibility" (2010).

physicians also embraced such ideas as a science of settler-colonialism; for example, consider the case of nostalgia, first described in the seventeenth century as an affliction resulting from a spatial displacement from one's familiar climate and environment. In revolutionary and Napoleonic France it was most associated with soldiers: military doctors reported that soldiers under their care, displaced from their native lands, were suffering from a pathological *mal du pays*, which could often be alleviated only by a return home.[544] For the new Republican government, the diagnosis served to problematise the kinds of hyperlocal attachments that might produce the sickness, which was considered particularly rife among rural young soldiers with strong regional identities and local accents and dialects.[545]

However, following the invasion of Algeria in 1830, the nostalgia notion became increasingly troubling for colonial administrators and physicians who sought to displace indigenous populations and establish French settlements in the tropical climate. As Thomas Dodman has shown, conflict on the subject continued within French medical ranks throughout the nineteenth century.[546] Polygenists who opposed the idea of species mutability perceived the notion of biological acclimatisation as too close to racial transformism; doctors who wrote on the health of the French settlers, on the other hand, often emphasised individual health interventions to ease the climatic adjustment rather than invoking the more poetic invocations of homesickness

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[544] Thomas Dodman, *Homesick Epoch: Dying of Nostalgia in Post-Revolutionary France* (PhD diss., 2011), 123. See also Marcel Reinhard, "Nostalgie et service militaire pendant la Révolution." *Annales historiques de la Révolution française* 30.1 (1958), 1–15.

[545] Lisa O'Sullivan, "The Time and Place of Nostalgia: Re-situating a French Disease." *Journal of the History of Medicine and Allied Sciences* 67.4 (Oct. 2012), 628–9; see also Briand, *Manuel complet d'hygièn*e (1826), 461.

[546] Thomas Dodman, *What Nostalgia Was: War, Empire, and the Time of a Deadly Emotion* (Chicago: University of Chicago Press, 2017); see esp. Chs. 5, 6.

that had been common in the revolutionary period.[547] To protect the overall imperial mission, interventions like granting sick leave to visit French spas and temperate 'oases' became standard treatment for soldiers.[548] Colonial administrators also came to fear that too 'successful' an acclimatisation would be a case of simple racial degeneration, leading to efforts in the 1850s to settle the colonies with groups from France's rural and mountainous areas under the theory that these groups would preserve their strong regional culture abroad and therefore succeed in acclimatising without themselves "becoming Arab and Creole."[549] Thus, the nostalgia diagnosis, and discourses of acclimatisation in general, demonstrate the malleability of medical theory itself to political ends. Indeed, as Warwick Anderson put it, "until the early twentieth century, medicine was as much a discourse of settlement as it was a means of knowing and mastering disease."[550]

In order to appreciate the significance of such medical discourses, it is also critical to recognise the position of discourses of racialisation as both justifications for, and scientised descriptions of, the process of colonisation. The nineteenth-century French position on race and racism has at times been a subject of some disagreement among historians. A previous tendency among Anglophone historians to conflate French beliefs about race and biology with those of their British and American counterparts risked overlooking the distinct characteristics of French biological sciences, particularly the lasting effects of Lamarckian evolutionary ideas. As Michael Osborne has emphasised, French tropical and military medicine in particular continued to invoke

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[547] Ibid. 161

[548] See Eric T. Jennings, *Curing the Colonizers: Hydrotherapy, Climatology, and French Colonial Spas* (Durham & London: Duke University Press, 2006).

[549] Dodman, *What Nostalgia Was* (2017), 173

[550] Warwick Anderson, *The Cultivation of Whiteness: Science, Health, and Racial Destiny in Australia* (Melbourne: Melbourne University Press, 2002), 4.

environmentalist ideas throughout the nineteenth century, defining race by place in a manner that made many of these physicians resistant to ideas about biological fixity that characterised physical anthropology.[551] The continued popularity of Lamarckian environmentalist ideas in France was both a cause and an effect of interest in minute provincial racial distinctions even within the hexagon itself, and Osborne argued that it was also partially responsible for a comparatively lower uptake in France of ideas of *innate* racial inferiority.[552]

However, and as Clifford Rosenberg has emphasised, Lamarckian and environmentalist theories about race were not incompatible with *racism* as a social or governmental technology; in some respects the French attitude toward race and racial hierarchy was ultimately quite similar to those of their English-speaking counterparts, despite the different medico-scientific logic backing it. For example, discussing the Radical politician Albert Sarraut, Rosenberg pointed out that he viewed white supremacy as the outcome of the evolutionary process, and the supposedly degenerate condition of colonised peoples as the product of "a long heredity."[553] Indeed, Sarraut considered the mode of life, intellect, and heredity to each mutually condition one another, over a long period of time and in conjunction with the influence of the environment. While US commentators put more emphasis on phenotypical appearance and blood type in their quest to scientise the social concept of race, Sarraut's "racial thought was no less biological than theirs. The traditional distinction between French cultural and American biological racism is

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[551] Michael A. Osborne, *The Emergence of Tropical Medicine in France* (Chicago: University of Chicago Press, 2014), 76–9.

[552] Ibid. 78

[553] Quoted in Rosenberg, "Albert Sarraut and Republican Racial Thought" (2004), 43

misleading."[554] Lamarck's own work presaged some of this: while Lamarck considered biology malleable and most characteristics mutable, he also believed that habits would become more strongly ingrained over the course of a person's life, and physiological changes could also occur and strengthen over the course of generations if the environmental conditions and the organism's needs and habits remained consistent (see Chapters 1 and 3 above). Additionally, as Alice Conklin has discussed, French anthropologists in the latter half of the nineteenth century "made their greatest mark internationally in racial classification," measuring skulls and brains in order to rank and compare races, and often asserting that 'primitive' races and cultures were less cognitively evolved than imperial European powers.[555] The distinction that Osborne pointed out between 'environmental' and more 'fixist' forms of racism was real; however, as both Osborne and Rosenberg have discussed, it was often a matter of rhetoric more than a substantive difference, and fealty to Lamarckian environmentalist thinking did not prevent French savants from developing scientific justifications for more fixist ideas of race.[556]

Thus, while both Lamarck and Lamarckians tended to oppose ideas of strict biological essentialism, including racial essentialism, their ideas were still quite compatible with the notion of *relatively* fixed characteristics—and they often considered the development of such characteristics to be processes of degeneration, the formation of biologically distinct races, or both. For example, an 1853 treatise on beauty hygiene by the physician Auguste Debay (1802–

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[554] Ibid.

[555] Alice L. Conklin, *In the Museum of Man: Race, Anthropology, and Empire in France, 1850–1950* (Ithaca, N.Y.: Cornell University Press, 2013), 2; 22–25.

[556] In the eighteenth- and nineteenth-century British empire, too, environmentalist and climatic theories of race coexisted with more overtly essentialist arguments; see e.g. Suman Seth, *Difference and Disease: Medicine, Race, and the Eighteenth-Century British Empire* (Ithaca, N.Y.: Cornell University Press, 2018).

1890), who had served as a military doctor in Algeria, attributed to Lamarck assertions that darker-skinned Africans[557] and indigenous Americans were more resistant than white Europeans to both harsh weather and "the irritating action of external bodies" because the pigment layer in their skin "constitutes a true membrane."[558] Certainly Debay was far from the first European physician to suggest that darker skin made Africans, in particular, insensate to pain; however, what is noteworthy about this source is that Debay used a Lamarckian argument about habituation and gradual physiological change to arrive at his defence of supposedly innate racial differences. He believed both intense heat and cold would thicken the epidermis, giving inhabitants of both polar and tropical zones "skin infinitely less sensitive than those living in temperate climates"—a process he also analogised to the formation of toughened callouses in manual laborers.[559] Debay was also a prolific and widely published author on the topic of hygiene in particular; the presence of these and other racist myths in his work is thus indicative of both the popularity of such ideas, and an avenue by which they continued to be propagated.

On the flip side, in the French context, a belief in racial essentialism did not necessarily preclude naturalists and science popularisers from simultaneously endorsing some environmentalist or Lamarckian ideas—the two simply were not inherently in conflict. For example, the anthropologist Julien-Joseph Virey (1775–1846) was a staunch polygenist and a

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[557] Debay used the term *les nègres*, which is an antiblack pejorative since about the late nineteenth century (see e.g. Stephen M. Marson & Quentin P. Bouvier, 'Translators' note,' in: Armand Corre, *Crime in Creole Countries: A Sketch of Criminal Ethnography*, translated by Stephen M. Marson & Quentin P. Bouvier [New York & London: Lexington Books (2021)]). At the time Debay wrote this treatise, the noun form was not generally deployed as a slur to the same degree of severity, though it is easy to see how the later usage evolved from texts and research paradigms like Debay's.

