

THE UNIVERSITY OF CHICAGO

NATURAL SCIENCE AND “NATIONAL SCIENCE”:  
RECEPTION OF GOETHE’S MORPHOLOGY IN NINETEENTH-CENTURY FRANCE

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AGATHA SEO-HYUN KIM

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This dissertation is dedicated to my parents,

Y.J. Lee and K.S. Kim

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## Abstract

The intensely inward and self-reflective nature of Romantic literatures has contributed to the popular characterization of Romanticism as mystical, philosophical, and emotional. Likewise, the scientific knowledge grounded in Romantic principles has often been described as an inferior maverick in the history of science. My dissertation challenges this portrayal. Through the Romantic lens, diverse living forms were understood as reflections and manifestations of a greater, constantly evolving nature. This view inspired in the nineteenth century, beyond the field of natural sciences, the attempts to understand political and social struggles, traumas, and divergences of the time as part of a natural historical process. The Romantic vision pushed beyond the simple analogies between ideas and reality, and instead rigorously merged the ideal and the real in multiple aspects of life, from the biological knowledge of nature to the historical knowledge of nations. In this sense, Romanticism was truly a revolutionizing and productive moment in history.

This project focuses on the blending of natural and national categories in nineteenth-century thought, through the case studies on the reception of J. W. von Goethe (1749-1832)'s morphology in French intellectual communities across the century. Goethe was a renowned German poet whose scientific ideas were impactful enough to resurface in French scientific discussions even after his death, yet eccentric enough to raise suspicions and doubts that often revealed nationalistic undertones. Employing and modifying the Kantian regulative ideas while prioritizing empirical experiences, Goethe's morphology was representative of Romantic science. At the same time, France—the neighbor and long-time cultural and political rival of Germany—was the hub of European scientific knowledge, where ideas in which Goethe was

interested, such as those of Geoffroy Saint-Hilaire (1772-1844) and Georges Cuvier (1769-1832), were being actively debated. The study of Goethe's reception in France not only reveals how Romantic science fared in one of the most scientifically advanced nations of the time, but also how biological and national conceptions interacted in the intellectual communities.

Together, the case studies illustrate the blending of natural scientific and national thought categories in at least two levels. At one level, practitioners of natural science and their ideas were nationalized and naturalized—a dual process resulting from the mixture of early Romantic celebration of the landscape as a source of the national identity, theories of environmental and cultural determinism, the ongoing classificatory efforts in natural sciences, etc., which did not necessarily agree with one another. At another level, biological and national concepts blended as a nation increasingly came to be considered as a unified living organism, participating in an evolutionary (and even teleological) process which was its national history.

History of the reception of Goethe's Romantic morphology shows a range of France's reactions that encompassed all these aspects. **Chapter 1** introduces the process of nationalization and naturalization of scientific ideas in nineteenth-century scientific discussions. It focuses on the famous debate between the two leading French zoologists at the Academy of Sciences in 1830, in which Goethe participated. The 1830 debate and other discussions around it absorbed the differences in scientific methods into the broader differences in the ways of *seeing* and *believing*. This absorption created space for the differences in scientific ideas and methods to interact and merge with other broad identifiers such as nationality and religion, allowing the dual process of nationalization and naturalization of scientific ideas. **Chapter 2** is a comparative study of Goethe and A. P. de Candolle (1778-1841), a Genevan botanist who actively participated in the French scientific community in the first half of the nineteenth century. Despite

their remarkably similar biological concepts such as the organic type, Goethe and Candolle were considered as representatives of the antithetical German and French schools, and thus, experienced very different receptions in France. In addition to comparing their ideas and receptions, this chapter experiments with a computer scientific and visualization method to analyze the forms and structures of their scientific texts. Through this method, I locate the source of the differences between Goethe's and Candolle's sciences in the varying interactions among the building blocks of their texts, rather than in the purported national differences. **Chapter 3** examines the reception of Goethe's morphology in France in the second half of the century, after the publication of Charles Darwin (1809-1882)'s *On the Origin of Species* (1859). It examines how the influx of new transformist and evolutionary theories renewed the interest in Goethe's morphology and modified the French view and use of Goethe. Portrayal of Goethe as a representative of German science and philosophy noticeably faded; instead, Goethe was increasingly associated with the earlier giants of French thinkers such as Denis Diderot (1713-1784), who emerged as a probable precursor to Darwin in the French eyes. **Chapter 4** analyzes natural historical writings of Jules Michelet (1798-1874), France's national historian. It highlights how, in the time of confusing regime changes, revolts, and the devastating war with Germany, Michelet employed and modified Goethe's concept of the organic type to establish the certainty of France's future progress, of the humanity in general, and of nature itself, which effortlessly blended into one other. **Chapter 5** ties these case studies into a conclusion.

Reception of Goethe's morphology in France across the nineteenth century mirrored the transformation in the modes of national expression in France. In the French perception, Goethe shifted from a national antithesis of French science, to a welcome mediator who bridged the earlier French philosophical tradition to the emerging evolutionary science, and then to a

productive conceptual model for both natural and national histories, to which France clung by the end of the nineteenth century. The history of Goethe's reception—himself a scholar of morphological forms—illustrates the slow grafting, transplanting, and unfolding of Romantic sensibilities in multiple societies with varying needs and contexts. In the process of studying this history, I interpret Romanticism as a form of thinking, seeing, and believing that a collective may adopt in different nations at different times, in its effort to close the gaps between its reality and its identity as understood through its history. With a broad range of conceptual applications that it could offer in and beyond the field of science, Romantic biology created clusters of related ideas and purposes, making it a significant contribution of the nineteenth century to the European history.

## Chapter 1 Nationalization and Naturalization of the Universal Science

“There is no patriotic art and no patriotic science. Both of these belong, like everything noble and good, to the entire world and can be advanced only through unfettered exchange among all those living in a given time ...”<sup>1</sup>

J. W. von Goethe, *Wilhelm Meister's Journeyman Years* (1821)

The immediate topic of the scientific debate between the two leading French naturalists, Georges Cuvier (1769-1832) and Geoffroy Saint-Hilaire (1772-1844), at the French Academy of Sciences in 1830, concerned the following question: are the countless forms of animals we witness today based on a single universal plan of animal organization, as Saint-Hilaire argued, or, did the animal life begin with at least four distinct and unbridgeable types of animal organization, as Cuvier supported? The significance of the debate has travelled far beyond this immediate topic, as Saint-Hilaire, Cuvier, their contemporaries including Johann Wolfgang von Goethe (1749-1832), as well as the historians of science in later generations, have interpreted it in multiple ways. For some, it was a precursor to the debates surrounding Darwin's evolutionary theory few decades later; it was a revolt against the Aristotelian tradition of studying nature in terms of final causes. The debate was also seen as a conflict between the different personalities and religious beliefs of Cuvier and Saint-Hilaire. For others, it was a collapse of the wall between the elitist scientific community and the public; it was an intellectual eruption equivalent to the July Revolution in 1830.<sup>2</sup> All these are valuable interpretations, but the complexity of the

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<sup>1</sup> Johann Wolfgang von Goethe, *Wilhelm Meister's Journeyman Years or the Renunciants*, trans. Krishna Winston & ed. Jane K. Brown (New York: Suhrkamp Publishers, 1989), 425.

<sup>2</sup> Toby Appel's *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin* (1987) and Hervé Le Guyader's *Geoffroy Saint-Hilaire: a Visionary Naturalist* (1998, English translation 2004) are the two major research on the 1830 debate. Appel proposes to examine the debate from several different perspectives, focusing on the main ideas of the debate, then on the differences of methodology between Cuvier and Geoffroy, then on personalities, institutions, etc. After completing this multi-sided investigation, Appel concludes that it is impossible to pinpoint one aspect of the debate as its real definition, as it meant different things for different people involved in the debate (Appel, *The Cuvier-Geoffroy Debate*, 236). Appel does emphasize that we should avoid using the post-1859 British context as our point of reference, which would easily lead us to read too much of the Darwinian idea of evolution into the 1830 debate. Instead, using the early nineteenth-century French context, Appel characterizes the

debate offers room for exploring at least one other, overlooked aspect: the debate also featured the naturalists simultaneously invoking the two virtues—universalism and patriotism—which sat uneasily together. In the debate, the “French science” was defined as at once a typical and atypical phenomenon in the history of universal scientific progress. The debate had a stake not only in settling on the truth regarding the origin(s) of animal forms, but there was also an emotional stake, as the debaters engaged in nationalistic discourses defending the French science against the sciences of other nationalities.<sup>3</sup> By highlighting nationalities of ideas, scientific discussions partly transformed into a cultural-moral act of classifying the normal and abnormal, the good and bad sciences. Robert Merton’s observation that scientific communities produce and self-impose the ethos of universalism, while at the same time bending it whenever the national interests pressure them, seems pertinent to the case of 1830 debate:

Particularly in times of international conflict, when the dominant definition of the situation is such as to emphasize national loyalties, the man of science is subjected to the conflicting imperatives of scientific universalism and of ethnocentric particularism.<sup>4</sup>

Hence the ideology [universalism] is rounded out by a conception of “good” and “bad” science ... Or, grounds for exclusion are sought in the extrascientific capacity of men of science as enemies of the state or church. Thus, the exponents of a culture which abjures universalistic standards in general feel constrained to pay lip service to this value in the realm of science. Universalism is deviously affirmed in theory and suppressed in practice.<sup>5</sup>

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main issue of the debate as “the conditions of existence versus philosophical anatomy” (Appel, *The Cuvier-Geoffroy Debate*, 235). Le Guyader, on the other hand, emphasizes the implication of the evolutionary argument in the debate. Le Guyader argues that the topic of evolution progressively entered the silent conflict between the two different scientific methodologies for more than a decade, before finally erupting into a public debate. Thus, the 1830 debate was only one incident within a vast set of similar discussions on the evolutionary topic (Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 226).

<sup>3</sup> The definitions of the “typical” and their emotional stakes were discussed at a conference: Heather Brink-Roby, “Two Types of Typical” (A talk presented at a workshop at the University of Chicago, “The Uses of Anomaly,” Chicago, Illinois, April 21-22, 2017).

<sup>4</sup> Robert K. Merton, *The Sociology of Science: Theoretical and Empirical Investigations*, ed. Norman W. Storer (Chicago: University of Chicago Press, 1974), 271.

<sup>5</sup> *Ibid.*, 272-273.

By surveying the texts and opinions that were circulated around and at the debate of 1830, this chapter aims to show that the debate involved a dual process of naturalization and nationalization of scientific thought, which had long been hailed as a universal achievement.

Though I discuss naturalists and their scientific texts that were part of French natural science in the first half of the nineteenth century, my dissertation as a whole centers on Goethe, whose scientific practice was widely perceived as counter to what was considered “French science.” Although Goethe and Saint-Hilaire supported each other’s scientific practices, the connection between Goethe’s morphology and Saint-Hilaire’s theory of the unity of plan—which proposed that all animals across different phyla were organized on a universal plan, and treated this plan as the basis for understanding animals’ taxonomic relations to one another—has often been questioned. For instance, historian Toby Appel asks whether there really existed a continuity between their ideas, and between German biology and French anatomical philosophy in general.<sup>6</sup> This kind of question is, however, irrelevant to my dissertation, which examines instead how the scientists and public intellectuals participating in French science perceived Goethe’s science, and how they used it for various purposes to define French science and French nation across the nineteenth century. As for this chapter, which focuses on the 1830 debate, what is relevant is the fact that Goethe paid a lot of attention to the debate; that Goethe himself saw

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<sup>6</sup> Appel, *The Cuvier-Geoffroy Debate*, 107. Appel writes on the question of whether Saint-Hilaire’s doctrines were indeed influenced by his German counterparts, including Goethe: “Although it shared some ideas with *Naturphilosophie*, Geoffroy’s doctrine was based on a different foundation. German biology was teleological, fundamentally indebted to Kantian philosophy, and gave primacy not to matter but to forces and their transformations. Because German biologists believed nature possessed an internal dynamism, their science was considered by the French to be pantheistic. Geoffroy’s doctrine, in contrast, was nonteleological, and as in the eighteenth-century Newtonian tradition, forces were assumed to be superimposed upon matter. Geoffroy shared none of the mysticism found in the writings of romantic *Naturphilosophen* such as Oken. ... In the 1820s, the heyday of *Naturphilosophie*, the formerly separate French and German traditions began to merge.” On p.90, Appel also rejects the continuity between Goethe’s morphology and Saint-Hilaire’s theory of the unity of plan, reasoning that Goethe’s scientific writings were little known in Germany and France and that the philosophical anatomy in France and *Naturphilosophie* in Germany were independent traditions at least before 1818.

the connection between him and Saint-Hilaire; that Saint-Hilaire confirmed such connection; that Cuvier and others criticized Saint-Hilaire by likening his idea to the “German idea”; and above all, that nearly all participants in the debate, whether supporting Saint-Hilaire or Cuvier, resorted to nationalistic discourses at one point or another.<sup>7</sup> In this respect, this chapter also attempts to trace the national affect,<sup>8</sup> which was often not recognized nor explained, but which nonetheless guided the way scientific ideas were expressed and the way scientific debates were performed. The subsequent chapters will trace both the forms of Romantic biology and those of national affect in nineteenth-century French scientific and public intellectual communities by examining their receptions of Goethe’s natural science and their own scientific writings. As an introduction, this chapter will demonstrate how the 1830 debate between Saint-Hilaire and Cuvier embodied a dual process of naturalization and nationalization of scientific thought.

## 1. The debate of methodologies

Nationalization of what has been promoted as the universal knowledge starts with the recognition of the differences within it. If the 1830 debate displayed the naturalists’ tendency to

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<sup>7</sup> The differences in the dominant research method in France and in Germany, as well as nationalistic rivalry, are not unnoticed by Appel and Le Guyader. Appel writes: “Goethe’s two essays served as vindication for himself and his countrymen against assaults from the French, and in particular from Cuvier. ... Like many of his contemporaries, he believed the so-called synthetic science of Geoffroy to be derivative from Germany rather than linked to the older *philosophie* science in France. ... Goethe saw the debate as primarily a conflict between the analytic view of nature represented by Cuvier and the synthetic view of nature introduced from his homeland into France by Geoffroy.” (Appel, *The Cuvier-Geoffroy Debate*, 160) Appel also writes that how France and other nations developed natural science in diverging ways “stem no doubt from differences in culture, both the culture of the French nation and the more particular subculture of French science.” (Appel, *The Cuvier-Geoffroy Debate*, 56) Le Guyader discusses the French-German antagonism, too. See note #27 in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 264. See also: Wolf Lepenies, *The Seduction of Culture in German History* (Princeton, N. J.: Princeton University Press, 2006). While both authors notice that the nationalistic affect was one of the components of the 1830 debate, it has significance for them only as *outcomes* or rhetorical manifestations of the debate. In contrast, I treat the nationalistic affect as one of underlying *causes* that preceded the debate.

<sup>8</sup> By “affect,” I do not mean “emotion” only, but every subjectivity that conditions one’s psychological and physical behaviors, both consciously and unconsciously.

affirm the existence of different types of science along the national divisions, then in what forms did these differences manifest in scientific practices? Although the debate can be interpreted in multiple ways as mentioned above, the definition most relevant to this chapter is that it was a battle of different methodologies. The debate centered on Cuvier's and Saint-Hilaire's distinct manners of *seeing* nature and manners of *thinking* science. In the following two passages, Goethe interpreted the debate as a manifestation of the ancient conflict between the competing scientific methodologies:

What has come to the surface here is the never-ending conflict between the two ways of thought, into which the scientific world has long been divided and which was always present among our neighboring scientific researchers but which has broken unusually violently on this occasion. ... Cuvier works untiringly as a differentiator, describing exactly what is at hand and is winning mastery over an immeasurable breadth. Geoffroy de Saint-Hilaire, on the other hand, is quietly concerned with the analogies of creatures and their hidden relationships. The former proceeds from the particular to the whole which is postulated but never regarded as recognizable. The latter cherishes the whole in its inner sense and continues to live in the conviction that the details can be worked out gradually. But it is important to notice that much which the latter is succeeding in proving clearly and distinctly in experiments is gratefully accepted by the former. Likewise the latter in no way despises whatever comes to him from the other that decides single details ...<sup>9</sup>

Nature can thus be interrogated in many different ways, so that it shows its true colors to the *observer* and to the *thinker*, letting the former penetrate in all its external and sensible manifestations and bestowing the latter's wise imagination the revelation ...<sup>10</sup>

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<sup>9</sup> Goethe, "Principes de philosophie zoologique," *Revue Médicale française et étrangère* 4 (December 1830), 446-447. The English translation is from: Goethe, "Principles of Zoological Philosophy," in *Mathematical Essays on Growth and the Emergence of Form*, ed. Peter L. Antonelli and trans. B. Taylor (Edmonton, Canada: University of Alberta Press, 1985), 311-312. Although Goethe clearly sympathized with Saint-Hilaire and his method of looking at the "whole in its inner sense," Goethe recognized the need for both approaches—"observing" and "thinking," or details and the whole—for progress in scientific researches. His tendency to embrace the seemingly opposite aspects to see the greater unity was reflected in his view of how the nature worked.

<sup>10</sup> Goethe, "Expliquant à l'Allemagne les sujets de philosophie naturelle controversés au sein de l'Académie des Sciences de Paris: deuxième article," *Revue encyclopédique, ou Analyse raisonnée* 54 (Apr. 1832): 57.

While interpreting the debate from the methodological perspective is not new, focusing on the two aspects of scientific method—ways of seeing and ways of understanding nature’s time—can help understand how methodological differences were transformed into national differences in the minds of both parties supporting Cuvier and Saint-Hilaire.

**a) Ways of seeing**

The debate provided a ground where the naturalists attempted to decide what types of experience should be prioritized as scientific evidence. Eighteenth-century France was the home of the Enlightenment, which aimed to foster the critical views of the old authority, bring about practical reforms on society, and redefine man as a rational and independent being whose perfectibility promised the full understanding of the universe in the future. France was also the home of the French Revolution, which violently responded to the political and social traditions that seemed to perpetuate injustice and ignorance, and which attempted to build a new nation on the principles of reason. Both Cuvier and Saint-Hilaire, as well as their colleagues, embraced the legacy of the eighteenth century and strove to establish a “French science” that was thoroughly based on facts. Jean Pierre Flourens (1794-1876), a student and colleague of Cuvier, praised Cuvier’s attention to facts and his prioritization of objects over theories: “for the lack of books, he had objects; and this direct, exclusive study of objects engraved them in his head much better than if he had, to use his own expressions, many engravings and descriptions at his disposal.”<sup>11</sup> Flourens also recounted that Cuvier believed that facts “could only emerge from their intimate nature that is thoroughly known.”<sup>12</sup> Cuvier’s strict reliance on the observable and knowable

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<sup>11</sup> Jean Pierre Flourens, “Historical eulogies of G. Cuvier by Flourens,” in *Éloges historiques, précédés de l’éloge de l’auteur par M. Flourens*, by Cuvier (Paris: E. Ducrocq, libraire-éditeur, 1860), 1.

<sup>12</sup> *Ibid.*, iii.

objects was reflected in his writings. He characterized natural science and its relationship to facts in the following words:

Placed between mathematical sciences and moral sciences, natural sciences begin where the phenomena are no longer easily measured with precision, nor the results are calculated with exactitude ... our natural sciences are merely the facts drawn together, and our theories merely the formulas which embrace a great number of those facts; and, as a necessary result, the smallest new fact that is well-observed must be welcomed, since it can modify our best accredited theories. ... It is this which gives natural sciences their particular character, and which, removing all the obstacles and limits from the field they travel, promises certain successes to any rational observer, who, never raising oneself to the imprudent suppositions, limits himself to the only routes open to the human mind in his present state.<sup>13</sup>

The same belief can be seen in Cuvier's evaluation of his contemporary naturalists. His eulogy of Abraham-Gottlob Werner (1749-1817), a renowned German geologist who developed the Neptunist theory of the history of the earth, is one such example. In this eulogy, Cuvier criticized the studies before Werner as based on "a small number of badly observed facts, connecting them together by imaginary suppositions." Praising Werner for bringing about a reformation of geology, Cuvier wrote that "the things which were presented for seeing and touching, the truths which it has placed before our eyes every day, are more admirable and more surprising than all that impudent imaginations conceived of."<sup>14</sup>

Saint-Hilaire, Cuvier's opponent, could be described in similar terms as well. In a review article of Saint-Hilaire's *Anatomical Philosophy* (1818), the same Flourens observed that Saint-

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<sup>13</sup> Cuvier, *Histoire des progrès des sciences naturelles depuis 1789 jusqu'à ce jour*, v.1 (Paris: Librairie encyclopédique de Roret, 1834), 1, 5.

<sup>14</sup> The Neptunist school argued that the earth had been covered with the ocean, which has since then deposited rock strata and receded to reveal the earth's crusts. Neptunism was gradually replaced by Plutonism, its rival school, which argued that the underground heat (magma,) not water, played the key role in the formation of rocks. Although Werner and Cuvier supported one another, Cuvier eventually concluded his eulogy with a criticism of Werner. Cuvier acknowledged that Werner established a more factual study of geology than the predecessors, but for Cuvier, Werner still embodied the "formalist spirit" that was "typical of German thinkers." Cuvier, "Historical elegy of Abraham-Gottlob Werner, read March 16, 1818," in *Éloges historiques*, 307-336.

Hilaire's unique focus on the material conditions of organic beings considerably contributed to dissipating the persistent occult theories like that of "vital forces." For Flourens, Saint-Hilaire's anatomical philosophy was as scientific and progressive as Cuvier's science (which claimed to be free of philosophical touch) because it was based on material evidences.<sup>15</sup> Even Cuvier praised Saint-Hilaire as a "wise naturalist" and acknowledged that the latter's works—at least its non-theoretical part—offered valuable facts: "This [first] part of his work, which consists of certain facts, largely new and all clearly presented, will always remain a precious acquisition for science."<sup>16</sup> Saint-Hilaire himself emphasized the factual basis of his theory of the unity of plan. Pointing out that scholars had for a long time intuitively suspected of analogies of organic beings, he asserted that his method could turn these intuitive conjectures into scientific facts:

Oken, Spix, Meckel, and earlier, but much more vaguely, Kiehmeyer, J. P. Frank, and first of all Burdin have noticed a striking analogy between some parts of the skull and the vertebrae. ... The preceding remarks, from which it follows that this material dismemberment is visible in the insects, will furnish proof for this insight, and will change into a scientific fact the ingenious ideas of these celebrated German and French physiologists.<sup>17</sup>

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<sup>15</sup> Flourens, "Essai sur l'esprit et sur l'influence de la *Philosophie anatomique*," *Revue encyclopédique, ou analyses et annonces raisonnées des productions les plus remarquables dans la Littérature, les Sciences et les Arts* 5 (1820): 230. What is interesting about Flourens's evaluations of Cuvier and of Saint-Hilaire is that Flourens did not seem to be interested in distinguishing between the two opponents, unlike his contemporary scientists and journals. His description of the legacy of Cuvier's scientific method, in fact, closely resembled what others would have considered as the description of Saint-Hilaire's legacy. Like Goethe, Flourens argued that the "true method in natural history" involved both the need to distinguish and the need to generalize (Flourens, "Historical eulogies of G. Cuvier by Flourens," xli-xlii.) Flourens also made a similar remark that each naturalist's systematic research helped turning questions of reasoning and intuitive facts into positive facts, in a separate articles where he evaluated Cuvier and Saint-Hilaire respectively (Flourens, "Historical eulogies of G. Cuvier by Flourens," xv; Flourens, "Essai sur l'esprit et sur l'influence de la *Philosophie anatomique*," 224.) Flourens, like Goethe, viewed both Cuvier's and Saint-Hilaire's methodologies as based on empirical evidences and contributing to the development of sciences.

<sup>16</sup> This comment was however immediately followed by Cuvier's doubt: "The second part, which establishes the relations between the pieces of which we have just discussed and those of superior classes, is already susceptible to more difficulty." Cuvier, *Histoire des progrès des sciences naturelles*, 390, 392.

<sup>17</sup> Saint-Hilaire, "Mémoires sur l'organisation des insects; Premier mémoire os du squelette dans les classes supérieures," *Journal complémentaire du Dictionnaire des sciences médicales t.5* (1819): 346. English translation from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 58. Similar position appears in the Preliminary Discourse of *Anatomical Philosophy* (1818), also translated in: Le Guyader, 28-29.

Saint-Hilaire also used his vast amount of fieldwork from the Napoleonic campaign in Egypt (1798-1799), to criticize Cuvier in 1825, who had identified the crocodile bones discovered in Normandy as belonging to the modern gavials. With his experience of studying living crocodiles in Egypt, Saint-Hilaire argued instead that the fossil bones belonged to a transitional form between the reptiles and the mammals. In addition to this evidence from fieldwork, his theory of the unity of plan required Saint-Hilaire to gather embryological and paleontological observations. Likewise, Goethe, who supported Saint-Hilaire and acknowledged the similarities in their scientific ideas—a point that likely strengthened Cuvier’s criticism of Saint-Hilaire’s method—preferred direct observations of nature over books, just like Cuvier, even though Goethe was also interested in the inspiration in the empirical evidence, while Cuvier looked for details that could be recorded with absolute certainty.<sup>18</sup>

Although both Cuvier and Saint-Hilaire emphasized facts in their scientific practice, they disagreed on which methodology they thought should be applied to the facts that were available for the both sides. This methodological debate concerned the two kinds of vision: on the one hand, vision as a sensorial mode of experiences, and on the other hand, vision as a more complex mode of registering experiences at multiple levels simultaneously. Interpreting the debate on methodologies as a prioritization of different types of experience allows us to understand how the nationalistic assumptions found their way into the scientific discussions in early nineteenth-century France.

Saint-Hilaire summed up the difference between his and Cuvier’s methodologies in terms of the different modes of experience:

Do analogies exist, on the contrary, of a sort such that, while not revealing themselves easily to the *eyes of the body*, they can nevertheless manifest themselves to the *eyes of the mind*, and so

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<sup>18</sup> Goethe, “Expliquant a l’Allemagne les sujets de philosophie naturelle controversies (v.53),” 571.

the Aristotelian principles are insufficient for this case? The old method stops in its applications, just at that moment when it would have to become doctrinal, to become an Ariadne's thread, to make us appreciate the *most hidden relations*, all the common points of general facts, the most important points of the sciences.<sup>19</sup>

In his response to Cuvier, who argued that scientific facts were to be strictly based on what could be immediately observed, Saint-Hilaire encouraged readers to see beyond what could be seen by the “eyes of the body” and learn to see with the “eyes of the mind.” Based on his studies of numerous animal bones, Saint-Hilaire interpreted different groups of animals as varying arrangements of the same materials and organs. His understanding of organic forms through analogies led him to develop the theory of the unity of plan, in which all organic beings were part of a series of modifications over time built on a single archetypal plan, resulting in multiple groups of animals with distinct forms and functions.

... if account has been taken of all the possible developments, as much of those of a single species traversing the ages of life as of those of the whole zoological series rising by degrees to the greatest organic complexity, we arrive at a simple fact, which is at the same time the most general condition of organization. Every organ is brought to the unity of its essence and of its capacity to incorporate certain elements. A simple organ, grafted on another of the same order, introduces the first facts of complication. Several others then come, at their precise moment, and by the paths of succession and generation, to surround that core; that augments the sum of the first facts without altering the character of their simplicity. But further, it is the same course of development that is pursued in the same circle, satisfying its original tendency. For there is only one mode of formation to engender organic facts, whether that action, coming to an early halt, produces the simplest animals, or whether that action, persevering all its possible capacity, leads to the greatest complication of organs. In fact, there

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<sup>19</sup> Saint-Hilaire, “Discours préliminaire, sur la théorie des analogues,” in *Principes de philosophie zoologique, discutés en Mars 1830, au sein de l'Académie royale des sciences* (Paris: Pichon et Didier, Libraires & Rousseau, Libraire, 1830), 17. English translation from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 115. Italics are mine. The 1830 debate resembled the ancient contention between Plato's and Aristotle's systems of classification, although Saint-Hilaire's position wasn't the same as Plato's system. In fact, Cuvier explicitly defended the Aristotelian science while Saint-Hilaire asserted that the traditional Aristotelian system needed to be modified to keep up with the vastly increased knowledge of the nature.

would be no question of miracles, but of the action of time, of progress from less to more.<sup>20</sup>

Saint-Hilaire's observations of animal bones included more than the literal vision. Behind his visual experiences, he saw that there existed different orders of complexity in animal structure, and that there also existed unmistakable analogical relations between different structures. These visual experiences led him to adopt other, seemingly conflicting tools to complete his theories: a concept of time that encompassed both the sense of historical time and that of ahistorical essence, or the unchanging "core" shared by all forms. I classify the latter experience as faith, which will be discussed in the next section. Saint-Hilaire's dual sense of time merged with his visual observations to activate his reasoned imagination, or his "dream" of potentialities.<sup>21</sup> He saw the history of nature as an unceasing process of generations and modifications, all layered over the "first facts" or the "original tendency" of the simple, primitive organ. He envisioned the panorama of the nature's history, and it was a constantly moving and continuous vision without empty space. Each animal was both a representative and a variation of the first organic structure.

On the other hand, Cuvier did not hold a full, continuous vision of the history of nature as Saint-Hilaire did. Cuvier was faithful to what he could directly observe from the bones of present and past animals, and rejected assumptions that required visualization of things that could not be confirmed with his eyes. For example, Cuvier found no certainty in Saint-Hilaire's argument that the fossil bones found in Normandy belonged to an intermediary form between the reptiles and

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<sup>20</sup> Saint-Hilaire, "Discours préliminaire, sur la théorie des analogues," 21-22. English translation from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 117-118.

<sup>21</sup> Saint-Hilaire described his theory as "that one thing of which I always *dream*." "Dream" is the word with which he chose to end his discourse, "On the Theory of Analogues" in March 1, 1830. Saint-Hilaire, "De la Théorie des analogues, pour établir sa nouveauté comme doctrine, et son utilité pratique comme instrument," in *Principes de philosophie zoologique*, 108. English translation from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 165.

the mammals; they had to belong to either of the two, or to an entirely different group.<sup>22</sup> There were too many gaps in fossil discoveries to argue for a continuous process of transformation. Rather than an evolutionary view of constant modifications, Cuvier propounded the view of successive creations, which established firm and unbridgeable boundaries among the distinct groups of animals and seemed to better explain why there had not been any discovery of the fossils that could prove the existence of the intermediary forms.<sup>23</sup>

In other words, while Saint-Hilaire's method allowed flexible navigations between empirical experiences, rational imaginations, and faith—which together formed a “vision” in a different sense from Cuvier's vision—Cuvier's method asked the observer to limit one's experience to one sensorial mode and to the present. In the eyes of Saint-Hilaire's supporters, the former method was creative and visionary while fully remaining within the border of sciences, as Saint-Hilaire “sought to penetrate the reason of the universality of things ... but without extreme reservation which limits one to what one can grasp at present.” It required him to research “the

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<sup>22</sup> In the debate of these crocodile bones from Normandy, Cuvier concluded that the bones belonged to the gavial group—a currently existent group, but only in a different climate. For more information about this particular debate, see chapter 4 of Le Guyader, *Étienne Geoffroy Saint-Hilaire*.

<sup>23</sup> Cuvier's non-evolutionary view corresponded to two related beliefs he held. First theory, catastrophism, was a geological one, which argued that the history of the earth underwent a number of interruptions (ex. the great flood,) each of which would have abruptly changed the environment, rock deposition, and animal life on the earth. The second theory was a religious one, where Cuvier envisioned God as a creator who controlled this world directly and in an untouchable way—as opposed to Saint-Hilaire's belief of God as a creator who provided materials and conditions for all possibilities in the beginning and then let the nature run its future courses using these conditions. This religious difference is discussed in Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 229. Elsewhere, Cuvier further criticized his opponent's assumption that the gaps in fossil succession would be eventually filled up with future discoveries. Cuvier, “Nature,” *Dictionnaire des sciences naturelles* 34 (1825): 261-268. On the other hand, Saint-Hilaire preempted the necessity to consider all possible intermediary forms: “Strictly speaking, it will suffice to consider man, a ruminant, a bird, and a bony fish. Dare to compare them directly, and you will arrive in one leap at all that anatomy can provide for you that is most general and most philosophical. Otherwise, if you continue to run through all the intermediate links, you are embarking on a long and painful voyage. ... The principle of connections, like another compass, thus brings together the different points of the theater of our explorations. In simplifying our investigations, it puts philosophical anatomy at the disposal of a greater number.” Saint-Hilaire, “Discours préliminaire,” in *Philosophie Anatomique t.1* (Paris: J.-B. Baillière, 1818), xxxviii. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 34-35.

necessary and contingent facts, engaging himself in a kind of contemplation on what future is called to develop.”<sup>24</sup>

Cuvier saw Saint-Hilaire’s method, however, as an artificial and unverifiable conjecture into the past and the future, which forced unity and order onto nature’s history that was in fact erratically punctuated. Cuvier expressed his discontent in several writings. In his speech at the French Academy of Sciences, Cuvier acknowledged that sciences and letters were just various forms of knowledge that had emerged from the same origin. However, he propounded the necessity to keep the methods of sciences and those of letters separate: “I know, gentlemen, it will be equally dangerous, and for letters and for sciences, to confuse their objects, and to apply to one of them the methods which are only suitable for the others. Entrusting the task of unveiling nature to an imagination without rules, it will be making sciences regress towards their cradles ...”<sup>25</sup> In another article directed at Saint-Hilaire, Cuvier problematized the tendency of certain “puerile philosophers” to imagine nature as having an individual personality. Specifically, he criticized that “one takes refuge in this figurative language where logic does not penetrate ... we don’t perceive any necessity for a chain of beings nor a unity of composition, and we do not believe in the possibility of a successive appearance of diverse forms.”<sup>26</sup>

Both Cuvier and Saint-Hilaire relied on facts and vision to produce their scientific theories. They were given the same facts of nature, but the kind of vision utilized by each naturalist differed, which in turn produced not only contrasting theories but also the fundamentally different views of nature and of sciences. At stake was the question whether all animals belonged to a single origin, and whether the boundaries among distinct animal groups

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<sup>24</sup> Goethe, “Expliquant a l’Allemagne les sujets de philosophie naturelle controversies (v.53),” 567.

<sup>25</sup> Cuvier, “M. Cuvier’s discourse at his reception at the French Academy,” in *Éloges historiques t.2* (Strasbourg & Paris: Levrault, 1819), 445.

<sup>26</sup> Cuvier, “Nature,” *Dictionnaire des sciences naturelles* 34 (1825): 263, 266, & 268.

were transgressible. What Cuvier criticized about Saint-Hilaire's and his supporters' method was, on the surface, what he considered as an interference of philosophical and aesthetic analogies, or an inappropriate extension of the border of scientific research. At the fundamental level, the debate was about the definition of empirical experience, and particularly that of "scientific vision." In this sense, a remark made by Antoine Étienne Serres (1786-1868), French physician and embryologist who supported Saint-Hilaire, was relevant: the spirit of philosophy was "*the art of observing in the large.*"<sup>27</sup>

#### **b) Ways of understanding nature's time**

The debate between Cuvier and Saint-Hilaire was in a sense a competition to determine what constituted a "scientific vision," which required defining the boundary between the legitimate law of nature and scientific or philosophical faith. The latter was as powerful as religious faith, in that it influenced how one understood everything one saw and experienced—not just natural phenomena, but also oneself and one's relationship with others and the world. A philosophical and scientific faith was as much part of one's identity as a religious faith would have been, and provided an entrance point through which other markers of identity, such as religion and nationality, could mingle with one's scientific ideas.

Saint-Hilaire's theory of the unity of plan highlighted what was visible to the "eyes of the mind," which was based on, but went beyond, what was physically visible. The concept of the universal plan for past, present, and future living beings allowed Saint-Hilaire to participate in a time travel across nature's history. Although an evolutionary view was by nature a historical view, it also produced an ahistorical concept of essence in his scientific belief. His theory centered on the concept of a greater unity, which sustained vast potentials for organic materials

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<sup>27</sup> English translation of Serres's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 237.

to combine in limitless ways and to manifest in different forms of beings over time. For Saint-Hilaire, this organic totality defined what an animal was, both historically and scientifically. This concept was shared by Goethe, whose theory of the metamorphosis of plants emphasized the presence of the “archetypal leaf” in all leaf forms, which, at one level, underwent a succession of varying forms of leaf, stem, calyx, flower, fruit, and seed within the lifespan of an individual plant, and on another level, constituted the unifying identity of different plant species. This archetypal leaf formed an incorruptible essence of the plant, which at the same time harbored potential histories of varying forms and functions.<sup>28</sup> Saint-Hilaire’s adoption of a diachronic view over a synchronic judgment based on anatomical facts might tempt one to interpret the 1830 debate as a battle between diachronic and synchronic views in science. However, Saint-Hilaire’s position was opposed to the both perspectives. His concept of the “incontestable identity of essence” did not belong solely to the present, past, nor future, but to all of them; it was a trans-historical concept which echoed Goethe’s transcendental archetype, the “eternal plant.”<sup>29</sup>

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<sup>28</sup> The affinity of the concept of the “archetype” in Goethe and Saint-Hilaire is greater than it has usually been recognized. Scholars have tended to reduce the extent of Saint-Hilaire’s support for Goethe, compared to Goethe’s open support for Saint-Hilaire. Appel, in particular, denies the connection between the two, citing the difference between the kind of homology developed in France and the serial homology in Germany, as well as the fact that Goethe’s work was not well known in France. Although these are valid points, a passage in Saint-Hilaire’s “On the Theory of Analogues” suggests otherwise. In this passage, Saint-Hilaire did not discuss animals, which was the usual subject of his studies, but instead discussed the *rosaceae* family—the same plant that Goethe studied in the *Metamorphosis of the Plants*. Saint-Hilaire defined the “archetype” as the true identifier of the plant, as Goethe had done: “The rose that has kept its stamens interests the botanist because of the maintenance of the reproductive power, and the rose that has lost them, through a transformation into petals, simply gives more pleasure to the gardener whose flower-beds it embellishes. But for the philosopher ... these two kinds of rose are but one and the same plant, variable under the influence of surrounding environments; for this member of the Rosaceae is composed of parts that are the same in substance, identical as constituent elements. The form and the functions of these parts are of no importance from this point of view; only, as the influence and the reactions of its external world determine, this element is either a stamen or a petal; but before any acquired quality, each element is first itself, then capable of all possible volumes, that is to say, capable of maintaining itself in a *medium*, of restricting itself to a *minimum*, finally of being carried to the *maximum* of its development, sometimes to the point of suffering the extremes of the most bizarre metamorphosis.” Such passage reveals not only that Saint-Hilaire was well aware of Goethe’s work, but also that he agreed with the essential part of Goethe’s theory. Saint-Hilaire, “De la théorie des analogues, appliquée à la connaissance de l’organisation des poissons (Séance du 22 mars 1830),” in *Principes de philosophie zoologique*, 118-119. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 170-171.

<sup>29</sup> The theme of eternity appeared in both literary and scientific writings by Goethe. In the *Metmorphosis of the Plants*, the archetypal leaf is the “eternal plant” that harbors potentials for multiple forms and functions of the plant.

As the term “transcendent” suggests, the concepts of eternity, unity, and essence had been tinted with religious connotations since the antiquity. Aristotle, the ancient authority whom both Cuvier and Saint-Hilaire repeatedly mentioned in their debates, had attempted to explain the mysterious structure and workings of the universe with the concepts such as the “unchanging center” and “eternal motions,” all arranged by the God.<sup>30</sup> Similarly, a Pre-Socratic thinker Empedocles of Acragas had also used similar concepts to explain how life perpetuated through constant interchanges between generation and decline.<sup>31</sup> Even though Empedocles’s writing did not mention God directly, he envisioned mysterious forces when explaining life on the earth, and attributed agency to these forces, which were eternally engaged in the acts of love, repulsion, and strife.

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The unchanging identity of the plant persists and revives through all physical manifestations of the plant. Similarly, in Part II Act V of *Faust* (1808), Goethe used the term “eternal female” to symbolize the pure beauty, goodness, and continuity through redemption:

Alles Vergängliche ist nu rein Gleichnis	All that is perishable is but an allegory
Das Ewig-Weibliche zieht uns hinan.	The Eternal Feminine draws us on.

For more on the connection between Goethe’s “eternal woman” and “eternal plant,” see: Robert Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago: University of Chicago Press, 2002), 395-397.

<sup>30</sup> Aristotle stated the following: “The Universe then is a system made up of heaven and earth and the natural things which are contained in them. But the word is also used in another sense of the ordering and arrangement of all things, preserved by and through God. Of this Universe the centre, which is immovable and fixed, is occupied by the life-bearing earth, the home and the mother of diverse creatures. The upper portion of the Universe, a whole with a fixed upper limit everywhere, the home of the gods, is called Heaven. Heaven is full of divine bodies, which we usually call stars, and moves with an eternal motion, and in one circular orbit revolves in stately measure with all the heavenly bodies unceasingly forever.” Aristotle, *On the Universe*, in *The Complete Works of Aristotle: the Revised Oxford Translation*, ed. Jonathan Barnes (New Jersey: Princeton University Press, 1984), 1372-1373.

<sup>31</sup> Empedocles’s vision of how life is perpetuated through the interactions of opposite forces is similar to Goethe’s theory of the archetypal leaf’s life cycle through “contractions” and “expansions.”

Double is the generation of mortal things, and double their decline.

For the coming together of all things gives birth to one / [namely, generation and decline] and destroys it,  
And the other is nurtured and flies away when they grow apart again.

And these never cease continually interchanging, / At one time all coming together into one by Love

And at another each being borne apart by the hatred of Strife. [...]

But in that they never cease interchanging continually,

In this way they are always unchanging in a cycle. [...]

At different times they come to be different things and yet

Are always and continuously the same.

Empedocles of Acragas, no.47 in *A Presocratics Reader: Selected Fragments and Testimonia*, ed. Patricia Curd (Indianapolis: Hackett, 2011), 83-84.

It is thus not surprising that Saint-Hilaire's theory of the unity of plan, which used the similar languages and concepts, was characterized with a spiritual, and even unscientific undertone in the eyes of his opponents, despite all the detailed observations that accompanied the theory. Both Saint-Hilaire's critics and proponents used this point to support their positions. The journal *Les Débats* gave a scathing opinion, describing Saint-Hilaire's theory as "overabstract considerations ... philosophical principle in which one had to believe as if through one's emotions, like a revealed truth."<sup>32</sup> On the other hand, Edgar Quinet (1803-1875), French historian and poet, claimed that Saint-Hilaire's science was the "eternal science," and that Saint-Hilaire "had been initiated into the secret works of Providence."<sup>33</sup> Jean Baptiste Dumas (1800-1884), French chemist, also evaluated Saint-Hilaire's concept of the unity of plan as the basis of chemical sciences, with its rational method that transcended observable phenomena.<sup>34</sup> Thus, the most criticized aspect of Saint-Hilaire's theory was a double-edged sword which could be seen as a truly rational and analytic scientific method or as a faith fueled by wish and imagination. With the shared language of spiritualism, a scientific thought like Saint-Hilaire's could be understood as part of one's identity at large, just like one's religious conviction or nationality. Cuvier's verdict on Saint-Hilaire's science summed up this connection:

... it is not that we are ignoring the new attempts by some foreign metaphysicians to connect the natural phenomena to the rational principles, to demonstrate them as a priori ... we can only prevent ourselves from declaring that we saw a deceptive play of the mind, where one only seems to make progress at the aid of figurative expressions taken sometimes in one sense and sometimes in another ... these metaphysical subtleties do not have any influence in the history and explanation of positive phenomena ...<sup>35</sup>

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<sup>32</sup> Saint-Hilaire, "Seconde argumentation de M. le Baron Cuvier (Séance du 22 Mars 1830)," in *Principes de philosophie zoologique*, 162. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 193-194.

<sup>33</sup> English translation of Quinet's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 241.

<sup>34</sup> English translation of Dumas's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 234.

<sup>35</sup> Cuvier, *Histoire des progrès des sciences naturelles v.1*, 6-8.

In this passage, Cuvier did not directly address Saint-Hilaire, but used a broader group of “foreign metaphysicians” to mask his real target. One’s scientific and philosophical thoughts, or the way one’s vision operated in understanding the world, merged with a much simpler and more convenient identifier—one’s nationality. What was taking place was the dual processes of naturalization and nationalization of scientific thought.

## **2. Nation and sciences**

One’s manner of seeing and believing could be easily incorporated into one’s identity and interact with one’s nationality in the minds of early nineteenth-century scientists. One of the conditions that facilitated this interaction was the inseparable relationship between nation and sciences. This section discusses long-existing competitions among nations for scientific prestige and the nineteenth-century attempts to explain nationalities in scientific terms. It also discusses how nationality of ideas became a visible component in scientific writings in general. Then, the final section looks at how the processes of naturalizing and nationalizing scientific thoughts permeated the 1830 debate between Cuvier and Saint-Hilaire.

### **a) Making sciences national**

Scientific knowledge has played a significant role, especially after the French Revolution when there was a widespread urge to reform the social and political aspects of the French society. Many of the leading scientists took up the political positions during this period. Cuvier was one of these politically active scientists: he served as the counsellor of the state, president of the committee of internal affairs, chancellor of public education, and the peer of France, in addition to his numerous academic positions. Cuvier argued that the essential objective of sciences was “to drive the human mind to its noble destination, the knowledge of truth; to spread

the healthy ideas down to the least elevated classes of people; to protect men from the world of prejudices and passions; to make Reason the arbiter and supreme guide of the public opinion,” and that, with its contribution towards the advancement of civilization and the collective well-being, science must merit the governmental protection.<sup>36</sup> Individual scientists could be directly supported or thwarted by political situations. For example, Cuvier attributed the excellence of the Genevan naturalists to the political and religious independence of Geneva.<sup>37</sup> Cuvier’s eulogies also reveal several unfortunate cases of French and foreign naturalists.<sup>38</sup> Conversely, scientific advancement directly reflected the level of civilization. Cuvier mused on the role of science in civilization in the following manner:

Retracing the bygone centuries, or transporting itself in the barbaric nations, it would show us the so-called man of nature dominating as tyrant his own family; treating his kind when he encounters them, as cruelly as the forest beasts. ... The power, this primitive magistracy of crude peoples, disarms itself, when science, by developing arts, assigns more value to the tributes of a peaceful work than to the arbitrary snubs. The property is freed; the industrious class raises itself; the skilled kings rely on it to reverse the anarchic powers; the true magistracy, that which makes the eternal laws of justice reign, constrains all ranks to submission: thus left to its natural progress, fortune is shared among families, according to the part of which each of them contributes to the well-being of others; and becoming thus the measure of their service, as

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<sup>36</sup> Cuvier, *Histoire des progrès des sciences naturelles v.1*, 365.