[558] Auguste Debay, *Hygiène médicale du visage et de la peau, formulaire de la beauté indiquant les moyens de conserver l'éclat du teint et la fraîcheur de la peau* (Paris: chez l'auteur & J. Masson, 1853), 22.

[559] Ibid. 21–2

critic of many of Lamarck's ideas, but still endorsed a transmutationist theory of species; he also considered the health and functioning of the body to depend not only on classical environmental-hygienic factors, but also on social factors such as methods of governance that could "more or less exalt our bodily and intellectual faculties … [and] excite or depress the rhythm of our organs."[560] Virey, who was particularly interested in the origins of human 'races' and who was heavily influenced by Buffon and Cabanis, was far from the only naturalist to marry select environmentalist physiological ideas with certain essentialisms, including racial ones. Medical topographies from the late eighteenth century onward mixed measurements of the climate, soil, winds, and natural conditions with observations of inhabitants' temperaments, habits, social customs and mores, and ways of living; these studies were made especially of rural areas within France and on military expeditions, such as Napoleon's invasion of Egypt.[561] Environmentalist thinking, and commitments to the notion of biological malleability, were virtually ubiquitous in the French nineteenth century, and could be invoked as justifications for many different political and social theories, including various racisms.

Indeed, and especially in the colonial context, it was precisely the idea of biological malleability that made Lamarckian-environmentalist ideas politically useful for commentators who sought to defend and expand the French empire. For example, in an overture to his course of 1826 at Montpellier, professor of hygiene Frédéric Bérard (1789–1828) countered certain theories of social degeneration with the assertion that "civilisation" was not only a net positive to

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[560] Julien-Joseph Virey, *Hygiène philosophique appliquée à la politique et à la morale*. (Paris: Librairie de Crochard, 1831), vii-xiii; see also Corsi, "Julien-Joseph Virey" (1987), 181–192.

[561] See e.g. René Desgenettes, "Lettre circulaire du citoyen Desgenettes aux médecins de l'armée d'Orient sur la rédaction de la topographie physique et médicale de l'Égypte." In: *Histoire médicale de l'armée d'orient*, Vol. 2 (Paris: Croullebois, 1802).

public health, but the principle cause of man's physical perfection.[562] Counterposing social and infrastructural improvements like medical care, increased agricultural yields, and industrial development against the "primitive" conditions of "savages," Bérard grounded the process of human biological melioration in man's ability to rationally direct his environment and way of life.[563] Based on his other works, it is likely that Bérard arrived at these ideas by reading Cabanis, rather than Lamarck (though Bérard did hold a chair in medicine at Paris for three years before being nominated professor of hygiene at Montpellier in 1826); however, the idea of ameliorating human beings by altering their social, political, and physical environment was a point on which Lamarck himself was also highly influenced by Cabanis's sensationalist psychological arguments.[564] Nor was Bérard alone in his attempts to study or alter people's health by means of their environments. By 1857, Benedict-Augustin Morel (1809–1873), one of the chief theorists of degeneration, considered people who lived in swampy conditions or worked in mephitic mines and factories to be tragic real-time experiments providing insight into the degeneration of the species due to the deleterious effects of their environments.[565] Adaptation, alteration, and habituation could yield new, *relatively* fixed types just as easily as they could introduce departures from any existing forms.

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[562] Frédéric Bérard, *Discours sur les améliorations progressives de la santé publique par l'influence de la civilisation* (Paris: Gabon et Compagnie, 1826), 6, 13.

[563] Ibid. 120

[564] On Bérard and Cabanis, see Frédéric Bérard, *Doctrine des rapports du physique et du moral, pour servir de fondement a la physiologie dite intellectuelle et a la métaphysique* (Paris: Gabon et Compagnie, 1823). On Lamarck and Cabanis, see Chs. 1 & 2 above.

[565] Benedict-Augustin Morel, *Traité des dégénérescences physiques, intellectuelles et morales de l'espèce humaine*, *et des causes qui produisent ces variétés maladives*, Vol. 1 (Paris: J. B. Baillière, 1857), XIV.

An important point to bear in mind is that, even as Pasteurism and the germ theory of disease became more widely accepted toward the end of the nineteenth century, environmentalist ideas about hygiene remained prevalent, both in professional medicine and in lay consciousness. Previous literature on this subject has sometimes overstated the degree to which Pasteurism ushered in an epistemological rupture; for example, in a 1988 essay, Anne Marcovich stated that Pasteur's work "brought about an important break with the past" and "an almost total abandonment of 'cultural culprits' [of disease]," such as dietary and personal hygienic habits, as well as broader "social and natural factors."[566] However, as both David Barnes and Bruno Latour have pointed out, Pasteurian germ theory was never truly incompatible with more environmentalist, sanitarian theories of disease.[567] Instead, hygienists responded enthusiastically to Pasteur's ideas and synthesised them with their own; both microbes and environmental factors could explain outbreaks and point to ways for state officials and hygienists to control the spread of disease. Additionally, the groundwork for a contagionist theory had been laid in the nineteenth century before Pasteur's microbial theory solidified, and contagionist positions had defenders prior to Pasteur.[568]

Thus, there was no epistemic break between environmentalist-sanitarian ideas and Pasteurian microbiology; as Anne Marie Moulin has argued, the early tropical medical theories referred to as 'medicine of warm climates' (*la médecine des pays chauds*) prior to 1880 were

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[566] Anne Marcovich, "French colonial medicine and colonial rule: Algeria and Indochina." In: Roy Macleod & Milton Lewis (eds.), *Disease, Medicine, and Empire: Perspectives on Western Medicine and the Experience of European Expansion* (London & New York: Routledge, 1988), 109.

[567] See Barnes, *The Making of a Social Disease* (1995), 81–96; and Bruno Latour, *The Pasteurization of France*, translated by Alan Sheridan (Cambridge, M.A.: Harvard University Press, 1993 [1984]), 33.

[568] See Barnes, *The Making of a Social Disease* (1995), 74–6; and Aisenberg, *Contagion* (1999).

simply not as distinct from Pasteur's theories as many Pasteurians claimed. These late nineteenth-century microbiologists over-emphasised the differences by claiming to be on the vanguard of a scientific revolution that marked the beginning of modern medicine and would soon eradicate "parasitic infections" (i.e., insect-borne diseases).[569] Such claims were part of a technopolitical strategy whereby the political will of the French empire changed the methods and aims of Pasteurian microbiology, and Pasteurians in turn reshaped the empire, using microbial technologies to empower or foreclose on certain political actions.[570] At the Pasteur Institutes and beyond, microbiologists claimed to prescribe a universal method for disease control and eradication, replacing local knowledge and factors with the French empire's 'modern' scientific knowledge.

In truth, Pasteurian microbiology frequently adapted or adopted earlier medical theories, such as by using the idea of immunity to local diseases as a re-definition of earlier notions of natural acclimatisation.[571] Though Pasteurians claimed fealty to theories of simple and singular causality for diseases, their rhetoric in this respect simply did not reflect the reality of the robust and continuous intellectual exchange between sanitarian and contagionist theories, in both colonial and metropolitan settings. As Michael Osborne has emphasised, tropical medicine's early roots—la médecine des pays chauds—were reinforced by the rise of transformist theory, Lamarckian and Buffonian ideas about the relationships between organisms and environments,

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[569] Anne Marie Moulin, "Tropical without the Tropics: The Turning-Point of Pastorian Medicine in North Africa." In: Arnold, David (ed.), *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500–1900* (Amsterdam: Rodopi, 1996), 160, 167.

[570] See Aro Velmet, *Pasteur's Empire: Bacteriology and Politics in France, its Colonies, and the World* (Oxford: Oxford University Press, 2020), 4–6.

[571] Moulin, "Tropical without the Tropics" (1996), 165

and a resurgence of Hippocratism in the early nineteenth century; all of these influences continued to be felt in the late-century synthesis between hygiene and microbiology.[572] Discourses of acclimatisation, referring to plants and non-human animals as well as to human settlement, remained popular in savant circles and in justifications of French imperial aims even as Pasteurian theories gained ground.[573]

In the latter half of the nineteenth century, and especially under the Third Republic, neo-Lamarckian theories gained popularity in French science as well as politics. 'Neo-Lamarckianism' was a broad designation encompassing varying positions on evolution, some of which diverged from Lamarck's own ideas; that such theories have all been identified with Lamarck's name is at least as much a reflection of naturalists' desire to align themselves with a retrospectively identified, venerated French intellectual tradition as it is a description of their actual political or biological positions. Still, neo-Lamarckism warrants a few words in this paper, and a valuable case study is Jean Marie Antoine Louis de Lanessan (1843–1919), a politician and naturalist remembered as an advocate of some such neo-Lamarckian evolutionary theory.

After serving in the medical department of the French Navy from 1862–1870, de Lanessan was elected to the Municipal Council of Paris in 1879 and to the Chamber of Deputies for the fifth arrondissement in 1881; he travelled on a government mission to the French colonies in 1886, and was the civil and military governor of French Indochina from 1891 until he was recalled in 1894. Throughout his career he remained a strong advocate of French colonial

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[572] See Michael A. Osborne, "La renaissance d'Hippocrate: L'hygiène et les expéditions scientifiques en Égypte, en Morée et en Algérie." In: Bouguet, Marie-Noëlle et. al. (eds.), *L'invention scientifique de la Méditerranée: Égypte, Morée, Algérie* (Éditions de l'EHESS, 1998), 185-8.

[573] Osborne, *The Emergence of Tropical Medicine* (2014), 7; see also idem., *Nature, the Exotic, and the Science of French Colonialism* (Bloomington: Indiana University Press, 1994); see esp. Chs. 4, 6.

expansion. He received his MD in 1872 and the agrégation of natural history in 1876, and taught zoology at the Paris Faculty of Medicine. A staunch anti-clericalist, he has generally been described in the secondary literature as a materialist.[574] He considered acquired characteristics to include morphology, anatomy, habits, tics, and intellectual and moral qualities, and did not invoke the idea of a divine will in his evolutionary theory; he also considered creationism and transformism to be mutually exclusive positions in an irreconcilable epistemological conflict between science and religion, a claim that departed from earlier attempts to synthesise the two.[575]

It is important to understand that de Lanessan's materialism was a naïve positivist one, which is to say it was not grounded in any historical or dialectical reasoning; he sought 'universal truths' that he believed would be naturalistically founded and revealed. For example, his anti-clericalism was not a critique or historicisation of human-created morality; rather, he argued that virtually all religions in their deeper moral codes converged on the same moral truths, which were naturalistic principles that transcended human meaning-making.[576] Similarly, he argued that the specific norms and forms of families could vary in different social and cultural conditions, but the fundamental linkage between family members was a human universal, grounded in biology.[577] His aim was not to critique prevailing social forms in the sense in which

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[574] For example, see Alain Lagarde, "Jean de Lanessan (1843–1919). Analyse d'un transformisme." *Revue de Synthèse* 100.95 (Dec. 1979), 338.

[575] Ibid. 344, 350, 340; on the history of religious positions on evolutionism, and the retrospective idea of 'creationists,' see Marcin Krasnodębski, "Constructing Creationists: French and British Narratives and Policies in the Wake of the Resurgence of Anti-Evolution Movements." *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 47.A (2014), 35–44.

[576] Jean de Lanessan, "La morale scientifique." *Revue scientifique* 4.16 (Oct. 1901), 482.

[577] Ibid. 484

Foucault used the word *critique*, but rather to discover a 'scientific' morality that would transcend (or precede) contingent social truths.[578]

This is critical context to understand de Lanessan's criticism of Darwinian biology, which he viewed as proceeding axiomatically from the 'struggle for existence' and therefore naturalising abuses of force. De Lanessan, along with a number of other turn-of-the-century naturalists including the Russian anarchist Peter Kropotkin (1842–1921), argued instead that individual organisms survived by forming cooperative relationships, both within their own species and symbiotically with other species.[579] Thus, for de Lanessan the point was not to challenge the basic intellectual methodology of the Darwinians—the use of biological observations to make political arguments, and vice versa—but instead to adapt the methodology to what he considered more accurate biology. This stance consistently coloured his commentary on evolution, morality, and biology. For example, rather than questioning the foundations of the social belief systems that valued certain individuals over others, he argued that inequalities were real and natural characteristics grounded in biology, but that *morally and politically* they should not be excessively favoured in an equitable society.[580]

This point is worth stressing because de Lanessan's fundamentally positivist materialism led him to argue that human history had a progressive tendency toward a future in which one

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[578] On Foucault's method of critique, see e.g. Foucault, "What is Enlightenment?" In: Paul Rabinow (ed.), *The Essential Works of Foucault 1954–1984, Vol. 1: Ethics: Subjectivity and Truth*, translated by Robert Hurley et. al (New York: The New Press, 1997 [1994]), 303–320.

[579] de Lanessan, "La morale scientifique" (1901), 484–5; see also idem., *Étude sur la doctrine de Darwin: La lutte pour l'existence et l'association pour la lutte* (Paris: O. Douin, 1881); and Peter Kropotkin, *Mutual Aid: A Factor of Evolution* (London: William Heinemann, 1910), 6.

[580] de Lanessan, "La morale scientifique" (1901), 486

single, shared social morality would prevail on the basis of its scientific correctness.[581] He recognised that different moralities could be observed in different nations, social groups, cultural contexts, and so forth; however, he applied an asymmetrical standard whereby his own moral commitments were justified by biological science and were therefore universally true, whereas religious claims increasingly diverged from the "simple moral precepts" of scientific morality, and religions themselves came to be represented by distinct classes of priests with their own "distinct interests."[582] My aim here is not to defend religious morality or indeed religion generally, but to point out that de Lanessan's anti-clericalism was a colonial epistemological position, whereby all local and particular systems of knowledge and morality were to be replaced eventually with the scientific principles discovered and advocated by de Lanessan and his ilk. That he aimed this criticism also at the Catholicism preponderant within metropolitan France and exported throughout its overseas empire does not make it any less colonialist, only atheistically so.

Thus, when de Lanessan argued that man was, "by reason of the superiority of his intelligence, the most malleable and the most easily educable of all beings," he was using his Lamarckian biological precepts to ground his argument that a truly enlightened—that is, non-religious and scientifically moral—society was possible.[583] It was up to the people's rulers and the educators to bring about such a society: "they have the power and they have the duty."[584] This was fundamentally an argument in favor of continued French colonial endeavors; the

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[581] Ibid. 488–9

[582] Ibid. 487

[583] Ibid. 488

[584] Ibid.

biological malleability that featured in both Lamarckian and neo-Lamarckian arguments was marshalled to support a liberal imperial position. It was also a position that was still fully compatible with certain essentialist arguments, such as the notion that some individuals were simply biologically superior to others; additionally, and much like Lamarck, de Lanessan thought that one's temperament was a result of physiological inheritance as well as early education and environmental factors, leaving room for hereditarian discourses in his transformist thought.[585]

The relationship between Lamarckian transformism and religion, specifically Christianity, had been fraught since long before de Lanessan wrote. For example, the Catholic socialist Philippe-Joseph-Benjamin Buchez (1796–1865)—a former Saint-Simonian and student of Lamarck's[586]—criticized Lamarck in 1838 by accusing French pantheists of invoking his name the way their German counterparts did Goethe's.[587] Lamarck had been named even further back as a representative of materialist, 'enlightened' beliefs that degraded the moral character of humans by placing them on the same level as non-human animals, as in the *Coup d'œil* of 1821 discussed above in Chapter 1. However, even if one accepts at face value the claim that there was an inherent tension between Lamarckian biology and Catholic theology, this clearly does not mean that Lamarckism or transformism in general had intrinsically progressive or liberatory characters in contrast. As Paul Lawrence Farber pointed out, the 'evolutionary ethics' of de Lanessan and his colleagues entailed not discovering ethical values in nature, but reading their

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[585] See e.g. Paul Lawrence Farber, "French Evolutionary Ethics during the Third Republic: Jean de Lanessan." In: Jane Maienschein & Michael Ruse (eds.), *Biology and the Foundation of Ethics* (Cambridge, U.K.: Cambridge University Press, 1999), 93.