<sup>37</sup> According to Cuvier, small states like Geneva were better equipped to foster the great scientific minds than others: “neither war nor administration, nor other careers offered enough lures to divert the minds of these long and silent works which prepared for the fame in sciences: being for themselves their own center, a great capital did not take off from them the geniuses whom nature produced there; economy and customs there did not let the talents be muffled by luxuries. Such was the village of Geneva since the Reformation; and to all the advantages of its political situation, it added that of speaking the same language as the people of Europe where the superior class carried the civilization farthest, and where one enjoyed this indefinite liberty of researches which the Protestants authorized even in the materials touching on religion ...” Cuvier, “Historical elegy of Charles Bonnet and Horace-Bénédict de Saussure,” in *Éloges historiques t.1*, 385-386.

<sup>38</sup> The experiences of Guillaume-Antoine Olivier (1756-1814), French naturalist and entomologist, were an example. According to Cuvier, the French Revolution and its political aftermath directly affected the career of Olivier, who was forced to take on a research journey abroad with Jean Guillaume Brugière, another French zoologist, to Turkey and Persia in order to move away from France. His journeys for scientific research were thwarted time and time again, not only due to the hostility abroad towards the French naturalists, but also due to the lack of support from the French government. For more information, see: Cuvier, “Historical elegy of Guillaume-Antoine Olivier, read January 8, 1816,” in *Éloges historiques t.2*, 235-265.

of their consideration, it establishes naturally this stability towards which the society gravitates.<sup>39</sup>

This passage not only suggests that science is a necessity for civilization, which improves both political skills and moral capacities of the people, but also that the nations which possessed more advanced scientific knowledge would perform better in their political, social, and moral aspects than those with cruder knowledge.

In the eighteenth century, when the emphasis on empirical sciences gained full force under the Enlightenment campaign of the “universal knowledge,” the rivalries among nations to claim the most advanced scientific knowledge did not abate. For instance, the vast scientific project of observing the transits of Venus in 1761 and 1769 was coordinated among multiple nations including France, Britain, Germany, Russia, Italy, Netherlands, Sweden, and American Colonies, which generated both international cooperation and competition.<sup>40</sup> It is also well documented that the memberships in French scientific institutions were highly coveted—for example, the Russian empress Catherine II actively tried to win over French and German scholars to take part in the Academy of Petersburg.<sup>41</sup>

Even the question of whether Cuvier, who received German education, was French or German seems to have been a popular topic among German scientists in as late as the early

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<sup>39</sup> Cuvier, “Reflections on the current development of sciences and on their relations to society,” in *Éloges historiques t.1*, 30-32.

<sup>40</sup> One of Cuvier’s writings revealed the competition between France and Russia concerning the project of observing the passages of Venus: “During the first passage of Venus on the Sun in 1763, France sent abbé Chappe d’Auteroche to Tobolsk, in order to make astronomical observations there ... [Catherine II of Russia] thus did not want that the foreign nations attend to observe the second passage, which would take place in 1769 ...” Cuvier, “Historical elegy of Pierre-Simon Pallas,” in *Éloges historiques, précédés de l’éloge de l’auteur par M. Flourens* (Paris: E. Ducrocq, libraire-éditeur, 1860), 171. For more stories about the eighteenth-century passages of Venus, see: Harry Woolf, *The Transits of Venus: a Study of Eighteenth-Century Science* (Princeton: Princeton University Press, 1959). And more recently: Andrea Wulf, *Chasing Venus: the Race to Measure the Heavens* (New York: Alfred A. Knopf, 2012).

<sup>41</sup> Cuvier indicated that Pierre-Simon Pallas, German zoologist and botanist who worked in Russia, was one of these cases. Because of the “excess of education” in Germany, Pallas was not recognized in his own homeland and chose to expatriate himself and to move to Russia which offered the newest field for his researches. Cuvier, “Historical elegy of Pierre-Simon Pallas,” 167.

twentieth century.<sup>42</sup> Cuvier's own writing reveals a similar attempt to take a foreign talent and absorb it into France's achievements. For example, Cuvier's evaluation of a German naturalist, Pierre-Simon Pallas, depended on how the latter was receptive to French science: "we saw there with astonishment such a young author ... courageously take as a model our great French naturalist, and his collaborator Daubenton."<sup>43</sup> Sometimes it seems as if the purpose of advancing scientific knowledge was to establish national honor. In the *History of Progress of Natural Sciences since 1789*, Cuvier's pride for the French achievements was evident:

Physicians and naturalists of our time honorably place themselves one after another and in the ranks of men who accelerated the progress of the human mind, and among them the French physicians and naturalists. We can, and we must declare in this solemn moment, and we are not afraid of being denounced by other nations, that the French physicians and naturalists have kept up with dignity the honor of their country; and in these twenty years, where ... some incredible prodigies of dedication, valor, and genius brilliantly bore in all parts of the universe the names of the heroes of France, those who cultivate sciences in this fortunate country deserve to partake in the glory of their nation. We repeat, it is not because of our partiality that the French scholars have been cited at the first rank in almost all branches of natural sciences; foreigners attribute it to them likewise; and even when chance did not permit the French to make principal discoveries, the manner in which they collected, examined, and developed the discoveries, the manner in which they followed all their results, places our compatriots close to the first inventors, and gives them, in many respects, the right to share the honor.<sup>44</sup>

These examples demonstrate the rivalry among nations for claiming scientific priority and superiority around the time of the 1830 debate. For Merton, these nationalistic competitions are only a natural outcome of the universal availability of scientific knowledge, a principle self-

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<sup>42</sup> E. L. Troussart, *Cuvier et Geoffroy Saint-Hilaire d'après les naturalists allemands* (Paris: Mercure de France, 1909), 12-14.

<sup>43</sup> Cuvier, "Historical elegy of Pierre-Simon Pallas", 165.

<sup>44</sup> Cuvier, *Histoire des progrès des sciences naturelles v.1*, 368-369. Cuvier displayed the same national pride when commenting on French surgery: "France can flatter itself of having tested in this genre the most important ameliorations, in the epoch whose history we have traced. One has sought to come closer and even surpass the examples which the universities of Pavie, Halle, Edingurg, Vienna, etc. have provided for a long time." (ibid., 339.)

imposed upon modern scientific communities. This mechanism may even benefit the rapid accrual and advancement of scientific knowledge:

There issues a competitive cooperation. The products of competition are communized, and esteem accrues to the producer. Nations take up claims to priority, and fresh entries into the commonwealth of science are tagged with the names of nationals: witness the controversy raging over the rival claims of Newton and Leibniz to the differential calculus. But all this does not challenge the status of scientific knowledge as common property.<sup>45</sup>

It is one thing to claim that a nation possesses higher level of scientific achievement than other nations, and another thing to claim that a nation's people are naturally more scientific than others. How did the sociological relationship between a nation and sciences come to be perceived as a biological relationship?

#### **b) Making nationalities scientific**

Nations have long treated scientific and technological knowledge as national property and evidence of national superiority; each nation guarded its scientific achievements, flaunted them, and imitated each other. In the early nineteenth century, a new development was sweeping across Europe. The efforts to define human mind in a systematic manner were manifested in an emerging field of phrenology, among other studies. A new view of the relationship between mind and body, in contrast to the tradition of Cartesian mind-body dualism, further motivated scientists to locate different types of mind and behaviors in different national bodies.<sup>46</sup>

Phrenology was pioneered by Franz Joseph Gall (1758-1828) in Germany and was warmly received in England. Although its reception in France was not as enthusiastic, leading French physicians such as François J. V. Broussais (1772-1838) and Jean Baptiste Bouillaud (1796-

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<sup>45</sup> Merton, *Sociology of Science*, 274.

<sup>46</sup> George Combe (1788-1858), one of the leading promoters of phrenology in the British Isles, used terms such as "national brain" and "national character" in his influential book, *The Constitution of Man* (1828).

1881) were actively promoting phrenology by the beginning of the July Monarchy in 1830, the very year of the debate between Cuvier and Saint-Hilaire.<sup>47</sup> This effort to understand nationalities as a scientific category was closely connected to the way one began to view one's nation and its history, the topics which were effectively played up throughout the explosions of revolutions in Europe after 1789. Emergence and popularity of the "panoramic literature," a term coined by Walter Benjamin (1892-1940), in early nineteenth-century France is a telling point. The panoramic literatures, in their attempts to represent a panoramic range of social and moral portraits of contemporary societies and peoples, frequently involved theories of different types of people based on physiological characteristics. Accordingly, these writings took pseudo-historical and pseudo-scientific forms. They demonstrated the extent to which the tendency to make non-quantitative qualities scientific penetrated into the popular culture, and in doing so, also revealed an uneasy encounter between the classificatory impulse and the apparent fluidity of the revolutionary and evolutionary world.<sup>48</sup> *The People* (1846) is a good example, where Jules Michelet (1798-1874), the renowned French historian and a contemporary of Saint-Hilaire and Cuvier, sought to define France and its destiny in poignant language that combined nationalism and natural science.<sup>49</sup>

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<sup>47</sup> Angus McLaren, "A Prehistory of the Social Sciences: Phrenology in France," *Comparative Studies in Society and History* 23. 1 (1981): 7.

<sup>48</sup> For more on the panoramic literature of the nineteenth century, see: Richard Somerset, "The Naturalist in Balzac: the Relative Influence of Cuvier and Geoffroy Saint-Hilaire," *French Forum* 27. 1 (2002): 81-111; Pauline de Tholozany, "Revolutionizing the Fossilized: Balzac and Janin's Naturalist Discourse in *Les Français peints par eux-mêmes*," *Nineteenth-Century French Studies* 41.1-2 (2012-2013): 48-65. The pseudo-scientific attempt to explain the "nature" of study subjects based on physiological observations is a visible feature in the works of several French literary giants of the time, including Honoré de Balzac, Victor Hugo, and Jules Michelet. See: Claudine Cohen, "Victor Hugo et l'anthropologie physique: 'Une tempête sous un crane'," *Revue d'Histoire littéraire de la France* 86. 6 (1986): 1008-1023; L. J. Jordanova, "Romantic Science? Michelet, Morals, and Nature," *The British Society for the History of Science* 13. 1 (1980): 44-50.

<sup>49</sup> Although Michelet has been mostly studied as a literary or historical figure, a connection between history and natural science in Michelet's thoughts has been made. See: Linda Orr, *Jules Michelet: Nature, History and Language* (Ithaca, NY: Cornell University Press, 1976); Edward K. Kaplan, *Michelet's Poetic Vision: a Romantic Philosophy of Nature, Man, and Woman* (Amherst, Mass.: University of Massachusetts Press, 1977); and Lionel Gossman, "Michelet and Natural History: the Alibi of Nature," *Proceedings of the American Philosophical Society*

### c) Digression: Jules Michelet and the French nationality

In *The People*, Michelet utilized four methods to exhort his French readers to recognize who they and their nation were, to embrace their recent Revolutionary past, and to unite in harmony under French identity. First, he emphasized the connection between his individual experience and the experiences of the French people, pointing to his childhood memories as the source of the shared understanding of life, work, and suffering.<sup>50</sup> He shared and combined the experiences and sentiments of all, even if the French people had divorced from each other through class struggles: “I combine them all in myself.”<sup>51</sup>

Second, Michelet defined the “Frenchness” as a both typical and atypical quality. It was typical in that the French destiny merged with the world’s destiny. France, as a miniature of the world and humanity, represented the liberties of the world: “the saint of France, whoever he is, is the saint of all nations; he is adopted, blessed, and lamented by the mankind. “For all men,” an American philosopher said impartially, “the first nation is his native country, and the second is France.””<sup>52</sup> The Frenchness was at the same time an atypical quality, in that France alone embodied the universal history and destiny. France was destined to sacrifice itself for the rest of Europe, as in the case of the Revolution of 1789. In making this argument, Michelet seemed torn between his view of foreign nations as France’s enemies (he warned readers to “believe in France, and not at all in Europe”<sup>53</sup>) and his view of diversities and differences of national characteristics as a necessary component for the greater unity:

The most powerful means of God for creating and developing the  
distinctive originality is to maintain the world harmoniously

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145, 3 (2001): 283-333. The introduction of *The People* is Michelet’s poignant letter to Edgar Quinet (1803-1875), who actively followed and commented on the scientific debate of 1830, as will be discussed later in this chapter.

<sup>50</sup> Jules Michelet, *Le Peuple* (Paris: Hachette & Paulin, 1846), 6.

<sup>51</sup> *Ibid.*, 39.

<sup>52</sup> *Ibid.*, 314 & 328.

<sup>53</sup> *Ibid.*, 40-41.

divided in these great and wonderful systems that are called nations ... The more man advances, the more he enters into the genius of his country, the better he takes part in the harmony of the world ... in it, he loves the world. One's native country is the necessary initiation to the universal country of all mankind.<sup>54</sup>

Third, in the process of defining the Frenchness as both typical and atypical, Michelet eternalized it: "This personality [the true French norm] ... I have not seen it from without, but experienced it from within. And in this very experience more than one intimate quality of the people, which they possess in themselves without understanding it, I have understood. Why? Because I could trace its historical origin, and see it emerge from the depth of the time."<sup>55</sup> His discussion of national characteristics is a self-contradictory mixture of, on the one hand, the concept of the fixed essence and destiny of a nation, and on the other, the concept of progression and constantly transforming experiences of a nation. For Michelet, the two were not opposed in that the progress of civilization helped bringing out the fixed, unique quality of a nation. The concept of transformation and perfectibility was permanently tied to that of the permanent essence and youth of a nation. Michelet expressed his view through an analogy between natural history and the history of civilizations, using popular scientific and philosophical concepts such as instinct, environment, growth, and evolution:

So far are the nationalities from disappearing, I see them every day morally characterizing themselves, and from being what they were, collections of men becoming individuals. It is the natural progress of life. Every man, in the beginning, is confused about his genius; he seems to be any man in his early years; as he develops, he investigates himself and starts to characterize himself externally by his acts and his works ... one must be ignorant of nature as well as of history, forget that the national characters derive not from our caprices, but are profoundly grounded in the influence of climate, food, natural productions of a country; that the characters may be somewhat changed, but are never erased.<sup>56</sup>

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<sup>54</sup> Ibid., 311.

<sup>55</sup> Ibid., 17.

<sup>56</sup> Ibid., 307-308.

Finally, Michelet went beyond defining history as a narration or analysis—instead, he consecrated history as a “resurrection,” imbuing the religious aura.<sup>57</sup> This interpretation was consistent with his characterization of France as a faith and a religion.<sup>58</sup> He defended his view: “And this is not fanaticism; it is the concise expression of a serious opinion, founded upon a long study.”<sup>59</sup> As will be discussed below, Michelet’s four-step argument did not seem much different from the arguments produced by his contemporary naturalists, when they were criticizing each other’s ideas for their non-French characteristics and claiming themselves as true representatives of French science.

If Michelet’s *The People* portrayed the separation between France and the rest of Europe and their unity at the same time, the real-life tension in Europe, especially between France and Germany, escalated after the Revolution of 1789. Historian David Blackbourn documents the social, economic, and political ordeals that German civilians went through in the aftermath of the counter-revolutions and the limited attempt to enforce a top-down reforms in Germany.<sup>60</sup> Blackbourn also discusses the psychological traumas which both Francophobe and Francophile Germans experienced, as well as their early nationalism, which emphasized language, history, and the “German virtues” against France.<sup>61</sup> “The Germans and the French” (1807), which was written by the Prussian general and military theorist Carl von Clausewitz, was one of many examples that demonstrated how Germans increasingly defined their identity in terms of the “Frenchness” at the time of the scientific debate in 1830.

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<sup>57</sup> Ibid., 37.

<sup>58</sup> Ibid., 329. The titles of the last four chapters of *Le Peuple*, too, contain the words “faith” or “religion.”

<sup>59</sup> Ibid., 329.

<sup>60</sup> For more details, see the first chapter of Blackbourn’s *History of Germany 1780-1918*.

<sup>61</sup> Ibid., 67.

The rivalry among nations for scientific prestige and the movement to explain human mind in scientific ways were a prerequisite for the development of the nationalization of thought and naturalization of it, which were visible in the arguments used in scientific discussions in the early nineteenth century. The nationalistic rhetoric in scientific discourses went beyond arguing that a certain nation held superior scientific institutions and education and was thus scientifically more advanced than other nations. Now the argument was the other way around: a nation produced more scientific achievements than others because it simply *was* scientifically superior. This subtle change suggests how the different ways of seeing and believing in the discussions of scientific methodologies (Section 1) could have absorbed the concept of national identity.

#### **d) Nationalization and naturalization of thought**

The debate between Cuvier and Saint-Hilaire in 1830 resulted in an influx of French and foreign scientists' opinions on the debate and their own speculations on the origin and classification of living beings. Among these, Goethe's response stood out for several reasons. First, Goethe was an international celebrity, whose literary achievement was well known in France. Second, Goethe himself and other scientists, notably Saint-Hilaire and A. P. de Candolle (1778-1841), confirmed that Goethe's theory of the metamorphosis of plants had already presented a similar idea to theory of the unity of plan, decades before the 1830 debate. Third, while being an international celebrity, Goethe was also considered a representative of the "German thought," especially of the *Naturphilosophie*, which Cuvier openly criticized as both unscientific and counter to the French spirit. Earlier section showed how the nationalistic rhetoric was commonly used among French scientists who criticized vague and philosophical ideas and languages. However, Goethe's report on the 1830 debate for the German audience revealed that

Goethe, standing behind the criticized party, built his opinion from the similar national perspective.

In his article “Explaining to Germany the controversial subjects of natural philosophy within the Academy of Sciences of Paris” (1832), which was translated and published in a French journal *Revue encyclopédique*, Goethe began with the background details necessary for readers to understand the academic debate that was taking place in Paris. He pleaded that he could not avoid these details because they related directly and indirectly to the controversial debate. However, his French translator made this moot by omitting those details altogether. Instead, the translator wrote in his footnote: “These details were largely abridged: one desired first and foremost, in permitting oneself a liberal translation, to present them in a most harmonious form with the French writings on the subject.”<sup>62</sup> The translator clearly considered Goethe’s details as excessive, and moreover, as a national characteristic—a form of writing that could not harmonize with the French scientific writings. They were not the only part that the journal chose to cross out. Goethe wrote another essay on the same debate, in which he expressed his view of how the “Germanness” fit into the debate. Below is a portion of this essay which the French journal did not publish:

... now one may well ask: what cause, what necessity does a German have to learn about this quarrel, even to join one side or the other? If, however, one maintains that any scientific question, wherever it is discussed, will interest any cultured nation—as one may regard the scientific world as one single body—so one must prove here that we are particularly summoned on this occasion. Saint-Hilaire names several Germans on his side; Baron Cuvier, on the other hand, seems to have formed the most unfavorable opinions of our German efforts in this field. ... To comment on [Cuvier’s] utterance word for word, to clarify it, to set out the pious innocence of German thinkers about nature, it would take an octavo volume; I want to achieve my aim in the shortest way.

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<sup>62</sup> Goethe, “Expliquant a l’Allemagne les sujets de philosophie naturelle controversies (v.54),” 54.

For a scholar of nature like Saint-Hilaire, it must give him satisfaction to be informed of the efforts of German researchers to some extent, to be convinced that they hold similar views to his own and that he can therefore expect informed applause from their side and, if he demands it, sufficient support. Especially in modern times, it has never been to our western neighbors' disadvantage when they gained knowledge of German research and effort.<sup>63</sup>

A few points emerge from this passage. First, while Goethe began with a description of a single-bodied scientific community, he recognized with frustration how the debate brought to light the national borders that seemed to divide Saint-Hilaire's, Goethe's, and other individuals' scientific ideas. Second, Goethe saw the national honor as one of the stakes in the debate, both for France and Germany. Third, Goethe interpreted Cuvier's criticism of Saint-Hilaire's "philosophical anatomy" as an attack on the German way of seeing nature—"pious innocence of German thinkers of nature"—rather than on Saint-Hilaire's, Goethe's, or any other individual's scientific thought. Fourth, Goethe asserted that the German research and effort was in fact as superior as (if not more than) the French counterpart. This assertion carried the similar motivation as Cuvier's implicit argument that the scientific method and knowledge practiced in France—particularly the ones he supported—held the universal validity: "Much of such fortunate works and results in the philosophical part of zoology allow us to claim that it is in some way a *French science* today. Applied one day to all the species in a general work, our methods will soon obtain a *universal influence*."<sup>64</sup> Both Goethe and Cuvier recognized multiple scientific methods and perspectives, saw some of them to be superior to others, and interpreted these values as a matter of national difference. In short, despite their opposite reactions to Saint-Hilaire's philosophical anatomy, Goethe and Cuvier were speaking on the same wavelength.

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<sup>63</sup> Goethe, "Principes de philosophie zoologique," 456. This essay was translated into French by a different journal. English translation in: Goethe, "Principles of Zoological Philosophy," 316-317.

<sup>64</sup> Cuvier, *Histoire des progrès des sciences naturelles v.1*, 300. Italics are mine.

Goethe pointed out that such a heated debate between the two different ways of thought “mostly occurs when individuals of different nations, different ages or some other divided circumstances, affect each other. However, in the present case there appears the remarkable circumstance that two men, equally advanced in age, colleagues at the same institution ... are yet finally subject to an outbreak.”<sup>65</sup> This statement indicated that there was no logical explanation to use nationality as an identifier for various scientific methods in the 1830 debate. Nevertheless, the nationalistic rhetoric became a visible feature the scientific debate.

The use of a nationalistic discourse in scientific arguments can be explained by the two processes discussed earlier: scientific thought could be absorbed into the broader category of the ways of seeing and believing, which would have implicitly allowed the naturalization of the scientific thought that had been nationalized. In Goethe’s report of the 1830 debate for his German audience, one can discern the tendency to equate one’s intellectual ideas to one’s self, or the tendency to naturalize one’s thought. For example, Goethe strongly sympathized with the following passage:

It is the fact of men of genius to distinguish themselves by a particular manner of presenting their ideas; they start by talking about themselves, being able to detach themselves from their personality only with regret; thus, they insist on the results of their own discoveries because they feel in the first place the need to tell when, where, and how the reflections which aimed at these results came to their mind.<sup>66</sup>

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<sup>65</sup> Goethe, “Principes de philosophie zoologique,” 449. English translation in: Goethe, “Principles of Zoological Philosophy,” 313.

<sup>66</sup> Goethe, “Expliquant a l’Allemagne les sujets de philosophie naturelle controversies (v.53),” 564.

Elsewhere, Goethe also emphasized the connection between the “personality, individuality of the persons in question” and the scientific debate.<sup>67</sup> In short, one’s life experiences, one’s “nature,” and one’s ideas were considered inseparable.

A similar process of naturalizing and nationalizing scientific thoughts can be seen in Cuvier’s writings that were not directly related to the 1830 debate, especially in his eulogies for foreign naturalists: Charles Bonnet (1720-1793) and Horace-Bénédict de Saussure (1740-1799)—uncle and nephew from Geneva—and Werner from Germany, mentioned earlier. When telling the story of Bonnet and de Saussure, Cuvier made a connection between scientific knowledge and nationality through their shared environment, part of their inborn identity:

I realize that, in thus painting the theater where the men whom I will talk about lived, I have presented to you, without thinking, an abridged table of their discoveries; and in fact their homeland is in some way a powerful fingerprint of their even the most universal works: one of them never quit the land, and if the other left it sometimes, it was always for him the center and the point of comparison to which he reported all that he saw elsewhere ...<sup>68</sup>

Furthermore, Cuvier described the type of scientific knowledge that one produced as directly dependent on one’s life experiences. For instance, Cuvier lamented how Bonnet’s once sharp, fact-oriented science took a reverse turn. Not only did Cuvier view Bonnet’s later science to be the mystical kind like Saint-Hilaire’s “speculative philosophy,” but he also merged this type of science with the personality that practiced it—outdated, weak, dull, and diseased.<sup>69</sup> Bonnet’s mystical and aesthetical theory of animal perfectibility, Cuvier concluded, must have been caused by Bonnet’s everyday experiences of “miseries of this world and irregularity of their

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<sup>67</sup> Goethe, “Principes de philosophie zoologique,” 453. English translation in: Goethe, “Principles of Zoological Philosophy,” 315.

<sup>68</sup> Cuvier, “Historical elegy of Charles Bonnet and Horace-Bénédict de Saussure,” 388-389.

<sup>69</sup> In his article “Nature,” Cuvier grouped Saint-Hilaire’s theory into the same category of “mystic” theories as Bonnet’s doctrine of the “great chain of beings.” Cuvier described Bonnet’s later science as follows: “But his eyes, weakened by the usage of microscope, refused to help him, and his mind, too active to take an absolute rest, threw itself into the field of speculative philosophy. From then on, his works took on another character ...” *Ibid.*, 395-396.

distribution,” and the scale of perfectibility was part of “a philosophy appropriated to the weakness of human mind, which prefers suppositions than the holes in the series of its ideas.”<sup>70</sup>

Then, in his eulogy for Werner—whom Cuvier described as the representative of the typically German formalist spirit, and as a loyal citizen who identified himself with Germany “in thousand ways”—Cuvier inserted a paragraph where he summarized and sympathized with Werner’s idea on the deep connection between the land and the people:

In the shadow of little chains of limestones, which cut Italy and Greece; in these charming valleys, rich with all products of living nature, germinated philosophy and arts: it is here that the human species saw the emergence of geniuses, whereas the vast sandy plains of Tartars and of Africa always retained their habitants to the state of nomadic and wild herdsmen; and even in the countries where the laws and language are the same, an experienced voyager predicts by the habitudes of the people, by the appearances of homes and clothes, the constitution of the land of each canton, just as the mineralogist-philosopher predicts the customs and degrees of affluence and education. Our granitic departments produce, on all functions of the life of men, different effects from the limestones ... the people in Limousin or in Basse-Bretagne would never think as those in Champagne or in Normandy.<sup>71</sup>

Then, how did Cuvier view his own nation, France? In his speech at the French Academy, he defined the “true French prose” as geometrical, precise, and refined, as reflected in Blaise Pascal (1623-1662)’s *Provincial Letters*. Cuvier declared: “in all that which is not clear, in all that which is not well reasoned, there is something which is not French.”<sup>72</sup>

For Cuvier, as it was for Goethe, one’s scientific perspective was a direct product of one’s identity, which encompassed one’s life experiences and what were considered as one’s

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<sup>70</sup> Ibid., 405 & 406.

<sup>71</sup> Cuvier, “Historical elegy of Abraham-Gottlob Werner,” 325-326.

<sup>72</sup> The passage including the quoted statement further revealed the significance in Cuvier’s thought of the place where an idea or thinker was born. Following his discussion of Pascal, Cuvier remarked that Jean Baptiste Racine (1639-1699), another writer of the “pure French writing,” had also spent his youth in Port-Royal, the place with which Pascal had a deep religious connection. Thus, Cuvier directly associated an academic style with a physical place. Cuvier, “M. Cuvier’s discourse at his reception at the French Academy,” 457.

inborn qualities. For early nineteenth century scientists, a form of scientific knowledge involved both nationalizing and naturalizing processes, whether they were aware of it or approved of it. I now return to the 1830 debate to show where these double processes of naturalization and nationalization of scientific thoughts could be observed.

### **3. Nation and sciences in the 1830 debate**

The nationalistic rhetoric seeped into the early nineteenth-century scientific writings. To examine how it operated in the 1830 debate and in the reactions to the debate, I look at the arguments made in support of Saint-Hilaire by his contemporaries and by himself, and then Cuvier's arguments against Saint-Hilaire.

#### **a) Arguments for Saint-Hilaire**

Saint-Hilaire's scientific method and perspective were likened to those of German philosophers of nature, and Saint-Hilaire himself recognized and welcomed the intellectual affinity with German allies. Saint-Hilaire and his supporters asserted that his approach was universally applicable and encompassed all the observable differences in organic forms and functions. However, the fact that they envisioned a universal truth did not mean that their writings were free of national affect. Although Goethe, major supporter of Saint-Hilaire, defined the scientific truth as something which required both French and German cooperation, Saint-Hilaire and his French supporters did not seem to have actively associated their ideas with the German counterpart, at least not in public.<sup>73</sup> Instead, they engaged in nationalistic rhetoric in the

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<sup>73</sup> Saint-Hilaire did acknowledge that "this flash of genius of the divine Goethe came to strike my head" in his private correspondence with Alexander von Humboldt (1769-1859), renowned German naturalist who spent twenty years in France and who also closely monitored the 1830 debate. According to Louis Agassiz (1807-1873), Humboldt "constantly declared that whatever deficiencies the doctrine of unity might still contain, it must be essentially true, and Cuvier ought to be its expounder instead of its opponent." In his correspondence with Humboldt, Saint-Hilaire also thanked his German supporters, especially Goethe, and complained how his own compatriots were slandering him as pseudo-scientist: "All my work in my country has procured me only the

same way as Cuvier did. At the end of the preliminary discourse of *Anatomical Philosophy* (1818), Saint-Hilaire emphasized that his new methodology could play a patriotic role: “I shall regard myself completely repaid of my work, if my research should one day exert such an influence. Could I but learn that they have been of use to the youth of our schools! What class of our fair France is more worthy of interest? What devotion, what application, what ardor for study!”<sup>74</sup> Although Saint-Hilaire was a less political figure than Cuvier was, he thought of his theory of the unity of plan as the future of French science; it was to guide the education of the youth and the intellectual destiny of France. Elsewhere, Saint-Hilaire similarly described zoology as a “French work” and “one of the greatest achievements of the epoch.”<sup>75</sup>

Flourens, too, emphasized the “Frenchness” of Saint-Hilaire’s science in his review article on the influence of the *Anatomical Philosophy*. Just like Goethe, Flourens recognized the necessity for both approaches—collection of facts and contemplation based on these facts—for the advancement of science. For Flourens, sciences before Saint-Hilaire tended to focus on collecting facts, and it was Saint-Hilaire who complemented the “bare observations” with reason; Saint-Hilaire made comparative anatomy a “French science.”<sup>76</sup> On the other hand, Alexander von

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ensuing, ardent hostility from a competitor [Cuvier], who has succeeded, thanks to his immense talent, but even better, by the effect of a power of fascination on men, which makes his major success in different occasions. There are in Goethe’s piece high and novel ideas on the activity of function, heard incomparably and absolutely: I understood this great man and his ideas would not remain there: I will pursue them, by gratitude, by duty, and by what is current, since Goethe made me a *poet* in the ideas (it was the objection that one piled upon me constantly, which did affect me) without slandering me ...” Ilse Jahn, “Étienne Geoffroy Saint-Hilaire an Alexander von Humboldt über Goethes Stellungnahme zum Pariser Akademiestreit,” *NTM-Schriftenreihe Gesch. Naturwiss., Techn. u. Med., Leipzig* 10 (1973), 63. However, I could not find any public speech or writing by Saint-Hilaire in which he acknowledged his affinity with German philosophy of nature as openly as in his private correspondences. For example, in his *Principles of Zoological Philosophy*, Saint-Hilaire asserted that naturalists should avoid both Cuvier’s type of extreme positivism and the German natural philosophy which took imagination too far: “let us do better: let us avoid both these reefs, thinking of what we owe to the sense of that adage, *in medias stat virtus*.” Saint-Hilaire, “Sur les os hyoïdes (Séance du 29 mars 1830),” in *Principes de philosophie zoologique*, 189.

<sup>74</sup> Saint-Hilaire, “Discours préliminaire,” in *Philosophie Anatomique t.1*, xxxix. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 35.

<sup>75</sup> Saint-Hilaire, “Rapport fait à l’Académie royale des sciences, sur l’organisation des mollusques (Séance du 15 Février 1830),” in *Principes de philosophie zoologique*, 52. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 134.

<sup>76</sup> Flourens, “Essai sur l’esprit et sur l’influence de la *Philosophie anatomique*,” 219-220.

Humboldt (1769-1859), another German supporter of the theory of the unity of plan, praised Saint-Hilaire but connected his achievement to the German glory, not to the French one: “You are the wisest in France who contributes most nobly to exercise what we do the least badly in our Germanic forests.”<sup>77</sup> Despite this difference, Humboldt employed the nationalistic rhetoric in support of Saint-Hilaire, just as Goethe did.

Other French commentators took more aggressive stances, using Saint-Hilaire’s achievement to highlight the contrast between France and other nations, especially Germany. The journal *Le National*, in printing a favorable opinion for Saint-Hilaire, claimed the priority of his idea over other similar theories in Germany:

Some have claimed that, though new among us, they [Saint-Hilaire’s ideas] were already old in Germany. Others, and in particular M. Cuvier, maintain that they are not new, neither in France nor in Germany, but that they date back two thousand years, and have nothing new but the name. Questions of priority are always difficult to resolve. What is certain is that in 1796, that is to say, thirty-four years ago, M. Geoffroy expressed clearly ... the fundamental principles that he still upholds today; and, searching in Germany, we find at that date no well-known work that contains them. Thus nothing prevents us from treating M. Geoffroy as their author, at least in our country, and, if they have some philosophical grandeur, from giving that honor to France.<sup>78</sup>

Serres focused more on the glory of French sciences, and thus praised both Saint-Hilaire and Cuvier rather than supporting one over the other. Even so, Serres implied that it was Saint-Hilaire’s scientific method that would usher in the future scientific developments:

Geoffroy and Cuvier, planted from their origin like two scientific branches from a common root; one fructified the differential principle, and the other, the principle of analogy. One created comparative anatomy, and drawing from it the paleontological theory sketched by Steno and Leibniz. The other created zoology and deduced from it the analogical theory of the creation of the

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<sup>77</sup> Jahn, “Étienne Geoffroy Saint-Hilaire an Alexander von Humboldt,” 65.

<sup>78</sup> “First summary of doctrines relative to the philosophical resemblance of beings by the editors of *Le National* (Mar. 22, 1830),” in *Étienne Geoffroy Saint-Hilaire*, Le Guyader, 223-224.

animal kingdom. Sublime conceptions! Worthily closing the eighteenth century and opening the nineteenth with glory! Boldly setting, on one side, the limits of the descriptive sciences, already so advanced, and marking out, on the other, the general or physiological sciences that are only coming to birth! In this way linking the past to the present to smooth the paths to the future.<sup>79</sup>

Serres further treated Saint-Hilaire's achievement as representative of the superiority of French science and of "Frenchness" in general:

France in particular is conspicuous among modern nations for its cult of intelligence, and this character is perhaps most eminent in distinguishing the Gallic race from other human races. Thus, gentlemen, in the religious feeling that brings us together beside the tomb of M. Geoffroy Saint-Hilaire, there is something more than sorrow. There is attached to it that sense of public grief that followed the loss of Lavoisier, of Lagrange, of Laplace, of Chaptal, of Cuvier, of Poisson, whose names and memories are so dear to the sciences and to France ... But that at the same time, twelve worthy scholars would be found to fill [the twelve chairs in the Museum of Natural History], and would go to work the very next day, that is a phenomenon that only France can produce!<sup>80</sup>

As an embryologist, Serres would have used the embryological contents of Saint-Hilaire's studies to justify France's scientific advancement. Serres emphasized that life forms were all united in their origins, and that their perceptible differences demonstrated the different points of "interruption" within the potential range of development:

In short, science reveals that progressive and continuous march of life marked at long intervals by halts that seem to be for nature times of rest. Thus the whole animal kingdom appears as but a single being that, during its formation, stops in its development, here sooner, there later, and thus determines, at each interruption, the distinctive characters of classes, families, genera, and species.<sup>81</sup>

Serres's view resembled Saint-Hilaire's own explanation of how his method and anatomical viewpoint differed from those of Cuvier:

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<sup>79</sup> English translation of Serres's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 237.

<sup>80</sup> *Ibid.*, 236-237.

<sup>81</sup> *Ibid.*, 239.

... while comparative anatomy makes man its point of departure, and when, relying on the principle that the organs of this privileged species are more perfect, better known, and better defined, it inquires how these organs are diversified, deformed, and altered in all the other animals, my new views lead me not to prefer any anatomy in particular, but to consider first the organs as they are the *maximum* of their development, in order then to follow them step by step to the beginning of their existence. In the first case, in which man is placed at the center of a circle, the movement is by a large number of paths or different radii to all the points of the circumference. I move, on the contrary, from that circumference to the center. I confront the most shocking anomalies, so as to embrace them in one and the same thought, and to make it plain that all these diverse types of organization converge on the same trunk, and are only more or less different branches of it.<sup>82</sup>

Saint-Hilaire highlighted how his method encompassed all observable possibilities, instead of focusing on the known maximal state of development. Serres was interested in the application of the scale of growth not just to species, but also to different races and nationalities. Both Saint-Hilaire and Serres adopted an evolutionary view where nature followed predetermined possibilities of development, and this belief took the form of an aggressive nationalistic discourse when Serres used it in support of Saint-Hilaire's science.

Edgar Quinet (1803-1875), a French historian and political philosopher as well as Michelet's friend, was not scientist but offered an interesting comment in his eulogy for Saint-Hilaire. At first, Quinet praised Saint-Hilaire's science as symbolic of the French achievements, just as many other eulogists did.<sup>83</sup> This portion of the eulogy also explicitly displayed a rivalry with Germany, specifically mentioning Goethe and portraying him as having surrendered to the power of Saint-Hilaire's, and thus France's, scientific mind: "when France has been materially

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<sup>82</sup> Saint-Hilaire, "Discours préliminaire," in *Philosophie Anatomique t.1*, xxxvi. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 34.

<sup>83</sup> Quinet described Saint-Hilaire as a scholar who "followed the road of the sword and turned the upheavals of war into the profit of civilization" during France's Egyptian, Spanish, and Portuguese campaigns, without ever being distracted by the changes in political landscapes. English translation of Quinet's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 240.

conquered, the obstinate thought of [Saint-Hilaire's] great mind invades foreign countries, and the greatest writer of Germany, Goethe, seems to have familiarized himself with all the sciences only to inaugurate and to popularize in the world the entirely French victory of M. Geoffroy Saint-Hilaire."<sup>84</sup> The most unexpected part of the eulogy came next: unlike other supporters who praised Saint-Hilaire's scientific method for penetrating into nature's hidden laws behind the immediately observable phenomena, Quinet drew the validity of his science from its ability to harness the "universal interest" of the world that went beyond the purely scientific goals.

... the idea that he brought to light is, in many respects, the foundation of our epoch. Desire, presentiment, necessity of a vast unity: that is what preoccupies the world. Geoffroy Saint-Hilaire, truly inspired precursor, established in nature and in science that harmonious principle that we are still seeking in the civil, political, and religious world. That is where the work of that creative mind is linked to the present work of the whole human race ...<sup>85</sup>

Whether Saint-Hilaire's method successfully captured the truth of the nature was beside the point; but it did strike a chord with what Quinet considered as the universal political hope. In a way, this passage revealed Quinet's definition of the correct form of scientific knowledge: science depended on how well it accommodated the collective political and social desires of the time, rather than on its inherent truth value. At the same time, Quinet turned the French interest into the "universal interest," making it seem as if Saint-Hilaire's science responded to the universal, not just French, desires. Although in a different way from other proponents of Saint-Hilaire, Quinet, too, participated in the dual process of nationalizing and then naturalizing the scientific thought.

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<sup>84</sup> Ibid., 240.

<sup>85</sup> English translation of Quinet's funeral oration from: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 240-241.

## b) Arguments against Saint-Hilaire

For Cuvier, the French language was geometrical and precise, and anything that wasn't so was not French. Elsewhere, Cuvier implied his belief in the direct influence between language and people: "An essential part of the history of peoples ... is the knowledge of their languages."<sup>86</sup> Thus, it is not surprising that Cuvier devoted a large part of his criticism against Saint-Hilaire to the problem of the latter's language.<sup>87</sup> By criticizing one's language, Cuvier implicitly criticized the way one's mind worked, providing a further support for his criticism for the non-French minds, especially the German mind.

Cuvier bridged language and mind when he responded to and rejected Saint-Hilaire's support for Pierre Stanislas Meyranx (1790-1832)'s and Laurencet (first name unknown)'s memoir on the organization of the cephalopods and its analogical relation to the organization of the mammals:

... in every scientific discussion, the first thing to do is to define well the expressions one is employing; without this precaution the mind promptly goes astray. Taking the same words in one sense at one place in the argument and in a different sense in another place, one produces what logicians call syllogisms of four terms, which are the most deceptive of sophisms. The danger is greater yet if, in the exposition of these arguments, metaphors and rhetorical figures are used instead of the simple language with proper meanings, which is rigorously demanded in the sciences. One tries to get out of an embarrassing situation by a trope, replies to an objection with

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<sup>86</sup> Cuvier, "Historical elegy of Pierre-Simon Pallas," 186. This statement was made when Cuvier was describing Pallas's linguistic project in Russia.

<sup>87</sup> It's also interesting that Goethe, who was Saint-Hilaire's supporter, problematized Saint-Hilaire's language as well. Like Cuvier, Goethe thought that Saint-Hilaire's terms were figurative and imprecise. In particular, Goethe took apart the four keywords—"materials," "composition," "branch (*embranchement*)," and "plan"—and argued that the term "plan" should have been replaced with "type," which was a term that Goethe had used for his own theory of the metamorphosis of plants. In opposition to Cuvier who viewed Saint-Hilaire's language to be both unscientific and un-French, however, Goethe treated Saint-Hilaire's scientific language as representative of the French language. For Goethe, French sciences had borrowed their language from mechanical and sensualistic arts, and thus, unsuitable for referring to organic phenomena of the nature. See: Goethe, "Expliquant a l'Allemagne les sujets de philosophie naturelle controversies (v.54)," 62-64.

a paronomasia, and by thus turning away from the straight path, one is at once caught in a labyrinth.<sup>88</sup>

Following this passage, Cuvier took apart the two main terms that Saint-Hilaire used, “unity of composition” and “unity of plan,” and concluded that they led to contradictory observations or that they were useless additions to the existing system of classification. In other words, Saint-Hilaire’s terminology was an unnatural use of language with a twisted sense; they pointed to metaphysical questions and vague generalities.<sup>89</sup> Cuvier concluded with a self-consolation that he did not engage with such imprecise and misleading language: “if I do not have the merit of novelty, I flatter myself that I have at least that of truth and accuracy, and of not muddling the minds of beginners with undefined expressions which appear, in the vagueness that surrounds them, to present a deep meaning ...”<sup>90</sup>

As discussed earlier, Cuvier was critical of the German *Naturphilosophie*. If he disapproved of Saint-Hilaire’s unnatural language, a similar concern reappeared in his discussion of the appropriate method for botanical studies. For Cuvier, a natural method was a guiding system with an internal point of view, “in such a way that those which the same group will reunite would resemble more among themselves than they resemble all others which has entered into a different group.”<sup>91</sup> This definition opposed Saint-Hilaire’s theory of the unity of plan, by positing from the start the existence of the inherent, unbridgeable differences among different groups of animals. This definition was soon followed by Cuvier’s emphasis on the “Frenchness” of the botanical studies and his claim that this natural method “penetrated the foreign botanists

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<sup>88</sup> Saint-Hilaire, “Première argumentation, ou considérations sur les mollusques,” in *Principes de philosophie zoologique*, 58. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 138.

<sup>89</sup> *Ibid.*,” 72. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 140 & 146. Notice that these vocabularies are the same ones with which Cuvier criticized the German naturalists.

<sup>90</sup> Saint-Hilaire, “Première argumentation, ou considérations sur les mollusques,” 72. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 145-146.

<sup>91</sup> Cuvier, *Histoire des progrès des sciences naturelles v.1*, 285-286.

with less success.”<sup>92</sup> Cuvier also extensively wrote about Saint-Hilaire’s theories in *History of Progress of Natural Sciences since 1789*, where at first he referred to Saint-Hilaire as a “wise naturalist” but soon launched into fifty pages of doubt aimed at Saint-Hilaire’s *Anatomical Philosophy* and his adoption of Oken’s theory. This negative review was then immediately followed by his evaluation of German naturalists’ theories (e.g. comparisons between insects and vertebrate animals,) which Cuvier considered to be composed of “vague and conjectural steps so much in vogue in [Germany] these days.”<sup>93</sup>

The intersection between the criticism of Saint-Hilaire’s scientific language and method and the criticism of German *Naturphilosophie* ties back to the interpretation of the 1830 debate as a conflict of the different ways of seeing and believing in sciences. Cuvier’s frustration with his opponent was the latter’s inability to see the “great and perceptible hiatus,” the “great change of composition and of connection,” and the definite ending of one organic group and the beginning of another.<sup>94</sup> Saint-Hilaire’s concept of the holistic identity, or the unity of composition, was “contrary to the simplest testimony of the senses,” and full of imagination and illusions.<sup>95</sup> For Cuvier, this inability to “see” was bound to lead to a blind faith in the eternally replicable identity that did not exist.<sup>96</sup> In his essay targeting Saint-Hilaire, Cuvier did mention that the natural studies practiced in Germany had the philosophical and even religious flavor: “those who recently gave a new form to the metaphysical system of pantheism, and who entitled it *philosophy of nature*, adopted the two hypotheses of which we have just spoken, and added to

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<sup>92</sup> Ibid., 286, 288.

<sup>93</sup> Ibid., 219, 441-442.

<sup>94</sup> Saint-Hilaire, “Seconde argumentation de M. le Baron Cuvier,” 155-156. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 190-191.

<sup>95</sup> Saint-Hilaire, “Première argumentation, ou considérations sur les mollusques,” 65. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 142; Saint-Hilaire, “Seconde argumentation de M. le Baron Cuvier,” 147. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 181, 186.