[586] See Corsi & Bange, "Chronologie de la vie de Jean-Baptiste Lamarck." *Jean-Baptiste Lamarck* (site de Pietro Corsi), accessed August 2024. https://redi.imss.fi.it/lamarck/chronologie/

[587] Philippe-Joseph-Benjamin Buchez, *Essai d'un traité complet de philosophie, du point de vue du catholicisme et du progrès*, T. 1 (Paris: E. Éveillard & Cie., 1838), 558.

own values into it.[588] Though Farber asymmetrically analysed this phenomenon as a particular failure of Third Republic liberals—and not, as it was in reality, a manifestation of the general fact that scientific rhetoric was ripe for political deployment across the spectrum—it remains true that for de Lanessan and his intellectual milieu, Lamarckian biology was one such set of scientific discourses available for them to deploy in social and political arguments. That is, to speak of the politics of Lamarckian and neo-Lamarckian biology is really to identify the values and agendas of its proponents—whether naturalists, politicians, or both.

Another illustrative case is the engineer and sociologist Pierre Guillaume Frédéric Le Play (1806–1882), whose writings on the European working classes married elements of climatic thinking with a social-hygienic conviction in the importance of prudent legislation and cultural customs to produce a healthy nation. Educated at the École Polytechnique and the École des Mines, Le Play travelled as a mining expert and produced sociological texts on the European working classes; he was also, like Buchez, sympathetic to the Saint-Simonians early in his life, before later advocating for the necessity of religion as a stabilizing social force, and even converting to Catholicism in 1879. Le Play travelled extensively throughout Europe in the 1830s and 1840s, eventually publishing his observations on the working classes in *Les Ouvriers Européens* (1855). His travelogues began with detailed descriptions of the places he visited, and he considered the geographical and built features to exert a considerable influence over the lives, habits, and wellbeing of inhabitants.[589] Indeed, part of Le Play's interest in the working classes specifically stemmed from his view that, unlike bourgeois, they lacked the ability to substantially

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[588] Farber, "French Evolutionary Ethics during the Third Republic" (1999), 85

[589] See e.g. Luigi Einaudi, "The Doctrine of Original Sin and the Theory of the Elite in the Writings of Frédéric Le Play." In: Louise Sommer (ed., tr.), *Essays in European Economic Thought* (Princeton, N.J.: D. van Nostrand Company, 1960), 183.

alter their physical and social environment, and so would be subjected to the same influences and habits over long periods of time.[590] In his mind, this made workers ideal control subjects for statistical observations that benefitted from constancy in their subjects. However, it is clear from his writings that the working classes were also of particular import to him because of their dual position as the producers of the nation's wealth and as vectors of social dysfunction and decline. For example, his criticism of French inheritance laws included the assertion that they encouraged the wealthy to limit the number of their offspring, such that

> sterility afflicts those social classes which any well-organized society would encourage to multiply … while the populations of our most improvident and more or less degraded classes are multiplying more rapidly than ever. This is why it is becoming so difficult to recruit a group of strong men in France and to establish a system of emigration like the ones which populated Canada, Louisiana, and the Antilles … This deficiency may also explain why the French race, which possesses intelligence, energy, and initiative to such a high degree, struggles to maintain its longtime borders, while other races which surpass the French in none of these fundamental qualities expand their interests all over the world.[591]

Le Play was a proponent of industry and economic production; he viewed work generally as morally salubrious and thought that individual workers could rise in their economic station if they had sufficient foresight and intelligence.[592] Yet as his remarks on reproduction and the French empire demonstrate, he viewed the workers themselves as prone to moral and physical degradation, and therefore as a threat to the national biological stock and the French state's economic interests. Thus, his sociological studies of workers, and his emphasis on the importance of good laws and customs to create healthy individuals and societies, represented the

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[590] Frédéric Le Play, *Les Ouvriers européens*, translated by Catherine Bodard Silver (1855). Printed in Catherine Bodard Silver (ed., tr.), *Frédéric Le Play on Family, Work, and Social Change* (Chicago: University of Chicago Press, 1982), 171–4.

[591] Le Play, *Les Ouvriers européens* (1855), in Bodard Silver, *Frédéric Le Play* (1982), 278–9.

[592] See Bodard Silver, *Frédéric Le Play* (1982), 231

use of environmentalist-hygienic theories about health in explicit service to state and imperial needs. Where previous literature has sometimes characterised him as part of a broader conservative movement, or emphasised that he did not style himself as a political agitator or radical reformer,[593] Catherine Bodard Silver categorised him as a positivist in the French tradition, but with methodological influences from the Statistical Society of London and the English meliorists. In her view, Le Play's "originality" lay in his synthesis of the Restoration Ideologues with the methods of the British empiricists.[594]

It should therefore be unsurprising that Le Playist ideas about social engineering had a profound effect on the colonial administration of Hubert Lyautey (1854–1934) as Resident-General in Morocco from 1912–1925. Though this period lies outside my main focus in this dissertation, it is noteworthy because of Lyautey's efforts to harness and re-appropriate local customs and mores to create a productive and peaceful colonial city. As Ellen J. Amster has emphasised, much of Lyautey's colonial policy in this respect drew on Le Play's sociological ideas, which in turn constituted applications of environmentalist social thinking. Lyautey's use of family policies, hygienic built environments, and strong local customs in an effort to "integrate the working classes into a harmonious, elite-driven social body" were colonial applications of Le Play's remarks on workers and the creation of a cohesive, productive society.[595] The long tradition of social and environmental engineering, rooted in the beliefs of the Idéologues and

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[593] See e.g. Einaudi, "The Doctrine of Original Sin" (1960)

[594] Bodard Silver, *Frédéric Le Play* (1982), 40

[595] See Ellen J. Amster, *Medicine and the Saints: Science, Islam, and the Colonial Encounter in Morocco, 1877–1956* (Austin, T.X.: University of Texas Press, 2013), Ch. 4.

Lamarckian transformists, was easily wielded by proponents of French imperial expansion and colonial settlement.

**Urban design: the built environment**

Le Play was certainly not the first scientist or political commentator to seek out concrete applications of environmentalist hygienic theories in areas like architecture and urban design. For example, the cultural and architectural historian Sun-Young Park has written extensively about how French architects and urban planners in the early nineteenth century altered the physical environment of Paris in an attempt to guide and alter the behavior of the populace, with particular attention to disabled subjects and the formation of new gender norms. These issues were perceived to be particularly pressing following the Revolution, as reformers hoped that by developing the bodily faculties they could promote moral advancement, thus ultimately leading to social renewal.[596]

Regular, ordered exercise was not just a means of strengthening the body, but of imparting order and virtue to the mind—a connection that Park attributes to eighteenth-century discourses of sensibility, expressed in the medical language of hygiene.[597] Thus, the reformers Park writes about focused on management of the built environment as a way of cultivating the body. Schools, public parks, and gymnasiums were central points of contention: places where a savvy architect could design a space that would encourage people to move their bodies in certain ways, and allow them to take in salubrious sights and sounds. These issues were considered

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[596] Sun-Young Park, "From Outcast to Citizen: Disability, Education, and Architecture in Postrevolutionary Paris." *Journal of the Society of Architectural Historians* 72.2 (June 2020), 184.

[597] Ibid. 185

particularly pressing in the case of disabled people—hence a significant focus on the design of deaf and blind institutes—and of women, as many reformers considered their bodies inherently weak, and believed that France's future wellbeing depended on encouraging a "modern model of active, publicly engaged femininity."[598] This was a vision of hygiene that demanded attention to all aspects of the environment, from what people wore to how much physical exercise they got and what spectacles they saw. Altering the urban environment, including schools, parks, or gymnasiums, was a way of encouraging—and sometimes outright coercing—behaviours that hygiene crusaders considered socially desirable.

In *French Modern: Norms and Forms of the Social Environment* (1995 [1989]), the anthropologist Paul Rabinow argued that, in order to invent and practice social modernity, France needed new social forms—such as architecture and urban planning reforms—as well as new norms to guide them. The distinguishing characteristic of modernity was the relationship these norms had to scientific discourses: for the first time, society was something that could be operated on technically, and social engineering and reform were carried out in accordance with scientifically derived norms—as in Park's discussion of the relationship between eighteenth-century discourses of sensibility and nineteenth-century attempts to encourage certain types of physical exercise.

Like Park would later, Rabinow pointed out that hygienic and architectural reformers were attempting to alter not just the physical environment but also human behaviour—indeed, scientific environmental modifications were precisely the way to do this.[599] And Rabinow traced

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[598] Park, *Ideals of the Body* (2018), 149.