<sup>96</sup> Saint-Hilaire, “Seconde argumentation de M. le Baron Cuvier,” 151-152. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 188-189.

it a third hypothesis, entirely of the same genre. Not only does each being, according to them, represent all others; it has a representation of itself in each of its parts.”<sup>97</sup> Altogether, a science based on this blind faith was not only mistaken, but it could even serve as an immoral practice of knowledge, since it was “casting before our eyes a veil that would conceal true nature” for the sake of consolation that came from the holistic view of the world.<sup>98</sup>

### Conclusion

This chapter has looked at how the nationalistic sentiment and discourse permeated the scientific arguments in early nineteenth-century France. In particular, I analyzed the writings and speeches that were relevant to the famous debate between Cuvier and Saint-Hilaire in 1830, and found that not just Cuvier, but also Saint-Hilaire and his French and German supporters engaged in nationalistic discourses to support their positions in various ways. In many cases, nationalistic discourses were more than a rhetorical tactic and worked with the actual scientific contents of the arguments, accentuating the fundamental differences between the two methods of seeing and believing. The urge to establish objective scientific truths entailed the need to choose a certain method of seeing the world over other methods, and one of the tools for filtering out the choices seems to have been the concept of nationality, which was flexible enough to blend into other ambiguous criteria such as “scientific language” and “sound mind.” The pursuit of the universal scientific knowledge had to involve nationalization of scientific thoughts and naturalization of those nationalities.

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<sup>97</sup> Cuvier, “Nature,” 267.

<sup>98</sup> Saint-Hilaire, “Seconde argumentation de M. le Baron Cuvier,” 160. English translation in: Le Guyader, *Étienne Geoffroy Saint-Hilaire*, 193.

In the next chapter, I ask how and to what extent the dual processes of nationalization and naturalization were applied to scientific thoughts beyond the debate of 1830. I also examine what “French science” really looked like, at a time when Paris was the most attractive place for scientists in Europe. Through the three case studies involving the participants in French natural science, with varying national, political, and religious backgrounds, I focus on how each participant received and used Goethe’s theory of metamorphosis, how such uses transformed across the century, and what that implied for France’s changing perception of itself in relation to its neighboring nations.

## Chapter 2 Goethe and Candolle: National Forms of Scientific Writing?

In the history of biological thought, the nineteenth century is often casually summarized as “Darwin’s century.” However, even before Darwin’s evolutionary theory, contending theories about the transformation of forms and structures of living beings emerged across Europe. Geoffroy Saint-Hilaire (1772-1844) and Georges Cuvier (1769-1832), the two leading French comparative anatomists, clashed in a public debate in 1830 over the possibility of the unity of anatomical structure across different animal phyla. Other naturalists laid the foundation for the debate by reworking the Linnaean system of classification. To understand what an organic being is, and how it is related to other beings, one had to start with the questions of classification: which form should be considered as the species norm, the basis for all other variations? How and why did these variations come about? Depending on how one answered these questions, history and shape of nature could look significantly different.

While naturalists were exploring these questions, one might notice another kind of classification at work: the distinctive ways in which naturalists were characterizing and dismissing each other’s ideas. Naturalists, of course, applied the usual criteria: scientific tradition to which a classification belonged, its logic, method, and evidence. But there was another, unlikely criterion, the nationality of the naturalist. One’s nationality tacitly signified the mode of scientific thinking specific to that nation. Nationality was a classification that preassigned individuals to a certain kind of knowledge and experience; and it served as a convenient tool to determine the validity of an idea, even in the republic of science which supposedly transcended the national, religious, and linguistic differences among its members. This was especially the case during the belligerent Napoleonic era and the relatively peaceful Bourbon Restoration, during which the impulse to define and prioritize the French identity transferred beyond the

political realm and into the everyday life. The practitioners of sciences found themselves in a difficult position, first, between cosmopolitan ideals of the scientific community and political reality, and second, between the amplified image of national differences and the actual comparisons of foreign scientific works. These tensions between multiple sets of fictions and realities point to the fragility of the concept of nationality as a scientific measure, and reveal that the nationalistic rhetoric tended to lump together the details of differences in scientific ideas that were difficult to pinpoint.

This study is inspired by the nineteenth-century chemist and historian John T. Merz's approach to human thought. According to Merz, thought of a period was not limited to "defined, clear, methodical thought, but likewise the great region of desire, impulse, feeling, and imagination," or "the whole of the inner life of an age."<sup>1</sup> This "whole" of the period's scientific thought was not the sum of the ideas of individual scientists. Rather, it was the "peculiar manner in which our age looked upon the world and life, how it intellectualised and spiritualised them."<sup>2</sup> Thus, scientific thought would encompass the collective *attitude* of mind that allowed individuals to produce and express ideas in certain ways. Merz proposed that this mental attitude could be partially recovered by tracing a portion of the course of European thought, just as a paleontologist might use a few fossil remains to reconstruct the whole structure of an organism.<sup>3</sup> Although Merz's classification of the European scientific thought by national divides—limited to French, German, and English—can seem dated, his view of nationalities as diverse and mutable modes or attitudes of manifesting the mental life of a given time is appropriate for this study, as it historicizes the nationalistic attitude of the participants in the early nineteenth-century

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<sup>1</sup> John T. Merz, *A History of European Thought v.1* (Bristol, England: Thoemmes Press, 2000), 5, 8.

<sup>2</sup> *Ibid.*, 13.

<sup>3</sup> *Ibid.*, 54-55.

scientific community. At the same time, Merz's approach implies that there existed a unifying mental life of the nineteenth century, while more recent scholars like Jonathan Harwood have placed much less emphasis on such unifying concept, focusing instead on the different political structures and dynamics within and outside the scientific institutions as the predominant cause of the national differences of scientific style.<sup>4</sup> Taking into account both approaches, I ask in this chapter: How did the nineteenth-century scientists and intellectuals come to classify themselves and each other based on nationalities within the unlikely space of the republic of science, and how did such classification influence the flow of scientific ideas? The peculiarity of this behavior can be illustrated by examining the gap between naturalists' classification of foreign scientific ideas and the actual composition of the texts that expressed these ideas. The ideas, texts, and receptions of Johann Wolfgang von Goethe (1749-1832) and Augustin Pyramus de Candolle (1778-1841) will serve as a case study.

### **1. Ideals of cosmopolitan languages and sciences**

Throughout the eighteenth and into the early nineteenth centuries, France basked in glory as the center of European sciences. The Swiss naturalist Candolle was one of many who hoped to build his career in Paris; Goethe, too, kept his eyes and ears open for the news from the learned societies of Paris. France was buzzing with a mixture of foreign botanical specimens, scholars, and texts—and with diverse languages as their medium. Language formed the soil where ideas took root and absorbed the cultural, historical, and national qualities from it. As Ludmilla Jordanova writes in respect to scientific communities in Europe, “To the concepts ‘science’ and

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<sup>4</sup> See: Jonathan Harwood, “National Styles in Science: Genetics in Germany and the United States between the World Wars,” *Isis* 78.3 (Sep., 1987): 390-414.

‘language,’ we must add that of ‘nation.’”<sup>5</sup> Thus, the ideals of cosmopolitan sciences went hand in hand with those of the universal language and faithful translations. As Genevan and descendant of French ancestors, Candolle spoke and wrote in French. For Goethe and other foreigners, their ideas had to be translated first to gain audience and potential followers.

The early nineteenth century was riddled with a series of revolutions and the Napoleonic wars, and intellectuals across Europe, notably between French and Germans, were not untouched by the heightened national divisions. Although the French language had long been the common currency of the European elites, the awareness of the fragments in the intellectual communities led many to consider the ways to overcome them partly by linguistic means. The need for faithful translations—which required improved knowledge of foreign languages—was a topic that several German scholars had in their minds. Goethe and Friedrich Schleiermacher (1768-1834), a protestant philosopher whose theology influenced the natural science of his day, understood the difficulties of truly good translations. For Goethe, good translations eased the transition from the unfamiliar to the familiar for the readers: “we would gradually become familiar with the attitudes and ways of thinking, until we could at last feel kinship with them.”<sup>6</sup> If Goethe considered a true translation rare but possible, Schleiermacher argued that a complete translation was “not only unattainable but also futile and empty in itself.” For him, language was like national character, which set a boundary for the very possibility of expressing ideas: “no one adheres to his language only mechanically, as if it were something externally attached to him.”<sup>7</sup> Nevertheless, he urged to continue translating foreign works—it was the “true historical goal of

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<sup>5</sup> Ludmilla Jordanova, “Science and National Identity,” in *Sciences et langues en Europe*, ed. Roger Chartier and Pietro Corsi (Paris: École des Hautes Études en Sciences Sociales, 1996), 221.

<sup>6</sup> Goethe, “Translations,” in *Theories of Translation*, ed. Rainer Schulte & John Biguenet (Chicago: University of Chicago Press, 1992), 62. By “unfamiliar,” Goethe had in mind not only the ideas of different nations, but also the unfamiliar genres or modes of thinking. Eight years after the publication of his scientific essay *Metamorphosis of Plants*, Goethe composed an eponymous poem to familiarize (female) readers with botanical subjects.

<sup>7</sup> Schleiermacher, “On the Different Methods of Translating,” in *Theories of Translation*, 50.

translation on a large scale,” and the “mission peculiar to Germany and German language” to unite foreign art and scholarship “into a great historical whole.”<sup>8</sup>

Schleiermacher was not alone in considering the unification of languages and ideas an impossible yet necessary task, while tying it to the notion of national destiny. Pierre Leroux (1797-1871) was an influential French literary critic and founder of *Le Globe* and *Encyclopédie nouvelle*, who took interest in German philosophy and knew enough German to translate some of Goethe’s works. Describing F. W. J. von Schelling (1775-1854) as the most representative of German scholarship—and Goethe as inspiration for Schelling<sup>9</sup>—Leroux pointed out the difficulty in bringing Schelling to the French audience:

We are French ... The mode of exposition of Germans is not ours; our mind does not perceive as theirs do. One often said that it was impossible to translate truthfully a poet from one language to another, and that the proverb *traduttore traditore* was always right. It is even more so for abstract philosophy. To translate materially the philosophers of the civilization of another time, or of another country, is possible only up to a certain point.<sup>10</sup>

But Leroux came up with a solution: if true translation could not be achieved, then the next best way to understand foreign ideas and texts (which Leroux called “original national essays”) was to find their analogues in one’s native language. For the French public to understand Schelling, Leroux recommended reading Saint-Hilaire, whose view of the history of animal kingdom as a history of variations of the universal anatomical plan, although under-appreciated by his French compatriots, was essential to Leroux’s own vision of humanity’s progression.<sup>11</sup> But why the need

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<sup>8</sup> Ibid., 53-54. Schleiermacher criticized France for being unwilling to translate foreign works, balking at the difficulties and being content with simple imitations.

<sup>9</sup> Pierre Leroux, “Discours de Schelling, prononcé à l’ouverture de son cours de philosophie,” *La Revue Indépendante* t.3 (April 1842): 6-7.

<sup>10</sup> Leroux, “De Dieu ou de la vie, considérée dans les être universel,” *La Revue Indépendante* t.3 (April 1842): 20.

<sup>11</sup> Ibid., 20-21. See also: John Tresch, “The Order of the Prophets,” in *History of Science* 48.3-4 (2010): 326-328. Leroux pointed out that Saint-Hilaire’s idea of the “unity of composition” was analogous to Schelling’s idea of the “Absolute identity.” Although Saint-Hilaire did not write on philosophical concepts, Leroux argued that his natural

to understand the foreign, especially German thoughts in the first place? Leroux quoted Schelling that “the salvation of the Germans is in scientific knowledge,” and modified it: “the salvation of *the French and the German peoples* is in a common scientific knowledge.”<sup>12</sup> It was not England, Russia, America, but France and Germany that were destined to shoulder together the progress of Europe; by understanding and inspiring each other, they would synthesize the fragmented sciences.<sup>13</sup> Leroux’s view was reminiscent of Goethe’s plea that France recognize the shared achievements between French and German scholars and cooperate with the latter.<sup>14</sup> For Leroux and Goethe, the Empire of Sciences should transcend the different modes of thinking that constituted the different languages.

The ideals of universal knowledge and communication did not however shield the French scientific community, especially its foreign members, from the impact of political currents. Even Goethe, one of the most cosmopolitan figures of his time, experienced the emotional strain that the mixing of the two worlds could cause. On March 14, 1830, Goethe said that he felt profound sadness whenever thinking about the German nation,<sup>15</sup> and that he found a haven in science and art: “I found in science and art the wings which can bring us far away from these miseries, for science and art belong to the entire world and before them collapse the frontiers of

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science was a precise analogue and best application of these concepts. In fact, he preferred his compatriot’s application: “Only Geoffroy has made greater discoveries, and laid down more certain principles on the *absolute identity*, as Germans say, than the entire school of naturalists following Schelling. It is as if an original-national essay can reduce obscurity of the philosophy of another people.” Goethe was mentioned again: “Goethe, the most French of all Germans, knew well that we had an analogue of Schelling and Oken. And he was not afraid to proclaim so.” It is not clear what Leroux meant when he described Goethe as “the most French of all Germans”; he might have meant that Goethe was able to imagine the forms these abstract ideas could take in different disciplines.

<sup>12</sup> *Ibid.*, 21. Italics are mine.

<sup>13</sup> *Ibid.*, 21.

<sup>14</sup> Goethe, “Expliquant à l’Allemagne les sujets de philosophie naturelle controversés au sein de l’Académie des Sciences de Paris.” *Revue encyclopédique, ou Analyse raisonnée* 53 (Feb. 1832): 573.

<sup>15</sup> This particular French translation uses the term “German nation,” but the term “German people,” as used by a different English translation, may be more fitting. Germany as a unified nation did not exist until after the Franco-Prussian War in 1870, when independent southern German states joined the Northern German Confederation led by Prussia. Before then, the German-speaking peoples existed across nearly forty different states.

nationalities.”<sup>16</sup> This remark was followed by a pessimistic confession: “the consolation they provide is however a sad one and does not replace the sentiments of dignity that one feels when one belongs to a great, strong, esteemed, and feared people. It is the belief in the future of Germany which truly consoles me.” If Goethe alluded that his reception in France reflected the general prejudice and antipathy towards Germany,<sup>17</sup> Candolle recounted how he received unfair treatments in the French scientific community due to his foreign nationality and religion.<sup>18</sup> The political reality as they experience, which counterbalanced the fiction of the republic of science, will be discussed in Section 3.

## 2. Political fiction

If language was a soil for scientific ideas to materialize, it was also treated as an object itself with a real influence on the intellectual and political environment. Foreign languages were like plant species that could be introduced and acclimated to, or eradicated from a country. Schleiermacher commented on the effect that foreign languages had on Germany: “Just as our soil itself has become richer and more fertile, and our climate more lovely and mild after much transplanting of foreign plants, so we feel that our language ... can only flourish and develop its

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<sup>16</sup> Goethe, *Conversations de Goethe* t.2, ed. G. Charpentier (Paris: Bibliothèque-Charpentier, 1883), 206.

<sup>17</sup> In his survey of the reception of the *Metamorphosis of Plants*, Goethe wrote that his work had found very few followers in France. Among his compatriots who embraced his work, Goethe listed H. G. L. Reichenbach, who included a review of Goethe in his *Botanik für Damen* (1828). Then, Goethe described how the *Bulletin des sciences naturelles* (May 1830, p.268) made a typo when reviewing Reichenbach’s *Botanik für Damen*: “metaphor” in place of “metamorphosis.” Goethe considered this mistake an intentional prank to make fun of the “German manner of handling scientific subjects.” Whether this mistake was indeed intended or not, this anecdote shows that Goethe was keen on the image of German science that French readers held. Goethe, “Influence de cet écrit,” in *Essai sur la Métamorphose des Plantes*, trans. Frédéric Soret (Stuttgart: J. G. Cotta, 1831), 207-209, 217-219.

<sup>18</sup> It should be noted that both Goethe and Candolle—and other foreigners who participated in the French scientific community, such as Alexander von Humboldt (1769-1859)—had a plenty of followers in and beyond France. This article however presents their own account of the adverse impact that their foreign nationalities and religions had on their careers in France, and highlights these testimonies by placing them against the cosmopolitan ideals upheld by the scientific community.

perfect power through the most varied contacts with what is foreign.”<sup>19</sup> French Hebraist Samuel Cahen (1796-1862) made a similar comment on the French words used in Germany: “One does not expel words as one would repress armies; words represent ideas, and once an idea enters the intellectual life, it is difficult to make it leave.”<sup>20</sup> Thus, he proceeded, it would benefit both French and German readers to learn each other’s languages and read the representative authors of one another, to improve their history of hostile relationship and rivalries. For Schleiermacher and Cahen, foreign languages were organic foreign bodies that could introduce changes in a nation’s intellectual and political environment.

Charles L. F. Panckoucke (1780-1844), whose close circle included several admirers of Goethe, published the *Journal complémentaire du Dictionnaire des sciences médicales* (1818-1832), a scientific and medical journal which aimed to improve France’s intellectual and political environment by normalizing its contact with the foreign. Its general editor, Antoine J. L. Jourdan (1788-1848) declared that the journal would serve as a forum to examine the established ideas and to consider new theories and discoveries.<sup>21</sup> To achieve these aims, foreign sources were to play an important role. Jourdan provided the list of forty-two foreign medical journals—thirty of which were German periodicals—and argued that the information extracted from them would benefit France, most of which were unknown to the editors of other French journals.<sup>22</sup>

Indeed, everything German—from the state of a plant research to the institutions for studying mental illnesses, and even the German scholars’ manner of criticizing each other—became a subject for discussion and a stimulant for self-reflection on the part of the French

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<sup>19</sup> Schleiermacher, “On the Different Methods of Translating,” 53.

<sup>20</sup> Samuel Cahen, “[Book review] Journal grammatical, littéraire et philosophique de la langue française et des langues en général”, *Revue du nord* (June 1835): 501.

<sup>21</sup> A. J. L. Jourdan, “Prospectus”, *Journal complémentaire du Dictionnaire des sciences médicales* t.1 (1818): 3.

<sup>22</sup> *Ibid.*, 5. The list of foreign journals follows, pp.5-7.

contributors to the journal. What had France neglected, and what did France not know that was a common knowledge for the Germans? And what was the cause for this general lagging behind?

By provoking these questions, foreign languages and ideas functioned as powerful political tools. Pietro Corsi shows that France and Germany were frequently compared in order to raise critical complaint against the state of scientific knowledge in France, which many considered to be under control of politically powerful scientists like Cuvier.<sup>23</sup> The progressivist journals' defense of German morphological ideas, as well as of the analogous ideas of French naturalists such as Jean-Baptiste Lamarck (1744-1829) and Saint-Hilaire, were examples of the political opposition at the intellectual level. For the editors and writers who promoted foreign knowledge, German language and ideas were a welcome new species that could induce necessary competitions and bring in desirable changes.<sup>24</sup>

In addition to the political purpose, however, there also seems to have been a genuine frustration with France's intellectual isolation. In the *Journal complémentaire*, Louis J. Bégin (1793-1859), a pro-German military surgeon of the Napoleonic campaigns and part of the Panckoucke circle, lamented the missed opportunities resulting from the French self-absorption:

one knows that the persons who cultivate these sciences in Italy, Germany, and England have adopted other ways of seeing and doctrines different from ours; that they invented other problems to solve; that they often draw different conclusions from facts ...

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<sup>23</sup> Pietro Corsi, "Idola Tribus," in *The Theory of Evolution and its Impact*, ed. Aldo Fasolo (Milan: Springer, 2012), 32-35. For the political oppositions at the intellectual level against the French governments, see: Jean-Luc Chappey, "Héritages républicains et résistances à 'l'Organisation impériale des saviors,'" *Annales historiques de la Révolution française* n.346 (Oct./Dec. 2006): 97-120. Also see: Pietro Corsi, "The Revolutions of Evolution: Geoffroy and Lamarck, 1825-1840," *Bulletin du Musée d'anthropologie préhistorique de Monaco* n.51 (2011): 113-134. Chappey discusses the resistance of French savants against the Consulate (1799-1804) and Napoleon, who assumed the authority to define the acceptable kind of science. Corsi similarly discusses the political behaviors of scholars under the Bourbon monarchy of the 1820's and then the liberal constitutional monarchy (1830-1848). Together, Chappey and Corsi suggest that both conservative and revolutionary authorities were on guard against morphology, as potentially subversive ideas that could undermine the image of a fixed French society.

<sup>24</sup> There were similar examples of using foreign ideas and cultures as a tool for criticizing the society and politics of one's own nation, or for stimulating the intellectual environment. Voltaire's *Letters concerning the English Nation* (1733), as well as his French translation of Newton's *Principia*, were well-known examples of the eighteenth century that achieved such purpose.

What vast field of consideration is being left out of the connection and comparison of so much diverse principles, different procedures, opinions, experiences, and methods!<sup>25</sup>

Not only did the French lack the interest in participating in the international commerce of scientific knowledge, but they also lacked its tool—the ability to understand foreign languages and to translate them. Noting that people of different nationalities expressed their ideas in different languages, Bégin emphasized that the French readers could access “important truths” and “useful and unexpected improvements” only through comparing the knowledge expressed in foreign languages. The foreign scientific literatures were rarely translated for the French audience, and only few who understood German were aware of the notable ideas developed outside of France.

Without the currency of knowledge trade, France could not only move forward in scientific improvements, but also morally regress. One contributor stressed that, without the necessary linguistic experience, which most young French physicians lacked, one could make a rash judgment about other nations:

Being in Paris in 1801, I had a discussion with a young physician on the state of medicine in Germany, who responded with irritation: *in that county one still practices medicine with fist punches*. I also recall that I encountered in Pavia a presumptuous doctor from Montpellier, who asked a German doctor, *whether there was in Germany some traces of chemistry*. The German replied, You are ignoring, Doctor, that we have a Stahl, a Hoffmann, a Boerhaave, a Bergmann, a Crell, a Scheele, etc.!<sup>26</sup>

The writer concluded that this “insolent presumption” by the physician-writers who did not even understand the language of a nation in question would always backfire upon them. For those who

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<sup>25</sup> L.-J. Bégin, “Œuvres chirurgicales d’Astley Cooper et de Benjamin Travers,” *Journal complémentaire* t.14 (1822):68-69.

<sup>26</sup> “Remarques sur les moyens de faire avantageusement les voyages d’instruction médicale,” *Journal complémentaire du Dictionnaire des sciences médicales* t.14 (1822): 47-48.

thought of themselves as progressivists, foreign languages were a key to both intellectual and moral corrections for the French nation.

Whether it was part of the political campaign against the established system, or genuine concern with the intellectual and moral decline of France, the pleas to embrace foreign languages and ideas stemmed from the same belief that the different ways of thinking germinated in different national soils. If the ideals of the republic of sciences aimed to blur the national divides, the political uses of the scientific ideas thrived on the image of national divides,<sup>27</sup> regardless of the intent. While the cosmopolitan ideals were challenged by political realities that the foreign scientists experienced, the amplified image of national differences interfered with the readers' understanding of foreign scientific texts. Treating the French-German divide solely as an artificial and political maneuver downplays the actual points of difference that the nineteenth-century French readers picked up on in foreign scientific texts. How did the French and foreign scientific texts really compare, and did this textual reality neatly correspond to the popular image of national differences? Section 4 will examine these questions.

### **3. Political reality**

Goethe's and Candolle's experiences with the French scientific community reveal the political realities that foreign naturalists experienced, in spite of the principle of blindness to political, religious, and national differences in the republic of science. Goethe paid close attention to the French scientific communities, and eagerly promoted his morphology in France by publishing his *Metamorphosis of Plants* in French and French-German editions. Despite his efforts, Goethe's work was often lumped into "German science" or "German philosophy" in a

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<sup>27</sup> Corsi offered a bold argument that the perception of the French-German divide was a fictional image for political and economic purposes, at the "Evolutionary Pluralisms" conference, University of Chicago, May 5, 2018.

pejorative way, meaning distinctively non-French. The Genevan botanist Candolle moved to France to build his scientific career, and established a theory of plant symmetry, which shared key concepts with Goethe's morphology. While Candolle was warmly received as embodying the French scientific style, he was subject to a different kind of political reality. As a foreigner living in the wartime France, Candolle was constantly risking his career and life, which eventually forced him to permanently return to Geneva. The receptions and experiences of these two foreign naturalists will be compared in this section.

#### **a) Overview of Goethe's and Candolle's morphologies**

Goethe's *Metamorphosis of Plants* was published in 1790, but was largely ignored until the 1830 when Cuvier and Saint-Hilaire's debate in Paris put it in the spotlight. In this work, Goethe described the individual plant growth in terms of serial homology, where a plant organ underwent transformations: the cotyledons became the stem leaves, and these into the calyx, corolla, stamen, and fruit by alternately contracting and expanding its underlying form. Goethe designated the leaf as the protean plant organ. Plant growth was an upward "successive reproduction" of leaves, ending with the flowering and fructification stages. If the leaf could transform itself into different parts of plant, then it was the source of all the variations of plant forms that have and have not taken place. It was an archetype,<sup>28</sup> which contained within it both the origin and future of all plants. Goethe considered these potential forms as having equal values, and thus, disagreed with Candolle's concept of "degeneration" of plant organs. Such term imposed a fixed regularity on nature that was rarely fulfilled in reality, and inevitably defined

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<sup>28</sup> Goethe wrote to J. G. Herder on May 17, 1787: "The primordial plant is turning out to be the most marvelous creation in the world, and nature itself will envy me because of it. With this model and the key to it an infinite number of plants can be invented, which must be logical, that is, if they do not exist, they *could* exist, and are not mere artistic or poetic shadows and semblances, but have an inner truth and necessity. The same law will be applicable to every other living thing." Goethe, *Italian Journey*, trans. Robert R. Heitner (Princeton: Princeton University, 1994), 256.

reality as a failure. For Goethe, metamorphosis was a better concept because it embraced both the “regular” and “irregular” phenomena: “When a plant, as a result of internal laws, or by external causes, changes its structure or relations among its diverse parts, one must consider the fact as being absolutely conforming to the first law, and not take any of these deviations as abortions or regressions.”<sup>29</sup>

Candolle’s major works include *Flora of France* (1805-1815), *Elementary Theory of Botany* (1813), and *Organography of Plants* (1827). He believed in the absolute regularity of nature and in the power of sciences to unveil it. Slowly but surely, scientific progress eliminated apparent irregularities and redefined them as examples of the regularity of nature. To eliminate as many irregular cases as possible, he proposed the “natural method.” Natural method placed “each being among those with which it has the most number of important resemblances,” while Carl Linnaeus (1707-1778)’s “artificial” method had “a single goal of making known each plant and isolating it from the kingdom.”<sup>30</sup> There was no question which was superior: he described the former as a “true science” that “should serve the unalterable basis for anatomy and physiology.”<sup>31</sup>

Candolle’s most lasting idea is the principle of the primitive symmetry and its variations. He described symmetry as “the general system of organization,”<sup>32</sup> and more specifically, the “non-geometrical regularity in organized bodies,” or an invariable and ideal type that was unique to each plant family and common to all its members.<sup>33</sup> Nature in its primitive state was symmetrical and regular, and each plant family had a primitive type. In actual plant growth,

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<sup>29</sup> Goethe, “Influence de cet écrit,” 223.

<sup>30</sup> A. P. de Candolle, “À Mr. de Lamarck” in *Flore Française* t.1, 3<sup>rd</sup> ed. (Paris: Desray, 1815), vii.

<sup>31</sup> *Ibid.*, vii. Candolle further explained the natural method in *Medical Properties of Plants*: he proposed to consider the nutritive organs, instead of the reproductive organs alone, to classify plants more precisely.

<sup>32</sup> Candolle, *Théorie élémentaire* (Paris: Déterville, 1813), 92.

<sup>33</sup> Candolle, *Organographie végétale* t.2 (Paris: Déterville, 1827), 238.

however, a combination of causes (each of which operated lawfully) could result in a wide range of modifications of that type.<sup>34</sup> This concept of primitive symmetry was inspired by the crystallographic theories founded of René Just Haüy (1743-1822), who considered various forms of crystals as products of different ways of aggregating primitive molecules. Studying which factors caused the modifications could reveal the original type, just as the layers of extended aggregations could be peeled away to reveal the primitive molecules that composed a crystal family. Thus, Candolle's understanding of plants had a geometrical edge. If Goethe's type was the leaf as an essential *element* of all plants which freely transformed in all directions, Candolle's type was a *regular structure* that was specific to each plant family, which deformed according to almost mathematical laws. While Goethe's type did not imply regularity, Candolle's type was regular by definition. This difference has been frequently pointed out by nineteenth-century naturalists and today's scholars alike, who classified one as the German and the other the French way of seeing nature.<sup>35</sup>

Goethe and Candolle have been frequently contrasted because they both dealt with the concept of the type and its transformation. Many scholars of the nineteenth century and more recently have noted—as Candolle himself did—the influence of crystallography on Candolle's morphology, which convinced them that his works were more rigorous and scientific than Goethe's. However, scholars have overlooked the analogy between nature and the human world in Candolle's texts, as well as his aesthetic manner of visualizing nature. To give just few examples, Candolle stressed that nature and its manifestations, despite the orderly law at their

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<sup>34</sup> “each family of plants, like each class of crystals, can be represented by a regular state, sometimes visible to our eyes, sometimes by the mind; it is what I call its *type*: unions, abortions, degenerations, or multiplications, separate or together, modify this primitive type, to produce the usual characters of beings they compose. These modifications are constant within certain limits, like the secondary forms of crystals.” Candolle, *Organographie végétale*, 241.

<sup>35</sup> See for example: Francesco Moiso, “De Candolle et Goethe. Botanique et philosophie de la nature entre la France et l'Allemagne,” *Sciences et techniques en perspective* ser.2 v.1 (1997): 85-123.

foundation, escaped any verbal or linear description. The only way to describe the relations among plant genera within a family, let alone nature as a whole, required the power of imagination and visualization. Candolle thus evoked an imaginary map—analogue to the geographical map of the human world consisting of political and societal units such as villages, provinces, and empires—to represent the relations of natural beings.<sup>36</sup> This analogy between nature’s map and the map of the human world was not a metaphorical digression, but a proper method, which he again applied in *Essay on the Crassulaceae Family* (1828). This work included a diagram (**Fig. 1**) which showed the relations among various genera in the Crassulaceae family. This diagram stemmed from the idea of visually mapping the otherwise indescribable nature, but it also revealed Candolle’s vision of what was natural and perfect. His use of a perfect circle, perfect symmetry, and equal quadrants to symbolize the unity and diversity of plant genera seemed to be based more on an aesthetic taste than on scientific observation.<sup>37</sup> Nature for Candolle was not only continuous with and analogous to the human world, but it also required a vision of perfect harmony. The aesthetic element of Candolle’s botany was not lost to his audience. Poet Jacques Delille (1738-1813), the “French Virgil” of his time, wrote a poem *The Three Kingdoms of Nature* (1808), in which Candolle’s scientific work

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<sup>36</sup> Candolle, *Propriétés médicales des plantes*, 24-25. “the species are large villages; the genera are provinces; the families are empires; the classes are analogous to parts of the world, and the plants that are still isolated are represented by the islands distant from any continent. ... in certain empires or provinces, villages are clustered together, while in others we see them scattered. ... It is not surprising to see, in social order, much populated and civilized countries exhibit uniform customs while the regions that are deserted or cut off by rivers and chains of mountains show great differences. Sometimes, in political order, one unites an isolated village or a small island to the nearest province: thus, in natural order, to avoid excessive divisions, one attaches to a genera or family a species which differs from it by organization ...”

<sup>37</sup> P. F. Stevens also discusses Candolle’s unusual interest in circles and number four. See: P. F. Stevens, “Haüy and A.-P. Candolle,” *Journal of the History of Biology* 17.1 (1984): 67. Other than Stevens, secondary sources rarely pay attention to the visual and aesthetic aspect of Candolle’s science. Even among his contemporaries, only Charles Daubeny thought it important enough to discuss in his eulogy for Candolle. See: Charles Daubeny, “Sketch of the Writings and Philosophical Character of Augustin Pyramus Decandolle,” *The Edinburgh New Philosophical Journal* v.34 (Edinburgh: Adam & Charles Black, 1843):226-228.

made an appearance.<sup>38</sup> Candolle did not explicitly offer an artistic understanding of his botanical science, but his audience was nonetheless inspired to make the connection, as they would have been for Goethe's works. There is more common ground than meets the eye between Goethe's and Candolle's attitudes towards nature and natural science.

#### **b) Goethe's reality: reception of a German science**

Goethe and Candolle shared similar scientific concepts of the primitive type and its transformation, as well as a holistic and aesthetic view of nature. Candolle himself acknowledged Goethe's priority, although he was not aware of it when developing the idea of symmetry. Goethe, for his part, welcomed Candolle's contribution. However, their works met different fates in France.<sup>39</sup> Some attributed this difference to the generational gap, remarking that Goethe was half a century ahead of time. However, when Goethe's work did become familiar to the French audience in the 1830s, Goethe's reception did not seem to have altered greatly.

Although reviewers tended to regard his scientific works as poet's hobbies, Goethe was serious about his science and was disappointed when they did not give it a consideration it deserved. One can get a sense of his devotion from how excited he became when his ideas were finally being debated in Paris.<sup>40</sup> Indeed, he immediately began to prepare the French-German edition of the *Metamorphosis of Plants*, and also kept a record of the reviews that his work had

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<sup>38</sup> The reference to Candolle is in the sixth song, "Kingdom of plants." The scientific discovery concerned the relation between light and plants' "sleeping patterns," which proved the immensely complex nature of plants, similar to that of animals. Jacques Delille, *Les Trois règnes de la nature* t.2 (Paris: Frères Mame, 1808), 76-77.

<sup>39</sup> Frédéric Gingins-Lassaraz, Goethe's translator for the 1829 French edition of the *Metamorphosis of Plants*, stated that Candolle's principles of the symmetry of organs had a rapid progress, unlike Goethe's very similar ideas. Goethe, *Essai sur la métamorphose des plantes*, trans. Gingins-Lassaraz (Geneva: J. Barbezat, 1829), ix.

<sup>40</sup> Goethe described the debate as a "volcanic eruption": "Now we have in Geoffroy Saint-Hilaire a powerful and permanent ally. I also see how interested the French scientific world is in this affair, since, despite the political agitation, the room was full at the session of July 19. ... I have worked on this grand question for fifty years; I started alone, I met later some supports, and finally, to my great joy, I am surpassed by the similar minds. ... now Saint-Hilaire has joined our side, and with him all his great disciples, all his French partisans! This event is for me an incredible importance, and it is only natural that I rejoice of having lived long enough to see the triumph of a theory, to which I have devoted my life and which is my own." Goethe, *Conversations de Goethe*, 231-233.

received. This record mostly contained favorable reviews from his compatriots. However, Goethe listed only two French supporters—Aubert du Petit-Thouars (1758-1831) and Pierre J. F. Turpin (1775-1840) (three, if Candolle is counted,) who themselves had very few followers in France.<sup>41</sup> This record corresponds to the sparse mentions of his work in French academic journals between 1790 and 1830 and confirms that the *Metamorphosis of Plants* did not draw enough attention in France. It was more frequently mentioned after 1830, but readers still found Goethe's scientific text confusing and often traced this unfamiliarity to his ethereal religious ideas and national identity.

Almost all of the reviewers were in awe that the eminent poet could have made important observations in science as well. For many, Goethe was half a century ahead of his time. Even before the eighteenth century was over, Goethe was asking questions about the intimate laws of the organization of beings, which were comprehensible only to the “new spirit” of the next century.<sup>42</sup> Some even listed *Metamorphosis of Plants* as a milestone of the “great lines of science,” along with Linnaeus's *Systema naturae* (1735), Georges-Louis Leclerc de Buffon's *Natural History* (1749-1804), Lamarck's *Zoological Philosophy* (1809), and Saint-Hilaire's *Anatomical Philosophy* (1818-1822).<sup>43</sup> Other reviewers were not so sanguine, describing Goethe as an unfortunate pioneer whose era was catching up with him only at the end of his life: “Goethe ... who also had conceived in 1784 a ‘universal model’ himself, wished to devote his masterful quill during his final years from 1830 to 1832 to Geoffroy's triumph. Like Xenophon, he became the historian of a battle which he could have won as commander.”<sup>44</sup>

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<sup>41</sup> Goethe also mentioned Saint-Hilaire in the Appendix of the book, thanking him for the support that he expressed in *Annales des sciences naturelles* in February 1831. Because this article appeared right before Goethe's edition went into printing, Goethe could not include Saint-Hilaire in his record of reviews.

<sup>42</sup> “Biographie,” *Écho de la littérature et des beaux-arts en France et à l'étranger* (Aug. 1843): 254.

<sup>43</sup> “Sociétés savants. Académie des sciences, séance du 13 février,” *Athenaeum Français* n.8 (Feb.25, 1854): 171.

<sup>44</sup> Pierre M. F. Chevalier, “Les cours publics dans un fauteuil,” *Musée des familles* t.16 (1848-1849): 109, 110. Pierre Chevalier (or Pitre-Chevalier) was editor of *Le Figaro* and director of the *Musée des familles*.

However, Goethe's identity as foreigner was highlighted from a religious point of view. While reviewers like Leroux, who was pantheist himself, commented on Goethe in a neutral manner, others were not so sympathetic. In fact, the most critical reviews tended to devote the most space to the discussion of his religious identity. One author detected in Goethe "one of these sad discords brought on by the mental epidemic which distressed the eighteenth century and still influences the nineteenth century." Goethe possessed a magnificent gift but he "chained himself in the shameful fetters." What was this mental epidemic that fettered him? The author answered: "Let us talk frankly, Goethe was pantheist."<sup>45</sup> He then defined a pantheist as someone

who, drowning the isolated existences in the ocean of universal life, and reducing intelligences to the role of cogs destined to fulfill this or that function in the movements of the whole, takes away from sciences their future and certainty, from morality its positive value and authority, from human activity its spontaneity and free will, and thus, leads individuals and peoples to a life of brutal pleasures or of observant quietism.<sup>46</sup>

This definition of pantheism was the antithesis of Goethe's view of the moral role of individuals in the world. However, it all the better showcases how the qualities not explicitly related to one's scientific ideas (e.g. religious or national identity) could serve as a cover for the details of these ideas that one might or might not have understood, when making a sweeping criticism. The aspect of pantheism that the reviewer found most problematic was that it rejected the idea of final causes; that it supposed instead that organic beings were guided by chances. From this, it was only a short step to argue that man could develop from lower animals through sufficient modifications: "Thus monkey is born, parrot, and man as well, without doubt; Goethe does not

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<sup>45</sup> Capitaine [first name unknown], "Oeuvre d'histoire naturelle de Goethe," *Journal des connaissances médicales pratiques et de pharmacologie* t. 5 (1837): 175.

<sup>46</sup> *Ibid.*, 175.

say this, but he makes it easy to guess.”<sup>47</sup> For the reviewer, Goethe’s scientific error was inherently tied to his moral flaw.

Other reviewers like Louis-Aimé Martin (1782-1847), friend of French botanist and writer Bernardin de Saint-Pierre (1737-1814), were receptive to the concept of a single type for all organisms, and offered a more sympathetic review of the *Metamorphosis of Plants*. Yet, Martin cautioned that “the union of all these organ-types would only produce a monster similar to the most hideous idols of India and of Egypt.”<sup>48</sup> Here, Goethe’s science was again associated with foreign—and false—religions, based on a superficial understanding of Goethe’s concept of the type. In these reviews, Goethe’s air of foreignness was evoked especially when the reviewer did not sufficiently understand his scientific ideas.

The concepts of foreign nationality and suspect religion often worked in mutually supportive ways. One reviewer remarked that there was a strong connection between Goethe and French naturalists Buffon and Saint-Hilaire. But there was an important difference between them, which was not a difference in argument or method but in the mode of understanding the world and God’s role in it. Above all, it had something to do with their nationalities:

In Goethe, [these ideas] are accompanied by a pronounced tendency towards pantheism—the form in which German minds often expressed the doubt, which had produced the fatal doctrines of materialism among the French philosophes of the last century. The latter no longer want to see God anywhere; the other, on the contrary, pretend to see him everywhere.<sup>49</sup>

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<sup>47</sup> Ibid., 176.

<sup>48</sup> Martin commented that this argument would have strengthened Cuvier’s position against Saint-Hilaire and Goethe, and concluded: “the creation is not composed of a series of abortion or metamorphoses which pass from oyster to crocodile, from crocodile to man; it was from the origin what it is today.” Louis-Aimé Martin, “Oeuvres d’histoire naturelle de Goëthe,” *Journal des débats* (April 3, 1839): 4.

<sup>49</sup> “[Book review] Oeuvre d’histoire naturelle de Goethe,” *Revue critique des livres nouveaux* (Aug. 1837): 275-276.

The review concluded that all of these belief systems contained some exaggerations.<sup>50</sup> However, the reviewer specifically discussed Goethe's pantheistic view alone, creating an impression that Goethe's—and German—way of seeing the world was a distorted mode of scientific thinking.

More sympathetic French reviewers gave mixed praises. The most common observation concerned his writing style. Many thought that Goethe coated his potential scientific ideas with “the charm of his poetic language.”<sup>51</sup> His poetic style, uncommon in the French scientific texts, could attract a wide range of audience beyond the scientific circles, but it could easily plant an impression that Goethe's work was not a real science, and Goethe hardly a scientist. Indeed, the *Metamorphosis of Plants* was regarded as “a failed poetry,”<sup>52</sup> even if its reception improved over time: “it was not at all comprehended. Some believed that it had a symbolic meaning; others believed it to be a mythology; those who did understand it rejected it as coming from a poet and not from a scholar.”<sup>53</sup>

Goethe seemed to have regarded the compliments as camouflage for criticism. Frédéric Soret (1795-1865) reported that Goethe was very unhappy upon reading Candolle's review of the French translation of the *Metamorphosis of Plants*.<sup>54</sup> It was a flattering review filled with compliments for Goethe, as well as the author's acknowledgement of the priority of Goethe's idea to his own. However, Candolle praised Goethe for making an important discovery “in passing, when he threw one look at the plant kingdom.”<sup>55</sup> He then subtly shifted the focus from

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<sup>50</sup> Ibid., 276.

<sup>51</sup> Charles V. Naudin, “Revue bibliographique,” *Journal d'agriculture pratique* ser.2 t.4 (Oct. 1846-Dec. 1847): 222.

<sup>52</sup> Frédéric Jacob Soret, “Goethe,” *Revue étrangère de la littérature, des sciences et des arts* t.3 (1832): 353.

<sup>53</sup> “[Book review] Oeuvre d'histoire naturelle de Goethe,” *Revue française* t.2 (Aug. 15, 1837): 177.

<sup>54</sup> Goethe was provoked by Candolle's review, and in his turn, omitted most of his discussion of Candolle which he had planned to include in the French-German edition of the *Metamorphosis*, when he was pressed to abridge the writing—which in turn offended Candolle, according to Soret. But Goethe spoke very highly of Candolle in general, and even translated a chapter from Candolle's *Organographie* into German himself. Frédéric Soret, *Conversations avec Goethe*, ed. A. Robinet de Cléry (Paris: F. Aubier, 1932), 77, 222-223.

<sup>55</sup> Candolle, “[Book review] Essai sur la métamorphose des plantes,” *Bibliothèque universelle* t.40 (1829): 262.

Goethe to his translator, Frédéric Gingins-Lassaraz (1790-1863), who was a Swiss botanist like Candolle himself:

[Gingins-Lassaraz] added some brief notes to clarify certain ambiguous points [that Goethe makes.] But he understood well that his task does not concern picking up on the small inaccuracies which might have escaped the *poet who has momentarily become a botanist*. It is a work in which one must recognize wisdom and genius, rather than wrangling over the trivial point of detailed observation. Mr. de Gingins could have, better than anyone, engaged with these researches; his monography on genus *Lavandula* proved to botanists his talent of observation, and we are happy to announce here that he will eventually extend his work to the entire family of Labiatae.<sup>56</sup>

This review portrayed Goethe as a momentary naturalist who, as expected of amateurs, made mistakes here and there—which did not matter, since he was a poet, or philosopher at best.<sup>57</sup>

Louis-François de Ronchaud (1816-1887), French art historian, director at the *Musées nationaux*, and one of the founders of the *Ecole du Louvre*, offered a similar compliment, while connecting the types of scientific practice to national identity. When Ronchaud reviewed *The Bird* (1856) by Jules Michelet (1798-1874)—another figure whose primary profession lay outside of natural science—he compared Michelet to Goethe with an intention to support their scientific endeavors. In the process, however, he unwittingly reinforced the image of Goethe as amateur. For him, J.-J. Rousseau (1712-1778), Michelet, and Goethe were the paragons of exceptionally useful amateurs. As illustration, Ronchaud proposed the following metaphor, implying an absolute barrier separating amateurs from the real scientists:

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<sup>56</sup> Ibid., 263. Italics are mine.

<sup>57</sup> In 1827, Candolle criticized the *philosophers* who “feign to deduce everything from the general laws” and adapt selective facts to their theories, and introduced Goethe as one of these philosophers who used *a priori* method. Candolle, *Organographie végétale*, vii-viii, 243.

These are the *foreigners* and travelers in the cantons of science. While the inhabitants of a country, that is, scientists, imagine themselves to fully understand the map and are content with travelling on established paths, others wish to form for themselves the idea of the expanse and happenings of the realm that they have decided to explore; they ... create their own landmarks with observations, all the while entertaining themselves with singularities and delighting in landscapes, and sometimes make fortunate encounters and unexpected discoveries.<sup>58</sup>

The passage suggests that Michelet, along with Goethe, strayed from the well-worn scientific path—they were both foreigners in the land of science. This foreign quality is even more pointedly demonstrated by a simple observation that, while few French professional naturalists like Saint-Hilaire and Candolle did acknowledge Goethe, most of the reviews that discussed Goethe's scientific work in some depth—such as the ones presented here—tended to come from public intellectuals. Whether the latter's reviews were positive, negative, or mixed, they took note of the role of Goethe's intuitive, poetic insight in his science, which often translated into an unfamiliarity of national and religious kind. For professional naturalists, their relative silence—and minimization of the significance of Goethe's insight—spoke volumes about the epistemological unfamiliarity that Goethe's science represented in their eyes, despite the serious empirical quality of Goethe's botanical work, as supported by Section 4(c) in this article. In short, Goethe was tagged with multiple kinds of unfamiliarity for the French audience, which reinforced and simplified his identity as a foreigner from all points of view.