[599] Paul Rabinow, *French Modern: Norms and Forms of the Social Environment* (Chicago: University of Chicago Press (1995 [1989]), 6.

this dialectic between environment and organism back to the transformist doctrine of Lamarck, who had argued that the relationship between body and environment was not inherently harmonious, instead requiring a constant and active process of adaptation in order to survive. Thus, the nineteenth-century urban and architectural reformers considered themselves to be building upon this scientific principle, coming up with rational and technical ways to apply it as they sought to create a more hygienic environment for nineteenth-century society. The positivist colonialism of Le Play, Lyautey, and many of the neo-Lamarckians certainly had novel elements compared to what Lamarck himself had written nearly a century earlier. But these later writers, politicians, and reformers were not deviating from the transformist tradition; they were simply marshalling it as a scientific justification and methodology for their political aims.

A final note about the politics of transformist thought is in order in regards to the criminology of the late nineteenth century. Crime was increasingly a subject of debate for social hygienists and physicians; if behaviors considered to be socially deviant and detrimental were simply the result of a biological defect, then it ought to be possible to eradicate criminality by eradicating the *criminal*, now configured as a distinct medico-biological 'type' that could be identified by a trained professional and then prevented from reproducing (or even put to the death). Although there were certainly more reformist positions on crime in the late nineteenth century, this topic is another useful case study in how the Lamarckian rhetoric of malleability and transformation could nonetheless support biologically essentialist arguments.

For example, as Laurent Mucchielli has pointed out, French neo-Lamarckists were critical of the atavistic theory of the 'born criminal'—however, this did not stop them from comparing criminals to non-human animals in order to claim that criminals were less evolved

than other people; nor did it stop them from describing adult criminals as "childish."[600] Such rhetoric reified the notion of the criminal as a lesser being, lacking a right to self-determination, and marked by such biological defects as to be comparable to a different species. Alexandre Lacassagne (1843–1924), a physician and the founder of an influential school of criminology based in Lyon, was nominally opposed to the fatalistic determinism of many of his Italian counterparts; however, his own theory of criminality placed at least as much emphasis on biological factors as on social ones, and when he spoke of the "social environment" he was using a hygienist framework in which physical and mental degeneration were largely traced to diseases and addictions commonly associated with the urban working classes.[601] Lacassagne had studied at the military school in Strasbourg and trained in a military hospital; he held a chair in forensic medicine on the Lyon Faculty, and was a pioneering figure in criminal anthropology and forensics, lending his expertise to high-profile criminal cases and advocating for both the death penalty and the establishment of penal colonies in the 1880s.

In the colonial context, too, criminology was a potent junction for ideas of environmental and climatic influence to meet with more rigid, essentialist theories of race. For example, in his study *Le Crime en pays créole* (1889), the physician-sociologist Armand Corre (1841–1908), who spent 15 years in the French colonies working as a medical examiner, argued that crime was partly the predictable result of social tensions, such as those between enslaved people and their captors. However, he also stated explicitly that social influences were not the sole cause of

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[600] Laurent Mucchielli, "Criminology, Hygienism, and Eugenics in France, 1870-1914: The Medical Debates on the Elimination of 'Incorrigible' Criminals." In: Peter Becker & Richard F. Wetzell (eds.), *Criminals and Their Scientists: The History of Criminology in International Perspective* (Cambridge: Cambridge University Press, 2006), 211.

[601] Ibid. 214

criminal behavior: "Human actions are obviously the result of correlative impulsivities of an individual organisation, hereditary or acquired."[602] He considered such "impulsivities" to be altered and provoked by both social and physical environmental factors—and named heat as a particularly important factor exacerbating crime—but, and much like Lamarck, he wrote about inherited or innate physiological characteristics as bearing heavily on a person's inclinations and behavior.[603] He considered humans to be biologically distinct along lines of both race and gender: for example, his explanation for a lower observed rate of criminality among Creole women than men was that women had a different physiology and temperament, and he stated repeatedly throughout the text that human races were real, biologically distinct categories arranged hierarchically, with Africans specifically considered inferior, impulsive, and biologically prone to criminal acts.[604] Additionally, races and nations could be prone to degeneracy within their own category; Corre considered the prevalence of crime in the colonies to be partly a result of emigration that had introduced "thousands of subjects recruited from afar, not the best of their race, but rather among the worst, vagrants and decommissioned of a special civilization."[605]

My point is not to suggest that Corre was exceptional in his racism or other commitments to biological essentialism. While French ethnologists and sociologists at the time held a variety of positions on the subjects of race, degeneracy, and criminality, Corre's arguments were not

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[602] Armand Corre, *Crime in Creole Countries: A Sketch of Criminal Ethnography*, translated by Stephen M. Marson & Quentin P. Bouvier (New York & London: Lexington Books, 2021), 49.

[603] Ibid.

[604] On women, see Ibid., 29. On race, see e.g. 55, 64, 125–6. Corre used multiple and sometimes overlapping terms to describe and categorize the human races; see Marson & Bouvier's translators' note, xix–xxi.

[605] Ibid. 27

outlandish or unusual. Rather, this text is useful because it demonstrates once again that Lamarckian and environmentalist theories of biological malleability and adaptation could, and did, coexist with policies and positions more readily associated with determinist and essentialist arguments. It would be a mistake to view a Lamarckian or environmentalist tradition as having been distinct from scientific racism, eugenics, or other essentialisms. Lamarckism—both in Lamarck's own words and in later invocations of his name—was invoked in service of a variety of political positions, including liberal imperialism and racism. What unified these political projects was the biopolitical view that human bodies constituted a source of value—a biological stock that the state had interests in protecting, cultivating, and exploiting. Lamarckian ideas about the malleability of these bodies and their relationship to social and physical environments constituted the loose body of scientific doctrines according to which such bio-capital was to be enhanced and used.

**Concluding remarks**

Lamarckian ideas about species transformation and physiological change had implications that ranged far beyond the bounds of debates on evolutionary theory. By contextualising Lamarckian biology in view of the social hygiene movement, I have shown how the French transformist tradition functioned as a scientific explanation and justification of social engineering efforts that ranged from infectious disease control to colonial administration to urban design to calls for the eugenic elimination of criminals and other 'undesirable' populations. Ultimately what united all of these manifestations of hygienic and transformist thinking was the view, increasingly held among medical professionals and state officials throughout the long

nineteenth century, that the populations of metropolitan and colonial France were not simply local inhabitants, but constituted a massive biological resource in the production of national wealth and strength. Altering these people's habits, bodies, and health status thus constituted not just a series of individual medical interventions but a broad effort at socially engineering a more prosperous, robust nation.

In short, social hygiene and its associated applications were manifestations of biopolitics; public health was an essentially political discipline and a guiding principle of government. Throughout the long nineteenth century, the French government and population became increasingly aware of health as a social phenomenon, both in the sense that social conditions influenced individuals' health and in the sense that society as a whole had an interest in promoting health. This shift also occurred in the context of a broader trend by which society itself was increasingly seen as a discrete entity that could be managed, controlled, and studied, including by scientific and technocratic means. Thus, Lamarckian-environmentalist biology was one body of medico-scientific theory by which the social body was to be tamed, altered, and enhanced. Health was not just a good the state might provide its citizens, but a duty *they* now owed to *it*; and, in the general context of biopolitics, ensuring health was not just a matter of altruism but of creating a sustainable and profitable nation-state.

It is important to note that Lamarck's influence, while considerable, was sometimes indirect. Many hygienists and reformers who espoused similar ideas to Lamarck may have been exposed to him via some third source; others likely read Lamarck's own influences, especially Cabanis, and may have ended up echoing Lamarck's ideas inadvertently. My intention is not to suggest that Lamarck was unique in regards to his belief in biological malleability—on the

contrary, many aspects of these ideas were common in his intellectual circles even before he began publishing on transformism (see Chapter 1 above).

Instead, I argue that Lamarck was one of many naturalists, politicians, hygienists, and social reformers in the French nineteenth century interested in the possibility for rational control over processes of biological change, and thus ideas both directly and indirectly traceable to him were invoked in the service of state, imperial, and medical efforts to improve the human species and French society. That Lamarck's name retains a dominant place in the historical literature on evolution reflects both the institutional positions he secured during his lifetime, and a concerted effort (particularly in the latter half of the nineteenth century) to shore up notions of a distinguished and distinctly French biological tradition that had preëmpted Charles Darwin's theory of evolution. Lamarck's name is therefore often over-emphasised in the history of evolution, without sufficient recognition for the hygienic and broadly biopolitical context in which his ideas remained influential throughout the long nineteenth century; in this chapter I have focused attention on this latter context.