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<sup>58</sup> L.-F. de Ronchaud, "D'une nouvelle philosophie de l'histoire naturelle," *Revue de Paris* t.32 (June 1856): 259-260. Italics are mine. While this passage makes the distinction between amateurs and professional scientists an established fact, it also indicates the image of equally insurmountable difference that foreigners embodied.

### c) Candolle's reception in France and beyond

Reviewers problematized the form of language and the belief system underlying Goethe's science by linking them to the peculiarity of the German nationality, whether or not they fully understood his ideas. Then, how did they receive Candolle, who was also a foreign naturalist and who offered very similar concept of type and symmetry? While some scholars have re-evaluated Candolle's botany to be more philosophical than empirical,<sup>59</sup> many of his own contemporaries considered him as a scientifically rigorous naturalist, especially in comparison to Goethe. Like Goethe, Candolle received some criticism from the religious point of view, by those who believed that the world was a product of intelligent design, not chance.<sup>60</sup> These criticisms were not associated with the discussions of nationalities, however.

As befits someone who belonged to over a hundred scientific organizations, Candolle was celebrated after his death by scholars from different disciplines and nations. Not one of them

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<sup>59</sup> For example, see: Jean-Marc Drouin, "Principles and Uses of Taxonomy in the Works of Augustin-Pyramus de Candolle," *Studies in History and Philosophy of Biological and Biomedical Sciences* 32. 2 (2001): 272. Candolle himself distanced his works from philosophy and avoided being associated with Saint-Hilaire, whose theory of the unity of composition, like Goethe's theory of the archetype, was very similar to his ideas. However, some reviewers did discern a philosophical tendency in Candolle. For example, Cuvier anticipated that Candolle's *Théorie élémentaire* would introduce a necessary *philosophical* spirit to natural history, while cautioning that his methods based on analogy "might be dangerous in less skilled hands." That is, Candolle was lucky that he was capable of controlling his philosophical tendency, which, in a small dose, could benefit science. See: Cuvier, "Proceedings of the French Institute for the Year 1813," *The Philosophical Magazine and Journal* v.44 (Jul.-Dec. 1814): 62-63. A Swiss physicist, Auguste Arthur de la Rive (1801-1873), noted the same philosophical tendency in Candolle. Unlike Cuvier, however, De la Rive was critical of Candolle's rejection of philosophy: "This zeal to defend physical and natural sciences was expressed often by an excessive opposition to the invasion of philosophy, whose folly he rightly feared, but whose influence he was wrong to reject, in my opinion. It was surprising that this caution against philosophy came from the naturalist who actively incorporated philosophy in his works. I ask, what is the basis of the *Théorie élémentaire*, if not one of the most philosophical ideas, primitive type or unity of composition? ... De Candolle was, thus, philosopher *all the same*." De la Rive then offered an explanation for Candolle's excessive antipathy to philosophy: "I can see, in his aversion for philosophy, the effect of the two external causes which had powerfully influenced him: one, the impressions of his youth; the other, his encounters with the *natur-philosophes* of Germany." The image of Germany and German sciences—inappropriately philosophical for clear, rational thinking—again seeped into this review. A. A. de la Rive, *Notice sur la vie et les ouvrages de A.-P. de Candolle* (Geneva: Imprimerie de Ferdinand Ramboz, 1845), 142-143.

<sup>60</sup> Candolle responded to the religious critics with a metaphor: nature is a banquet, and the thoughtful designer has arranged dishes on the table in a symmetrical manner. Among these dishes, there will be some "fake" dishes (equivalent to the organs that are no longer used by an animal or plant) to complete the aesthetic balance. Thus, the fake dishes are part of the design. Candolle, *Théorie élémentaire* 2<sup>nd</sup> ed. (Paris: Déterville, 1819), 185.

failed to mention Goethe in these eulogies. French reviewers all welcomed the connection between Candolle and the world's greatest poet, but they agreed that it was Candolle who did Goethe a favor by drawing attention to the *Metamorphosis of Plants*, decades after its first publication. They also agreed that Candolle gave scientific character to Goethe's brilliant but philosophical ideas. Charles-Frédéric Martins (1806-1889) was a French naturalist of German descent, who translated and was familiar with Goethe's scientific works, albeit in critical manner. Martins wrote that "Candolle demonstrated scientifically the reality of [Goethe's] doctrine, made botanists adopt it, and completed it by the discovery of the law of symmetry."<sup>61</sup> He interpreted Goethe's rejection of Candolle's concept of degeneration to be based on Goethe's subjective belief, or his unwillingness to admit that "monstrosities" or degenerated beings have come to dominate nature.<sup>62</sup> French physiologist Jean-Pierre Flourens (1794-1867) gave the same verdict: Goethe was mistaken in rejecting Candolle's theory, which was confirmed in multiple cases and which was also an extension of Goethe's own admirable ideas.<sup>63</sup> Foreign scholars' reviews revealed similar attitudes towards Goethe and Candolle. For instance, an English chemist and naturalist Charles Daubeny (1795-1867) also gave Goethe a backhanded compliment that Goethe was lucky to have arrived at truth "by a rapid glance over nature" while Candolle worked through "patient investigation of particular phenomena."<sup>64</sup>

If Goethe was a less scientific counterpart to Candolle, several reviewers mentioned the Jussieu family—the French botanists Bernard de Jussieu (1699-1777) and his nephew Antoine Laurent de Jussieu (1748-1836)—as an important influence on Candolle. Indeed, Candolle's

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<sup>61</sup> Charles Martins, "La métamorphose des plantes de Goethe et la lois de symétrie d'Augustin Pyramus de Candolle," *La Revue Indépendante* t.7 (March 10, 1843): 54.

<sup>62</sup> *Ibid.*, 58.

<sup>63</sup> Flourens, *Éloge historique de Pyramus de Candolle*, xii-xvii, xxix-xxx.

<sup>64</sup> Daubeny, "Sketch of the Writings and Philosophical Character," 232.

classificatory system was built upon Jussieu's "natural method."<sup>65</sup> This meant that Candolle essentially adopted the ideas of French school; even the French government recognized and supported his work on the third edition of *French Flora* (originally authored by Lamarck,) where he applied his natural method for the first time to classify and record all plant species inhabiting France.<sup>66</sup> Belgian botanist Charles François Morren (1807-1858) also viewed Candolle's achievement as part of the greater legacy of Jussieu: Belgium was still under the "German influences" by the late eighteenth century, and it was only when Candolle introduced the natural system that the Belgian naturalists finally changed their views on plants.<sup>67</sup>

Scholars during the period offered varying interpretations of Candolle's science, as well as of which national style it belonged to. Unlike others, Daubeny credited Lamarck and his doctrine of rudimentary organs as part of Candolle's inspiration, just like Haüy's crystallography.<sup>68</sup> Carl von Martius (1794-1868) identified Candolle's science as part of the French school, while also linking him to the ancient Classicism. Although this latter connection was made in terms of his political and social activities, overall, Candolle embodied the Classical and revolutionary spirit through his way of merging theory and practical reality.<sup>69</sup> Morren offered yet another interpretation. After extolling Candolle, the "father of botany," by likening him to Saint Augustin the "father of the church," Morren portrayed Candolle as an intermediary

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<sup>65</sup> Bernard de Jussieu first came up with a classification based on the anatomical characters of plant embryos. A. L. de Jussieu developed his uncle's idea and published the "natural classification," which classified plants using a wide range of characters (and assigning relative values to different characters,) unlike the "artificial" Linnaean system. Several French reviewers, including Paul Gervais (1816-1879) and Flourens, and foreign reviewers, including Daubeny, Martins, Von Martius, and Charles Morren, made connections between Jussieu and Candolle. It is ironic, however, that Candolle seems to have disliked Jussieu. See footnote #75 below.

<sup>66</sup> Carl von Martius, "Life and Labors of De Candolle," *American Journal of Science* 44 (1843): 218, 224.

<sup>67</sup> Charles F. Morren, "Notice sur la vie et les travaux d'Augustin-Pyrame de Candolle," *Mémoires pour servir aux éloges biographiques des Savants de la Belgique* (Bruxelles: Bayez, 1843), 33-35.

<sup>68</sup> Daubeny, "Sketch of the Writings and Philosophical Character," 211.

<sup>69</sup> Martius, "Life and Labors of De Candolle," 230-231.

that brought the German progress into France, part of which was Goethe's morphology.<sup>70</sup>

According to him, Goethe became "the French botanist, and botanist of the entire world, by Candolle's word."<sup>71</sup> The ideas and achievements from Germany were, as it were, replanted in French soil by Candolle, where they bloomed into their best version. This interpretation was on the same wavelength as an extreme claim that "the reputation of Candolle was an entirely French glory; in pulling away from us, he could not stop belonging to us."<sup>72</sup>

#### **d) Candolle: a foreign scientist in France**

From the positive receptions discussed above, it might seem that Candolle was able to secure for himself and his family a stable, esteemed life in France. Goethe was an international celebrity, and Candolle's reception surpassed even Goethe's, at least within the scientific community. However, his autobiography indicates that Candolle's scientific career, too, suffered from political restrictions, if in different ways from Goethe's. The years he stayed in France, from 1798 to 1816, were the time when the French regimes experimented with political and legal definitions of "French citizen" and "foreigner."<sup>73</sup> Every aspect of life was politicized, and Candolle's life and career in France were not exceptions. Despite all the praises he garnered for the "French style" of his science, Candolle was a foreigner in and outside of the French scientific community, just like Goethe.

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<sup>70</sup> Morren, "Notice sur la vie et les travaux d'Augustin-Pyrame de Candolle," 36-37.

<sup>71</sup> Ibid., 38. Morren concluded with the following remark on p.41: "he has become the great mediator of literary and scientific clashes, and under his patronage German and French scholars have given each other their hands. ... Let us congratulate us, thus, that Candolle was born in Swiss: for Geneva, with its philosophical school and its double languages German and French, gave to its illustrious child the gift of accomplishing such a great mission."

<sup>72</sup> Gervais et al., *Inauguration du Buste d'Augustin-Pyramus de Candolle* (Imprimerie de Ricard Frères: Montpellier, 1854), 8-9.

<sup>73</sup> Peter Sahlins, *Unnaturally French* (New York: Cornell University Press, 2004), 267-312. Sahlins discusses the history of *droite d'aubaine* (the French nationality law which guaranteed the royal and state right to seize the properties of the deceased foreign residents) from the late sixteenth century through its reforms in the Revolutionary period to its final abolition in 1819. Sahlins shows that this reform movement was a complex story of the emerging distinction between legal/civil identity (nationality) and political identity (citizenship,) and how the latter's development came to define what it meant to be "French."

Candolle came from a well-established French Huguenot family that had emigrated from Provence to Geneva at the end of the sixteenth century. His love of botany, as well as the instability after the French Republic annexed Geneva, led him to Paris in 1798, where he was soon recognized as a rising star.<sup>74</sup> One can detect in his autobiography the joy of working with the leading French naturalists in the early days, but the tone quickly changed into a constant anxiety. His ordeals during the French military disasters in 1813, the Hundred Days when Napoleon briefly returned to power in 1815, and the early years of the Bourbon Restoration form an important part of his story, which are however omitted or vaguely referred to by his eulogists and colleagues. During these politically volatile times, Candolle tormented himself worrying about Swiss independence and welfare of his family and acquaintances, when Paris was taken by the Allies and whenever local revolts erupted. He had to foresee political tides, worrying about which color of the cockade he should be wearing the next day, and whether it would be better for him to escape to Geneva or remain in France. Candolle was not free from anxiety and resentment within the scientific community, either. Despite a promising start, Candolle failed to be elected to a regular seat at the *Institut*, which he suspected was due to his Protestant faith and his foreign status.<sup>75</sup> Candolle eventually moved to Montpellier in 1808 to serve as a professor of botany, but he held on to a hope to return to Paris in the future.

Even in Montpellier, Candolle continued to face disadvantages for being a religious, political, and national foreigner. Siding with neither the royalists nor the bonapartists, he found himself in a difficult position, no matter which side won the victory of the day. His wish to

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<sup>74</sup> Cuvier—whom Candolle considered as his “second father,” according to Morren—chose him as the substitute instructor for his course; Lamarck left the task of preparing the third edition of *French Flora* entirely to him.

<sup>75</sup> According to Candolle, his French colleague A. L. de Jussieu “was a bigot who found pleasure in throwing out a Protestant,” and was “[René Louiche] Desfontaines’s hidden enemy” who aimed to remove one of Desfontaine’s students—Candolle himself. Jussieu supported Palisot de Beauvois, whom Candolle considered as clearly less qualified than himself, but who was elected over Candolle in the end. Candolle, *Mémoires et souvenirs*, 185-186.

uphold his scientific identity in the forefront is unmistakable in his autobiography and correspondences, where he repeatedly stated how he was struggling to shield his scientific task from politics as much as possible. When Candolle was forced to take a political stand, he chose neutrality. As the rector of the *Académie de Montpellier*, he tried to save his colleagues from the fickle political demands, regardless of their political positions: “as soon as one of them was threatened, I had him come and I hid him in a small apartment of my house. ... I also said while laughing, to those who asked on which party I was: ‘Put in your head that I am always on the beaten side.’”<sup>76</sup> For his neutral and hospitable acts, he ironically faced hostility from his colleagues, who felt uncomfortable that Candolle knew all about their political leanings. The fact that he was Protestant and foreigner added weight to their denunciations of Candolle; he was forced to resign from the Academy and took a flight back to Geneva for good in 1816.

Politicization of the scientific community influenced Candolle’s career in a distressing way. It is possible that his scientific thoughts were impacted by these political experiences, too. Although Goethe and Candolle shared the concept of the primitive type of organic beings, they disagreed on the latter’s concept of symmetry and degeneration. Candolle argued that the existing life forms were monstrosities that developed away from the original symmetric model. The exceptions from these monstrosities revealed the persisting impulse to return to the original symmetry. His vision of the present world as full of irregularities and ugliness, however, was cast against an ideal past. Through his endeavors to assert political neutrality and his identity as a citizen of the republic of science, Candolle was making a statement that the ideals, scientific or political, still existed and must exist. If Goethe brought timeless poetry into reality, Candolle took refuge from the ugly reality into a poetic past. The distance between the ideal and the real

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<sup>76</sup> Ibid., 258.

was much wider in Candolle's worldview than in Goethe's, and such gap could reflect psychological and physical strains that Candolle endured in France. Notably, his theory of the primitive type and symmetry was first expressed in *Elementary Theory of Botany* in 1813, when Geneva was still a French satellite and France, too, was experiencing the highest military pressures. Although the warm reception of Candolle's science in France might suggest otherwise, his life, career, and science were deeply impacted by the political reality he lived in.

Curiously, Candolle's colleagues rarely mentioned his political ordeals, instead highlighting the outward significance of France as the birthplace of his ideas. His botany was touted as French science, on condition that it upheld the image of the superior French influence on his scholarly growth while downplaying his actual experience as foreigner. It might have been against these claims that his son Alphonse de Candolle (1806-1893) added a brief essay of his own at the end of Candolle's autobiography. In this essay, Alphonse researched the number of scientists from each nation in Europe who had earned the title of the "foreign associate" (*associé étranger*) at the *Académie des sciences de Paris*. This title was highly prestigious: the list of the foreign associates, which included Candolle, amounted to just 81 names across 137 years, from 1725 to 1861, out of all non-French scientists in all branches of sciences. Alphonse found that the percentage of the distinguished scientists of each nation was not at all proportional to the size of the nation. Three small countries, Switzerland, Holland, and Sweden, boasted high proportions of the foreign associates. British Isles and Germany came next, but at much lower percentages. Even within these nations, the associates were mostly from the Protestant states (e.g. foreign associates of the British Isles were mainly from Scotland, and almost none from Ireland.) He concluded that two conditions must be satisfied to cultivate great, independent scientists: the emancipating influences of liberalism and the absence of absolutism and

democracy.<sup>77</sup> One's ideas were shaped by the political and religious atmosphere of one's native environment, and Candolle was an example of the extraordinary intellectual power of Geneva, a religiously tolerant and politically neutral republic.

By making these arguments, Alphonse was distinguishing Candolle from other scientists of the major European nations that ranked with France. Above all, while conceding to his French colleagues that the environment influenced the quality of scientific ideas, he prioritized the native environment over secondary habitats. Thus, if any nation were to take credit for Candolle's achievements, it was going to be Geneva. At the same time, Alphonse could avoid disapproval from his French colleagues by adopting the French standard of scientific greatness: the title of the "foreign associate" was a recognition conferred by the French scientific institution in the first place. Even though Alphonse's commemoration of his father challenged the selective memory that the French scientific community had of Candolle, it did so by, again, focusing on the question of nationality.

#### **4. Textual reality**

Goethe's and Candolle's cases illustrate, in different manners, how the political realities for foreign naturalists (Section 3) challenged the cosmopolitan ideals of the republic of science (Section 1). It now remains to examine the dynamics between the political fiction (Section 2) and the textual reality. The amplified image of national differences potentially interfered with the readers' understanding of foreign scientific texts. As demonstrated above, Goethe and Candolle shared key biological concepts, yet their works met opposite fates. Instead of attributing everything to the different national styles that their works were thought to represent—the

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<sup>77</sup> Candolle, *Mémoires et souvenirs*, 568.

philosophical, mystic German thought and the rational, positive French thought—can we find more precise causes in the scientific texts themselves?

**a) Methodology**

I will examine the articulations of Goethe’s and Candolle’s texts: *Metamorphosis of Plants* by Goethe; *Essay on the Medical Properties of Plants*, “Elementary Essay on Botanical Geography,” and Chapter II, Book V of *Organography of Plants* by Candolle.<sup>78</sup> For each text, every sentence was tagged with one or more categories of the following “thought-components”.

Abbreviations will be used for the tables in this section:

**Table 1.** List of thought-components and abbreviations

<b>Emp</b> = Empirical	<b>Rom</b> = Romantic	<b>Clas</b> = Classical
<b>Induc</b> = Inductive	<b>Deduc</b> = Deductive	<b>Ratio</b> = Rational/Speculative
<b>Method</b> = Methodological	<b>Hist</b> = Historical/Descriptive	<b>Clsf</b> = Classificatory
<b>Anlg</b> = Analogical	<b>Metaph</b> = Metaphors/Visual	<b>Phil</b> = Philosophical
<b>Num</b> = Numerical	<b>Agency</b> = Metaphors attributing agency to nature	
<b>Fut</b> = Future/Utility	<b>Wr</b> = Writing aims, directions	

Below are example sentences from Goethe and Candolle, which belong to the Romantic, Classical, and Inductive categories.

**Table 2.** Example sentences

	Goethe	Candolle
Romantic	“There is a hidden relationship among various external parts of the plant ... The process by which one and the same organ appears in a variety of forms has been called the metamorphosis of plants.”	“If botany is much behind mineralogy in this regard, it results, on the one hand, from all these facts being submitted to a particular force (vital force,) whose laws are much more obscure and difficult to study than those of analogy and attraction.”
Classical	“This action of nature is accompanied by another, that is, the union of diverse organs around a center in fixed numbers and proportions.”	“It often happens that such plant which is thought to be an exception to a family or genera in which one has placed it, really belongs to a different family, when its organization is better known.”

<sup>78</sup> Shortnames will be used for these titles (Goethe, Candolle 1, Candolle 2, and Candolle 3, respectively) for the tables later in this section. The French-German edition of *Metamorphosis of Plants* was selected because most French audiences (even Candolle and Saint-Hilaire) did not read German and would have read the translations of Goethe’s work. Candolle spoke and wrote in French. The selected texts by Candolle all illustrate the theme of organic transformation, and in particular, the selected chapter from the *Organography of Plants* (Candolle 3) discusses the concepts most similar to Goethe’s concept of primitive type. Because the nineteenth-century French tended to conjoin multiple sentences with semicolons, we split these longer sentences accordingly.

**Table 2** continued

Inductive	“Thus, a stamen emerges when the organs, which earlier expanded to form petals, reappear in a highly contracted and more refined state.”	“Even if it is impossible to find a flower whose petals were geometrically the same ... there is no denying that one is struck by the kind of regularity of these organs.”
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Once every sentence was tagged, categories were ranked from those that occupy the most space in the text to those occupying the least space. **Fig. 2** ranks the categories for each text. The Results section below examines which categories tend to be tagged together in sentences.<sup>79</sup>

### **b) Definitions of Romanticism from the nineteenth century to present**

Among the categories of thought-components listed above, the Romantic and the Classical categories require a further discussion, as they have often been layered over the national divide between Germany and France, simplifying and reinforcing the contrast between Goethe and Candolle. What do these terms mean, and in particular, what is Romantic science? There are now sophisticated definitions that capture the multifaceted nature of Romanticism. Historian of science Robert J. Richards emphasizes the theme of “growth” that permeated all corners of the concept of Romanticism. Schelling’s *Naturphilosophie*—the trunk philosophy from which Romanticism stemmed—modified Immanuel Kant (1724-1804)’s and Johann Fichte (1762-1814)’s philosophical views to bridge self-knowledge and the knowledge of nature. The individual matured both in its ability to fully express its creative power and in its interaction with the “absolute ego,” which gave shape to that creativity by anchoring it to the reality. Thus, growth of the individual self-knowledge meant the growth of one’s understanding of the

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<sup>79</sup> To increase consistency and reliability of the method, I repeated the tagging process eight times across all texts. After the fifth round, I asked two of my colleagues to test the replicability of the sentence-classification. Our results showed a high degree of overlap. After making minor adjustments, I repeated the tagging process three more times and found that the top five categories composing the texts did not change. For more explanation on the methods behind the sentence-classification and visualization components of this project, see the following: Andrew McNutt, Agatha Kim, S. Elahi, and K. Takahashi, “Supporting Expert Close Analysis of Historical Scientific Writings: A Case Study for Near-by Reading,” *2020 IEEE 5th Workshop on Visualization for the Digital Humanities (VIS4DH)* (2020): 1-6. <https://doi.org/10.1109/VIS4DH51463.2020.00005>

objective world. Individuals were not alone in their growth. Nature, too, experimented with its expressions of the archetypes along the historical timeline.<sup>80</sup> Rooted in *Naturphilosophie*, Romantics further emphasized the moral nature of the growths described above, applying the concept of *Bildung* in biological, aesthetic, and moral senses.<sup>81</sup>

Historians Warren Breckman and Gerald Izenberg offer comprehensive analyses of Romanticism, although they do not specifically discuss the Romantic science. Breckman opposes the simplified definitions of Romanticism as the antagonist of the Enlightenment and Classicism. Romantics did not reject rationality, but pointed out that a self was more than that. Similarly, they did not reject Classicism, but opposed the tradition that put Classical works on a pedestal as the sole model to imitate.<sup>82</sup> Both Breckman and Izenberg see the French Revolution as a turning point, which generated a tension between hopeful enthusiasm and disillusionment, between freedom and disorder—which, in turn, became a powerful source of resilience and creativity for the Romantics.<sup>83</sup> The violent unfolding of the Revolution, and especially the experiences of the Napoleonic campaigns, promoted the conservative and nationalistic turn in Germany, inspiring a strong desire for the culturally and spiritually unified German nation.<sup>84</sup> In France, Romanticism

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<sup>80</sup> This theme of nature's organic growth in Romantic philosophy allowed its followers to temporalize nature, which was a prominent difference from the mechanistic vision of nature in the eighteenth century, and which was also a key framework for the later evolutionary theory to relate empirical findings in nature. Richards places Darwin's theory of evolution within the tradition of the idea of instantiation of archetypes in nature, along with German and British Romantic philosophies. Richards, *The Romantic Conception of Life*, 10.