Placing Lamarck and Lamarckian ideas in the biopolitical context also clarifies the relationship between meliorist, progressivist ideas and openly exterminatory and eugenic ones. As I have discussed in Chapter 1 above, ideas about social and biological degeneration predated even Lamarck in France; however, over the long nineteenth century, state and medical efforts to counter degeneration and to improve the population also took the form of overtly eugenic projects. Efforts to eliminate, or prevent the reproduction of, the urban poor and colonised subjects were often justified by claims about these groups' biological inferiority and the consequent threat they posed to the French biological stock. As I have shown in this chapter,

claims about essential racial differences and inborn inferiority were not incompatible with Lamarckian environmentalist ideas; on the contrary, the two frequently came hand-in-hand and mutually developed one another. Tracing the ideological and political ends to which Lamarckian biology was invoked is critical to contextualise Lamarck and his legacy. Thus, in this chapter I have focused on the ideological aims of various nineteenth-century reformers and politicians who made use of Lamarckian ideas, rather than on Lamarck's own politics or intentions.

Transformism and environmentalist theories of biological change were always consequential for more than just the 'species question.' Tracing environmentalist medical and hygienic thought in French colonial endeavors and the development of scientised notions about human 'races' over the nineteenth century makes clear that the legacy of Lamarckism also lies in French colonial and imperial endeavors, and the scientific rhetoric used to justify and facilitate them. Efforts within France, such as architectural and urban design efforts intended to alter people's habits and physiology, or the 'internal colonialism' discussed in Chapter 1 above, were outgrowths of the same biopolitical efforts to alter the nation's subjects and economically exploit them. Indeed, scholars of European colonialism have noted since at least Aimé Césaire's *Discourse on Colonialism* (1950) that colonial expansion generally did not represent an exceptional economic logic or political policy; rather, and in large part aided by notions of racial hierarchy and white European supremacy, peripheral colonial policies tended to operate on the same principles as internal and domestic policies—only with a greater public tolerance for open brutality.[606] Similarly, as I have shown in this chapter, French colonial expansion and domestic

[606] Aimé Césaire, *Discourse on Colonialism*, translated by Joan Pinkham (New York: Monthly Review Press, 2001 [1950]), 35-9; 47–53. On French 'internal colonialism,' see also remarks on William Max Nelson in Ch. 1 above.

policies—such as efforts to control the urban poor or to encourage reproduction among wealthy families—often mutually influenced one another, and both drew justifications from a shared pool of medical and biological theories that included Lamarckian transformist principles.

Although biopolitics by the late nineteenth century was distinct in certain ways from the progressivist, meliorist claims of French Enlightenment texts, I have shown in this chapter that many of the motivating concerns were similar, coterminous, or overlapping. The form and tactics of the French state changed significantly over the course of three revolutions and additional regime changes; capitalist forms and practices, too, underwent radical alteration in the long nineteenth century. However, and as the connective tissue of Lamarckian and transformist biology suggests, many underlying political concerns remained present throughout the period: concerns about maintaining a growing, and biologically desirable, population; economic incentives driving colonial and imperial expansion and military endeavours; and a mutual state and scientific interest in ideas of both biological malleability and essentialism that were invoked to justify such endeavors. Placing Lamarckian biology in this context elucidates the stakes of nineteenth-century debates over the origin and alteration of species, expanding these discussions from a narrow naturalists' disagreement in order to examine the broader meaning and biopolitical significance of social engineering efforts and the social hygiene movement.

**Conclusion**

In this dissertation I have first placed Lamarck in the context of late-eighteenth and early-nineteenth century French politics and science. Next, I have provided a close reading of Lamarck's transformist arguments, his understanding of physiology, and the scientific reception of his work during his own life. Finally, I have evaluated the longer legacy of Lamarckism in France, focusing on the importance of Lamarckian and environmentalist ideas in medical circles and the eventually consolidation of a group of 'neo-Lamarckians' with significant institutional power under the Third Republic.

Placing Lamarck in his own context, as I have suggested here, presents us with significant insights. First, it grounds his transmutationism firmly in the political and social debates about regeneration, degeneration and reform. Here I have shown that Lamarck was not merely trying to explicate an evolutionary theory of how species had come to exist in their present forms. Rather, we understand him best by locating him in the context of national concerns about social—and biological—progress and degeneration.

Historians have long argued that we can best understand the development of Darwin's ideas as the product of the competitive and individualist ethos of the British Industrial Revolution, and so it should seem reasonable that context should matter too in our consideration of Lamarck. Placing Lamarck in context, we see that he believed that the current state of human society was part of the natural history of the human species, making social commentary a legitimate part of the naturalist's work. Furthermore, social change and reform would be part of the future development of the species, giving humans a genuine ability to direct their own evolution. This aspect of Lamarck's thought drew not only from natural historical debates about

species transformation, but also from medicine, physiology, and empiricist epistemology. Thus, and although the reception of Lamarck's ideas among British radicals has not been my concern here, it would seem that they did not, in fact, entirely misappropriate his ideas when they turned to transmutation to support their own radical political agenda.

More specifically, though, what I hope to have shown here is that Lamarck and his work have been woefully misrepresented by both past and prevailing conceptions of 'Lamarckism.' Cuvier, Lyell, Darwin, and others misled not only many of their own, but also many of our own contemporaries about Lamarck's ideas, especially regarding the role of the environment, the 'inheritance of acquired characters,' and the role of the will in evolution. The so-called 'Lamarckian' mechanism of the inheritance of acquired traits has been recognised as having played an important role in responses to fears of national and racial decline across many European countries throughout the nineteenth and early twentieth centuries.[607] Yet, and as I have shown here, this mechanism was neither unique nor central to Lamarck's ideas, and, with only a few exceptions, the very real way in which he did invoke his evolutionary theory in discussions of the future of the French nation has gone largely unrecognised.

Given this context, we can make sense of Lamarck's remarks on the will and the evolutionary process. While Lamarck certainly did not consider all species transformation to be the result of will or desire, he did believe that the history and physiology of the will had moral and political significance. This fact has been obscured by Cuvier's caricature of voluntary species change, which advanced a seemingly apolitical critique of Lamarck's ideas as scientifically unsound rather than engaging with their deeper social context and political

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[607] Nye, *Crime, Madness, and Politics* (1984), Ch. 4; Pick, *Faces of Degeneration* (1989), 100; Jennings, *Curing the Colonizers (*2006), 27.

meaning. While Cuvier was certainly not the only person to propagate criticism of Lamarck's ideas, his *éloge* has long retained a notable role in the historical understanding of Lamarck—not least because of Cuvier's influence on Lyell and, through him, on Darwin. In truth, Cuvier's explanation of the place of the will in Lamarck's thought had little to do with Lamarck's actual conception of it, which was formulated in the context of an intellectual environment in which the idea of self-directed change was neither absurd nor even particularly unusual. His ideas were especially shaped by Rousseauvian political philosophy, social reformers like Cabanis and Condorcet, and naturalists like Buffon, each of whom shared overlapping national concerns about degeneration and regeneration that remained prevalent in medicine and hygiene throughout the nineteenth century.

Thus, while species transformation was an important part of Lamarck's thought, he was much more than the early, erroneous, and somewhat naïve evolutionist that many authors have made him out to be. We only see this by properly contextualising his ideas, rather than by extracting them from the context in which they were articulated and presenting them, devoid of context, as a contribution to a sanitised history of scientific ideas. Lamarck's interest in the role of self-direction in species transformation was part of a broader political vision of the rapports between the physical and the moral. His interest in human evolution was especially driven by the belief that the biological improvement of the human species was key to the moral and physical regeneration of French society. Willed biological change was much more than Lamarck's critics portrayed it to be: it could mean political reform, public health and social medicine, environmental management, or reproductive hygiene. In this French context, self-directed

evolution was an important part of Lamarck's answer to widespread anxieties about degeneration and national decline.

Understanding the role of voluntary action and self-directed change in Lamarck's system thus demands a contextualist approach. His *biologie* was bound up with his interest in social change, regeneration, and moral agency, and he was far from alone in seeing deep links between the history of nature and the future of society. The capacity to act by will gave humanity immense power over the natural world—including the human species itself.

Furthermore, the promise of voluntary physiological alteration was part of what made Lamarck's ideas useful in medical contexts, both during and after his life. From the public health reformers I discuss in Chapter 4 to the politician–physicians of Chapter 5, medical commentators in the nineteenth century linked together notions of health, fitness, biological improvement, and voluntary self-control in ways that frequently echoed or directly built off Lamarck's work. The idea that broader social improvement depended on the management of individuals' behaviours and environments was a conceptual linking-point between Lamarckian evolutionism and much of the public health movement. While Lamarck's name certainly did continue to be associated with his evolutionary explanation for speciation, this was far from the only association made to his work. Attending to his legacy in the medical and social-scientific context makes clear that evolutionary theory itself ought to be evaluated as both a response to, and a further intellectual condition for, numerous interlocking debates about social reform and national enrichment—a point Emma Spary has also discussed, including with regards to Buffon in particular.[608]

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[608] See Spary, *Utopia's Garden* (2000).

As I also discuss in Chapter 4, French medicine in the nineteenth century underwent both internal methodological changes and a general process of professionalisation. In addition, starting in the 1820s, popular and state interest grew in social medicine and public health—signifying a broader shift toward doctoring society at large, not just an individual patient. Though this shift built on prior trends in medical discourse—such as the claims discussed in Chapter 1 that the Revolution could or would be a socially curative event—the level of institutional and state support for public health reform increased dramatically during the nineteenth century. Medicine gained professional status, and physicians gained economic status, as the discipline increasingly came to be seen as scientific, and as a means of rationally ordering society. Lamarckian theories of speciation, biological malleability, and environmental influence over the body were critical linkage points that physicians deployed in order to claim epistemological authority over social issues, from public health reform to personal health recommendations to debates over the best physical design and layout of urban spaces. If health was a matter of cultivating an environment that was full of the right sensory stimuli and conducive to advantageous physiological adaptations, then physicians could make use of the naturalist's insights in order to claim professional dominion for themselves over virtually any social issue or political debate.

As I have shown in Chapter 5, the growing emphasis on health as a measure of general social success did not arise de novo. By the eighteenth century, the monarchy and royal scientific societies had already drawn a connection between the size of the labour force and the growth of national wealth, making population growth and health into critical economic matters. Indeed, this link was one of the characteristic ideas of the Physiocrats and other agronomists. As population

thinking became more entrenched in the nineteenth century, society itself was transformed into an object of scientific knowledge.[609] Population management and the cultivation of healthy, robust bodies were, at root, strategies of economic enrichment and modern statecraft—and the emphasis on such strategies only became more pronounced as France industrialised, changing the size and composition of the workforce needed to ensure national economic dominance. Indeed, the attitudes I trace in Chapter 5 toward the necessity of maintaining a steady supply of productive labour were only echoed in the French immigration policy of the mid-to-late twentieth century, when the state accelerated efforts to encourage colonial and postcolonial migration in order to keep a disenfranchised immigrant population arriving to perform vital labour.

Thus, in Chapter 5 I have argued that Lamarckian evolutionary ideas should be evaluated as a critical scientific foundation for the development of what Michel Foucault called biopolitics, an orientation of the state toward the regulation and management of entire populations. Lamarckian notions about the habitual mediation of physiological change, the environmental influence on the body, and the possibility of gradual and even inherited biological change provided theoretical links between medical intervention into individual bodies and the profitable administration of society writ large. This was true in both colonial and metropolitan contexts; however, colonised people were considered especially in need of the 'civilising' force of expert medical management of their bodies, life-styles, and built environments. Additionally, when medical and anthropological observers did turn their gaze toward the metropole, they tended to home in on groups like rural peasants or the urban working poor, and to describe these groups as

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[609] See e.g. Cole, *The Power of Large Numbers* (2018).

vectors of racial degeneration—sometimes even comparing their health or conduct to those of 'savages' or describing them in similar terms.

As this much makes clear, one implication of an evaluation of Lamarckian transformism in the context of biopolitics is that it foregrounds the use of evolutionary arguments to make claims about the progress or regress of individual bodies, species, human societies, and racialised populations. In other words, the problems that evolutionary theory was deployed to solve ran deeper than just a debate over the origins of new species. Evolutionary arguments also underpinned 'stadial' theories of history and politics, and were used to justify the taxonomisation and hierarchical ranking of human 'races,' despite the concept's lack of grounding in any biological or objective observation of physical appearance, physiology, or geographical origins. In this way, the notion of improving a body, or cultivating a healthier population, encompassed not just the desire to rid the country of disease, but also a promise of racial regeneration. Indeed, as Foucault pointed out and as I have discussed in Chapter 5, not all such biopolitical interventions even aimed at creating a larger population. On the contrary, preventing 'overpopulation' was as much a concern as reversing any tendencies toward 'depopulation'—especially where poor, colonised, and racialised populations were concerned.

A point of contention with regards to Foucault's reading of nineteenth-century medicine has focused on his characterisation of the interpersonal dynamics of doctor–patient relationships. For example, Dora Weiner has argued that Foucault overstated the extent to which individual physicians bore ill-will toward their patients, and that this is indicative of broader theoretical problems with his interpretation of medicine.[610] While my intention is not to debate the motives

[610] Weiner, *The Citizen-Patient* (2002), 15

of any given individual, it is worth stressing that the analysis of nineteenth-century medicine as biopolitical in nature does not necessitate attributing individual malice to practitioners. Indeed, one of the critical insights of Foucault's remarks is that the biopolitical remit accounts for both a genuine philanthropic interest in a patient's health, and the state's efforts to control, exploit, and profit from its populace as a biological resource.

Furthermore, the biopolitical nature of medicine and public health did not mean that all patients or populations were equally valued or exploited; nothing in Foucault's framing contradicts the idea that some patients may have been treated with genuine humanitarian interest by physicians. As Weiner also discussed, part of the impetus for hospital reform in the revolutionary years and during the Restoration was born of the desire to convert Paris's ailing institutionalised population into an economically productive citizenry.[611] In other words, the doctor–patient relationship forged in the clinical context was intended to provide healthcare in exchange for an economic return—not just economically productive labour, but also the promise that a healthy population would continue to reproduce and grow, enriching the nation.

Thus, when it came to those who were deemed defective or degenerated in ways that made their reproductive potential a threat to the state rather than an asset, the fundamental aims of medical intervention were not the same. Rather than encouraging population growth and health, as in metropolitan patients considered to be curable, colonised and racialised populations and trafficked slaves represented economic value only by virtue of their own labor-power. These populations were viewed as potential vectors of racial degeneration and social disorder; thus the national interests that led, for example, to the proliferation of natalist medical advice on marital

[611] Ibid. 45

and reproductive hygiene in metropolitan contexts were the same interests that also guided medical remarks on supposed problems of 'overpopulation' among Arabs (discussed in Chapter 5).

To evaluate nineteenth-century medicine with the theoretical frame of biopolitics does not abrogate the possibility that some physicians genuinely cared about their patients' well-being, or that, as individuals, they had personal investments in their profession aside from its financial rewards or political role. Rather, Foucault's insight accounts for the overall tendencies of medicine and public health toward what he called a politics of massification: an overall attention to the importance of maintaining not just a large population, but one composed of healthy and biologically desirable individuals. Evolutionary notions of biological progress and hierarchy were easily grafted onto, and used to justify, medical discourses about the definition and inferiority of racialised groups, the backwardness of indigenous and colonised peoples, and so forth.

As should be clear, Lamarck himself was not uniquely invested in such biopolitical logic; if anything, as I have shown in Chapter 2, he was likely engaged in direct political action only to the extent that he had to be, as a savant working at the Jardin/MNHN through a period of multiple political upheavals. Though one of his central insights was his assertion that the political domain could—and should—be analysed as an object of naturalist knowledge,[612] Lamarck himself did not express the kind of ambition for naturalists that, for example, Cabanis did with regards to the medical profession. However, in the medical contexts I have discussed in this dissertation, the relationship between biological assertions and political analysis was

[612] Lamarck, *Histoire naturelle* (1815–1822), 281

consistently a close one, and this has critical implications for the evaluation of Lamarck's legacy and the long-term ramifications of his evolutionary theory.

Certainly many self-professed admirers of Lamarckism and neo-Lamarckism had little familiarity with Lamarck's own work, and many may have even disagreed with him on central evolutionary points, particularly by the rise of the Third Republic liberals who often invoked Lamarck's name as much because he was French as because of any real underlying commitment to 'Lamarckian' mechanisms of speciation in contradistinction to British and German 'Darwinian' ones. Nevertheless, tracing the broader legacy of Lamarck's ideas and the rhetorical uses of his name indicates not only that Lamarck himself ought to be understood in the context of a country increasingly trying to scientise health and wealth—but also that this is a valuable shift to make in our understanding of evolutionary theory writ large.

The question of speciation was, of course, a contentious and thought-provoking one in its own right. However, an epoch's scientific inquiry does not occur in isolation from its political and social context. Critical elements of evolutionary inquiry solidified around efforts to ensure a scientifically grounded theory of social reform—and evolutionary theory, like other scientific theory, was re-framed, appropriated, or repurposed to support numerous political positions throughout the nineteenth century. These included continued colonial invasion and administration; hygienic reforms both abroad and within the metropole; limitations on labour protections and regulations; and more. Understanding Lamarckian transformism as both arising from, and later playing critical rhetorical roles in, such arguments is therefore consequential for a larger analysis of the relationship between biology, medecine, and politics in the nineteenth century.

**Limitations and further research**

As this much should make clear, the inquiry I open here should not end with Lamarck. Indeed, as I have discussed in Chapters 1, 3, and 5, Lamarck was neither the first nor the only savant (even in France) to propose transformism as an explanation for speciation, and he was certainly not a unique or even particularly dominant voice in the kinds of debates over the national future that form the context in which I have evaluated his work. The relative prominence of his name, in both the nineteenth-century treatises I have discussed here and in the secondary historical literature, is a reflection of a nationalist interest in making priority claims for French scientists at least as much as it is indicative of the genuine impact of Lamarck's ideas.

Thus, although I have artificially limited this dissertation to focus on Lamarck, this is a necessary concession to space; further inquiry in this area should evaluate the origins and significance of transformist theory more broadly. For example, figures like Cabanis who are already relatively well-represented in the literature may warrant a second look, bearing in mind that discourses about national progress, decline, and degeneration/regeneration often had a shared intellectual lineage with, or ideological investments in, various evolutionary or transformist concepts. Additionally, figures who may not have been recognised as 'evolutionary theorists' at all should be re-evaluated with the understanding that transformism was, in many ways, only a more extended version of commonly accepted arguments about biological malleability.

Thus, and without erasing the distinction between savants who considered transformism to be the mechanism of speciation and those who did not, it is still valuable to note points where elements of transformist arguments appear in the writing or professional work of savants not

traditionally associated with evolutionism. For example, in Chapter 5 I have analysed elements of Lamarckian thinking in the public health treatises of A.J.B. Parent-Duchâtelet. This sort of analysis does not aim to prove that Parent or any other particular savant actually read Lamarck firsthand, but rather to show that the prevalence of transformist ideas was such that many physicians, naturalists, and other savants did accept elements of Lamarckian arguments, or use them in their own work, even if they did not defend species transformation or consider themselves to be transformists. Integrating a similar analysis of other figures in the history of medicine and public health with a further exploration of the breadth of transformist theory itself will yield a much richer picture of the stakes, parameters, origins, and consequences of evolutionary debates in nineteenth-century France.

An additional consideration in such inquiry is to transcend the national border, which I have had to make use of here largely as another practical limitation. As Pietro Corsi and others have shown, the nineteenth-century debates over transformism were never neatly demarcated along territorial borders. During his own lifetime, Lamarck taught students from across Europe and the Americas; his ideas circulated especially in cities like Edinburgh and London that had direct intellectual exchange networks with Paris, but his followers and commentators also included transformists across Italy, Germany, and beyond—to say nothing of later twentieth-century Lamarckian and neo-Lamarckian influences across countries including India and Brazil. With a broader picture of the scope of transformist theory in general during the nineteenth century, future research in this area should seek to follow knowledge and professional networks beyond the confines of specific national borders—or, as is the case in much of this dissertation, even specific municipal borders.

For the French situation, one critical result of this geographic consideration will be to properly consider the relationship between colony and metropole, and the centrality of colonial and imperial interests to an analysis of the scientific and evolutionary ideology of the nineteenth century. Although I have touched on the use of Lamarckian and evolutionary arguments in colonial administration in Chapter 5, this dissertation has been mostly limited to Lamarck and the Parisian scientific establishment. Though it is true that colonial science often entailed using the colonial setting as a kind of 'laboratory' to test theories and cures later imported into the metropole,[613] it would be a mistake to assume this meant that scientific theory and argumentation were developed only by the occupying empire, with no ideological or philosophical influence from the colonised or the colonial context.

Indeed, the process of bidirectional scientific exchange warrants further exploration, as does the general matter of the role of evolutionary or transformist ideas in colonial occupation and administration—both by the French and by other imperial powers. Connecting the economic and political weaponisation of transformist ideas in the metropole and the colonies will elucidate the underlying logic of both, and the ways in which colonial science sometimes differed from, and at other times represented a more overt form of, its metropolitan counterparts. Furthermore, this dissertation has only touched on the colonisation of Algeria and Morocco, the Napoleonic invasion of Egypt, and Armand Corre's remarks on criminal behavior across the late-nineteenth-century empire. A much more systematic and thorough investigation of French colonial endeavors and their relationship to evolutionary biology is sorely needed. Two obvious places to start are the colonial Institutes Pasteur—building off Aro Velmet's *Pasteur's Empire* (2020)—and

[613] See e.g. Gwendoline Wright, "Tradition in the Service of Modernity: Architecture and Urbanism in French Colonial Policy, 1900–1930." *The Journal of Modern History* 59.2 (June 1987), 297.

the relationship between transformist arguments and colonial medical treatments like balneology —discussed by Eric T. Jennings (*Curing the Colonizers*, 2006). Just as I have argued in this dissertation that the 'transformist' and environmentalist arguments baked into nineteenth-century public health and hygiene served to grant physicians epistemological authority over virtually any aspect of society within Paris and metropolitan France, so was the same true—perhaps even more so—in colonial conquest. From architecture to daily habits, any practice or object interpreted as too foreign or insalubrious (or, often, insalubrious because foreign) could become a target for medical and social reform, justified on evolutionary grounds. Thus, a much more thorough examination of each of France's colonial holdings is in order if we are to determine the contextual characters of nineteenth-century transformist theories.

Even within the metropole, scientific practice varied greatly. I have focused here mostly on the Parisian scientific establishment, partially because it was Lamarck's milieu during his life, and partly as a consequence of the easier availability of Parisian archival sources than of provincial ones. However, and despite the outsize weight of Paris within French historiography broadly, science in nineteenth-century France encompassed a wide range of activities, institutions, and professional networks, and provincial and autonomous naturalists belong no less in this story than do the chaired professors at the MNHN. Networks of information-sharing, specimen collection, and funding linked Paris to provincial gardens, institutions, and naturalists; Robert Fox's *The Savant and the State* (2012) provides an excellent introduction to these scientific networks.[614]

[614] See esp. Ch. 2.

Finally, and although I have sought to bring elements of contextualist history to the study of Lamarck and French evolutionary theory, this dissertation has focused predominantly on intellectual history. Further research in this direction should therefore expand to include closer consideration of the real social and professional networks in which transformist theory was formulated, debated, and propagated. The role of central institutions like the MNHN, as well as state funding structures and élite professional societies, is critical in any such history; however, further study is also sorely needed to interrogate the importance of additional, and sometimes informal, scientific and professional networks. This includes attention to naturalists' professional interests—such as Cuvier's motives for criticising Lamarck in the ways he did, as well as Geoffroy's interest in countering such criticism—and their interpersonal relationships. Although many minor figures may not have been preserved thoroughly enough in the archives to warrant a full biographical treatment, it is critical to bear in mind that debates like the one over speciation were not just shaped by professional disagreement, but inevitably also by the social networks that savants belonged to. Tracing these networks will also synergise with the geographical and conceptual expansions in the research that I have called for here. By reconstructing the actual debates and concerns—scientific and political—that gave rise to various transformist speculation and theories in the late eighteenth and early nineteenth centuries, we can come to a more thorough understanding of what transformist theory was, and what problems it was intended and deployed to solve beyond any narrow teleological narrative bounded by modern categories of historical and scientific inquiry.

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