<sup>81</sup> *Ibid.*, 13.

<sup>82</sup> Warren Breckman, *European Romanticism* (Boston & New York: Bedford/St. Martins, 2008), 8-12.

<sup>83</sup> *Ibid.*, 15-17.

<sup>84</sup> *Ibid.*, 24-25 & 31-33. Breckman notes that, unlike in modern nationalism, the Romantics focused on the concept of nation as a means to expand the individual self. In "What is a People in the Higher Meaning of the Word, and What is Love of Fatherland?" (1808) Fichte identified the universal desire to eternalize one's self as the source of the patriotic love. Such view allowed the coexistence of the concept of universal humankind and nationalism (nations as various manifestations of that universality.) Michelet made a similar argument in "Our Native Land: Are Nationalities about to Disappear?" (1846): nationality was to a nation a mature personality to an individual; formation of nationalities was part of a natural progress of life, and of God's design to maintain the universal harmony. Stronger nationalities meant the full outward expressions of the "universal nation."

took an explicitly political turn, which set it apart from the Romantic movements in Germany or England.

These studies reveal that Romanticism was anything but static and definite. The Romantic movement and its participants developed and adapted themselves to the turns of historical events. And yet, there existed a common set of underlying anxieties and questions: How do I make sense of the world I am in? How do I live well—how do I participate in this world in a meaningful, purposeful way? As in the Enlightenment of the previous century, the focus of the Romanticism kept returning to the self, but in a more psychological, complex manner. The attention to the relation between an individual and the world, with its moral implications, remained intact across the questions and answers that Romantics proposed in scientific realms.

With such multifaceted traits of the Romanticism, then, how did the nineteenth-century contemporaries define it? What did Romanticism mean to the French, including the professional and public intellectuals whose opinions would have shaped the general image of Romanticism? French dictionaries, encyclopedias, and journals of the 1820s and 1830s sometimes discussed Romanticism in scientific contexts, if indirectly. Félix Vacquié (1797-1834), a French physician and author of several medical treatises, touted the experimental physiology practiced by François Magendie (1783-1855) as a healthy restraint on Romantic science:

All that which is merely inventive is unforgivingly sacrificed, and exactitude makes [Magendie's physiology] the most interesting, and without dispute most useful, work of this kind we have. The author is merited above all for having brought physiologists to a good path, and his example cannot fail to produce most fortunate consequences, for, as he observes, physiological and pathological Romanticism loses its empire every day.<sup>85</sup>

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<sup>85</sup> Félix Vacquié, "Précis élémentaire de physiologie; par F. Magendie," *Journal complémentaire du Dictionnaire des sciences médicales* t.21 (1825):162-163.

The binary opposition in the receptions of Goethe and Candolle reappears here, this time explicitly defining the Romantic science as antithesis of the empirical science.

There were positive definitions as well. In *Histoire du romantisme en France* (1829), a work that aimed to defend Romanticism, French writer and dramatist Eugène Ronteix (1804-1842) included a section on Romanticism in medical science.<sup>86</sup> Although it was a cursory discussion, it at least indicated what kind of scientific practitioner was considered a Romantic. If Vacquié sympathized with Magendie against the Romantic science, Ronteix defended Joseph Broussais (1772-1838), Magendie's opponent. For Ronteix, Broussais's physiology was an exact science like geometry,<sup>87</sup> while for Magendie and others, Broussais's generalizing tendency obliterated any empirical trace. The weight of the question—how empirical was a given scientific work—is unmistakable in François L. I. Valleix (1807-1855)'s eulogy for Broussais. Valleix problematized another eulogist's description of Broussais as a "profound observer, bold generalizer, ingenious physiologist, passionate writer, formidable critic, vigorous debater, philosopher, moralist." While granting all of the above characteristics, Valleix adamantly stated over and over: "No, we cannot admit that Broussais was a profound observer."<sup>88</sup>

The nineteenth-century image of the Romantic science—bold, ingenious, passionate, philosophical, generalizing, but *not* empirical—was simple and powerful enough that it could substitute for a national character. In the first volume of *Encyclopédie moderne* (1824-1832), the editor announced the aim to update the famous *Encyclopédie* of the preceding century, which

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<sup>86</sup> Ronteix discussed Romanticism mostly in literature and art, and defined Romanticism as reaction against the dominance of the antiquity and the materialist and irreligious spirit of the Revolutionary France. Unlike others, however, he also viewed Romanticism as a historical process: "It is a modification, which the arts of imagination undergoes. It is a new form substituting for the old, which would become Classical like other forms that are aging." Eugène Ronteix, *Histoire du romantisme en France* (Paris: Dureuil, 1829), 16.

<sup>87</sup> *Ibid.*, 136-137. Broussais argued that all illnesses could be traced to the inflammation of organs. Despite varying forms, all diseases were the same in essence and all treatments had to aim at subsiding the inflammation.

<sup>88</sup> F. L. I. Valleix, "Discour de M. le Professeur Bérard. Eloge de Broussais," *Archives générales de médecine* 3 ser. t.6 (1839): 511.

had become outdated due to, among other factors, the increased contacts with foreign ideas.<sup>89</sup> While he acknowledged the impact of foreign ideas, he treated it as an irritation to be dealt with, than a welcome inspiration: “Our literature will always be Classical because our great models have followed the path, and because the precision of our language would not give rise to the vague idealism of Germany, or to the fantastic Romanticism of England; however, one should take into account of the influence these exotic novelties have exercised on our native productions ...”<sup>90</sup> This quote reveals the fixed association in people’s minds about nationality and systems of thought like Romanticism or Classicism.

For my textual analyses, the gap between, on the one hand, the more rigid, simple characterization of Romanticism and Classicism in the nineteenth century, and on the other, the multifaceted understanding that our historical lens has equipped us, guides which definitions to use for Romanticism and Classicism. Since the purpose is to test the nineteenth-century audience’s image of the German natural science, it seems fitting to incorporate their own definitions. This choice is made for the sake of practicality as well. The texts are analyzed sentence by sentence, and each sentence is tagged with one or more of the categories of thought-components. This requires that the categories be roughly equivalent in terms of their complexity. Based on the survey of definitions above, I will tag with the Romantic category the sentences which express the idea of underlying interrelation among diverse forms and those which offer ideas that lie beyond the physical explanations. On the other hand, the sentences which explain the observed facts in strictly physical or mathematical terms and those which express a belief in the absolute regularity of nature and ultimate intelligibility of nature constitute the Classical category.

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<sup>89</sup> E.-M. Courtin, “Avis de l’éditeur,” in *Encyclopédie moderne* t.1 (Paris: Bureau de l’Encyclopédie, 1824), v-viii.

<sup>90</sup> *Ibid.*, vii.

### c) Results

First, let us consider the overall comparison between Goethe's *Metamorphosis of Plants* and Candolle's botanical texts. See **Fig. 2**, which ranks the categories from the most tagged to the least tagged for each text. Although the three texts that represent Candolle's science have varying topics and aims, the Romantic category always predominates over the Classical category. However, the ratio of the Romantic to the Classical decreases across the texts (2.21→1.66→1.28). That the weight of the Classical continues to increase in *Organography of Plants* (the third text) is interesting because it is where Candolle introduces the concepts of type, which are similar to Goethe's concept of the archetype. This point seemingly confirms the traditional evaluation that Candolle was able to express the same concepts in a more logically convincing manner than Goethe. However, when examining the total percentages for both Romantic and Classical categories, they are ironically highest in *Organography of Plants* (29.49% and 23.08%). This means that, even though Candolle heavily utilized the Classical language to express his concepts, he still required a language that was as much Romantic as Classical.

Understanding the comprehensive shapes of the texts requires examining not just how each category performs, but also which categories tend to be tagged together to define the sentences—in other words, which pairs or triples of categories work together to build a given scientific text. Before comparing each of the three texts by Candolle to Goethe's text, some general observations can be made. In Goethe's text, the Romantic category is most often tagged with the Empirical category. The Romantic-Inductive pair, which takes the first rank in Candolle's texts—follows next. But the gap between these pairs—the Romantic-Empirical pair and the Romantic-Inductive pair—is wide: the former occurs exactly twice the latter. This

observation offers two insights. First, contrary to what Goethe’s critiques claimed, Goethe’s theory of metamorphosis was fully supported by empirical observations. In fact, the Empirical category occupies as much as 52.23% of Goethe’s text, which is higher than in Candolle’s texts (38.85% at the highest in “Botanical Geography.”) Second, the observation partly answers why Goethe’s reception was less enthusiastic than Candolle’s, even when they both employed similar top five categories to express similar concepts. That the Romantic elements are expressed more often through empirical observations, rather than through inductive statements, points to the possibility that the audience could easily interpret Goethe to be drawing hasty conclusions from general and few examples. An important form of writing, which creates an impression that the author is making a general statement based on sufficient examples, might be lacking in Goethe’s text, regardless of how much empirical evidences he was actually using. See **Fig. 3**, which visually demonstrates a clear contrast between Goethe’s and Candolle’s texts, in terms of the interaction between the Romantic and Empirical categories.

Now, I compare Goethe’s text to each of Candolle’s texts. In the tables below, each number represents the percentage of the text that a given pair of thought-categories occupies.

**Table 3.** Comparison of Goethe and Candolle 1

	<b>Goethe</b> <i>Metamorphosis of Plants</i>		<b>Candolle 1</b> <i>Medical Properties of Plants</i>	
<b>1</b>	Emp + Rom	11.02 (%)	Rom + Induc Emp + Anlg	6.97 (%)
<b>2</b>	Emp + Anlg	7.87	Anlg + Fut	4.56
<b>3</b>	Rom + Induc	5.51	Anlg + Hist	4.29
<b>4</b>	Rom + Agncy	4.20	Emp + Clsf	4.02
<b>5</b>	Rom + Clas	3.94	Emp + Rom	3.75
<b>6</b>	Emp + Agency	3.15	Induc + Anlg Rom + Method Ratio + Anlg	3.22

**Table 3** continued

<b>7</b>	Rom + Anlg	2.89	Emp + Induc	2.95
<b>8</b>	Emp + Induc Rom + Method	2.62	Induc + Clas Rom + Anlg	2.68

In both Goethe's *Metamorphosis of Plants* and Candolle's *Medical Properties of Plants*, the Empirical-Analogical pair is one of the top two pairs that compose the texts. This shows that both texts heavily rely on analogical findings in nature. But there is an important difference in terms of the categories with which the Analogical category (highlighted in yellow in **Table 3**) is paired.<sup>91</sup> I argue that analogies are illustrated in different manners in Goethe and Candolle 1, although they are one of top five categories composing both texts (11.81% in Goethe, 17.69% in Candolle 1; see **Fig. 2**.) Analogies are usually presented as empirical evidences for both. In Goethe, analogies are also used to support Romantic ideas, and rarely as part of inductive conclusions or in any other way. In Candolle, too, analogies are used in sentences that express Romantic ideas, but it is one of the auxiliary purposes they serve: analogies are more frequently used to give historical information (i.e. description of current knowledge of plant analogies, etc.) and to prove utility of the researches on plant analogies. They are also part of the inductive conclusions more than they are part of Romantic statements. To summarize, Goethe mainly used analogies as empirical evidence or as part of Romantic ideas; Candolle used analogies either as empirical evidence or as part of historical information, more than as part of Romantic arguments. Compared to Goethe, Candolle could have appeared to offer analogies as solid information, for

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<sup>91</sup> The Empirical-Analogical pair and the Romantic-Analogical pair take up similar percentages of Goethe's and Candolle's texts. However, there are other categories with which analogies are paired. For example, in Candolle, analogies are also paired with the inductive statements, historical statements, and with the statements about future research—in fact, these pairs rank across the top three and the sixth places in Candolle. On the other hand, in Goethe, analogies are usually paired with either Empirical or Romantic category.

purposes that could be immediately grasped. See **Fig. 4** for the difference in how analogies were used by the two naturalists.

Then, what role does the Romantic category play in these texts? Calculations of ratios of different categories show that the percentage of the Romantic-Empirical pair is abnormally high in Goethe.<sup>92</sup> It seems as if these two categories have an unusually strong bond between them, and in **Fig. 3**, they almost look as if they are merging. What Goethe observed in nature, and the process it underwent in his mind, may have been infused with Romantic language from the beginning, as if seen through a Romantic lens. If this is the case, this Romantic infusion is more like a psychological or visual state, rather than a conceptual system that one adopts or rejects. These comparisons could indicate why the audience felt uneasy with Goethe's language, compared to Candolle's. It might not be a matter of whether one chose the Romantic or Classical approach to natural science, but how the approach operated in one's mind. The Romantic elements in Goethe's text appeared foreign to the French readers not because they were Romantic, but more because they were something beyond a methodological system that could be spelled out.

Now, let us consider how Candolle's second text, "Botanical Geography," compares to Goethe's *Metamorphosis of Plants*.

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<sup>92</sup> In Candolle 1, the ratio between Classical and Empirical categories is 2.21. This ratio is reflected in other ratios: the Romantic-Empirical pair composes 3.75% of the text, and the Classical-Empirical 2.14%, with a ratio of 1.75; the Romantic-Inductive pair occupies 6.97%, and the Classical-Inductive 2.68%, with a ratio of 2.6. Both these ratios roughly correspond to the ratio between Classical and Empirical categories (2.21). In Goethe, the ratio between Romantic and Classical categories is 4.185. However, this ratio is not as consistently reflected: the Romantic-Inductive pair occupies 5.51%, and the Classical-Inductive pair 0.79%, with a ratio of 7 between these two pairs; the Romantic-Empirical pair composes 11.02%, and the Classical-Empirical 1.31%, with a ratio of 8.41. The fact that these ratios are approximately double the ratio between Romantic and Classical categories (4.185) suggests that the Romantic-Empirical and the Romantic-Inductive pairs have abnormally high percentages. Again, because the Romantic-Empirical pair occurs twice as the Romantic-Inductive pair in Goethe, I focus on the former.

**Table 4.** Comparison of Goethe and Candolle 2

	Goethe <i>Metamorphosis of Plants</i>		Candolle 2 “Botanical Geography”	
<b>1</b>	Emp + Rom	11.02 (%)	Emp + Ratio	7.39 (%)
<b>2</b>	Emp + Anlg	7.87	Induc + Ratio	4.26
<b>3</b>	Rom + Induc	5.51	Emp + Anlg	3.76
<b>4</b>	Rom + Agncy	4.20	Emp + Hist	2.38
<b>5</b>	Rom + Clas	3.94	Emp + Num	2.26
<b>6</b>	Emp + Agency	3.15	Induc + Rom	1.88
<b>7</b>	Rom + Anlg	2.89	Rom + Ratio Clas + Ratio	1.63
<b>8</b>	Emp + Induc Rom + Method	2.62	Hist + Ratio Induc + Clas	1.25
<b>9</b>	Emp + Ratio	2.10	Emp + Rom	1.13

One noticeable change from the previous comparisons is that the Rational/Speculative category (highlighted in yellow in **Table 4**) is much more present in Candolle’s text this time. This category is the second most dominant category overall, occupying 23.31% of the text (see **Fig. 1.**) and the pairs with this category in them are also the most numerous pairs that build the text. In Goethe, the Rational/Speculative category is the fifth most present component overall (8.92% of the text,) but in terms of pairs, it appears only at the ninth place. Thus, it seems that there is a difference in how Goethe and Candolle used the reasoned speculations. In Goethe, the sentences that contain this category tend to be “simple,” belonging to the Rational/Speculative category alone, without any other category tagged together. In Candolle 2, they tend to accompany empirical observations or inductive conclusions.

This difference is affirmed when the sentences that are tagged with three or more categories are examined: the Rational/Speculative category appears in nearly all triples in top three ranks in Candolle 2.

**Table 5.** Comparison of triples in Goethe and Candolle 2

	<b>Goethe</b> <i>Metamorphosis of Plants</i>		<b>Candolle 2</b> “Botanical Geography”	
<b>1</b>	Emp + Rom + Anlg Emp + Rom + Agncy	2.84 (%)	Clas + Emp + Ratio Emp + Hist + Num	0.63 (%)
<b>2</b>	Emp + Rom + Induc	2.27	Induc + Ratio + Rom	0.376
<b>3</b>	Emp + Rom + Clas	1.70	Emp + Ratio + Rom Emp + Anlg + Rom Induc + Ratio + Clas Rom + Ratio + Clas Induc + Ratio + Anlg	0.25

For the triple sets composing Candolle’s text, notice that the third category that is most tagged with the top two pairs—the Empirical-Rational/Speculative pair and the Inductive-Rational/Speculative pair (highlighted in yellow in **Table 5**)—tends to be Romantic or Classical category (highlighted in green.) Candolle not only expressed Romantic and Classical ideas through empirical observations or Inductive conclusions, but further supported them with some type of reasoning process. This manner of explicitly demonstrating one’s thought-process could have created an impression that Candolle’s writing was more systematic. His use of numbers—which is entirely absent in Goethe—to complement his observations (see **Table 4**, with the Empirical-Numerical pair in the fifth rank) would have had a similar effect.

Finally, I compare Goethe’s text to Candolle’s third text, a chapter from *Organography of Plants*, which contains ideas similar to Goethe’s.

**Table 6.** Comparison of Goethe and Candolle 3

	<b>Goethe</b> <i>Metamorphosis of Plants</i>		<b>Candolle 3</b> <i>Organography of Plants</i>	
<b>1</b>	Emp + Rom	11.02 (%)	Rom + Clas	15.38 (%)
<b>2</b>	Emp + Anlg	7.87	Rom + Induc	11.54
<b>3</b>	Rom + Induc	5.51	Clas + Induc	8.97
<b>4</b>	Rom + Agncy	4.20	Rom + Hist Clas + Hist Fut + Method Hist + Method	7.69
<b>5</b>	Rom + Clas	3.94	Rom + Method Clas + Method	6.41
<b>6</b>	Emp + Agency	3.15	Hist + Induc Hist + Ratio Anlg + Rom Anlg + Clas Fut + Rom	5.13
<b>7</b>	Rom + Anlg	2.89	Hist + Anlg Hist + Fut Hist + Phil Fut + Clas	3.85
<b>8</b>	Emp + Induc Rom + Method	2.62	Rom + Deduc Rom + Emp Rom + Clsf Clas + Clsf Clas + Deduc	2.56

In Candolle 3, the Romantic-Classical pair outnumbered both the Romantic-Inductive and the Classical-Inductive pairs. Even for Candolle, who promoted himself as a naturalist receptive to chemical and mathematical thinking, the discussion of plant type and its variations required integrating the Romantic and Classical languages into each other, to the point that there was almost a perfect symmetry between the two. Indeed, the Romantic-Classical pair occupies 15.38% of this text, which is higher than the percentages of other top pairs that compose Goethe's and Candolle's other texts (the same pair occupies only 3.94% of Goethe's

*Metamorphosis*.) Candolle seems to have understood the need to take the two categories out of a binary opposition and to change the shape of his text from the previous texts.

The Historical/Descriptive category and especially the Methodological category (highlighted in yellow in **Table 6**) play an auxiliary role in Goethe, Candolle 1, and Candolle 2, but they are dominant in Candolle 3, where he outlined his theory of plant symmetry and explained how this method compared to the existing research methods. Among the pairs that compose Goethe's text, the Methodological category first appears in the eighth place, with the Romantic category (2.62%). In Candolle 3, it is paired with diverse categories: it appears in the fourth and fifth places, paired with the Future/Utility, Historical/Descriptive, Romantic, and Classical categories (6-8%). The Historical category is handled in a similar manner.

**Table 7.** Comparison of triples in Goethe and Candolle 3

	<b>Goethe</b> <i>Metamorphosis of Plants</i>		<b>Candolle 3</b> <i>Organography of Plants</i>	
<b>1</b>	Emp + Rom + Anlg Emp + Rom + Agncy	2.84	Induc + Clas + Rom <b>Method</b> + Clas + Rom	5.13
<b>2</b>	Emp + Rom + Induc	2.27	<b>Hist</b> + Clas + Rom Fut + Clas + Rom <b>Hist</b> + Induc + Rom <b>Hist</b> + Induc + Clas Fut + <b>Method</b> + Rom Fut + <b>Method</b> + Clas	3.85
<b>3</b>	Emp + Rom + Clas	1.70	Anlg + Induc + Clas Anlg + Rom + Clas Clsf + Rom + Clas Deduc + Rom + Clas <b>Hist</b> + Fut + <b>Method</b>	2.56
<b>4</b>	Rom + Induc + Anlg	1.31	Ratio + Rom + Clas Ratio + Rom + Phil <b>Method</b> + Rom + Induc Deduc + Clas + Fut Deduc + Clas + Anlg Deduc + Clas + <b>Method</b> Deduc + Rom + <b>Method</b> Deduc + Rom + Fut Deduc + Fut + <b>Method</b> Agncy + Rom + Fut	1.28

**Table 7** continued

			Method + Clas + Hist Fut + Clas + Hist Fut + Rom + Hist Method + Rom + Hist Ratio + Phil + Hist Ratio + Rom + Hist Phil + Rom + Hist Anlg + Rom + Hist Anlg + Rom + Emp Anlg + Rom + Method Anlg + Clas + Method	
5	Rom + Clas + Method Rom + Induc + Agncy	0.79		

The role of the Methodological and the Historical categories is even more evident when the sentences tagged with more than three categories are examined. The Romantic and the Classical categories, and especially the combination of the two categories, are frequently tagged with Methodological and/or Historical category (highlighted in yellow in **Table 7.**) Thus, much of the Romantic and/or Classical elements of the text seem to be absorbed by methodological and historical purposes in Candolle 3. On the contrary, the Romantic and Classical ideas enjoy more independence in Goethe: they are mostly the main elements that are supported by empirical observations, sometimes expressed through generalizations, or accompanied by admiration of nature. In Goethe, Romantic elements tend to be associated with the categories that directly involve the observer; they *are* the nature that Goethe sees. For Candolle, they are part of a methodological or historical system for understanding nature.

This difference is not visible by looking at the performance of any single category. It becomes visible only by examining the interactions between multiple categories, echoing the complex and interdisciplinary history behind Romanticism that we know from the present-day scholarships. But this difference may have been discerned much early on. Friedrich Schiller

(1759-1805) was entirely right when he said, with his friend Goethe in mind, “The poet... either *is* nature or he will *seek* her. The former is the naïve, the latter the sentimental poet.”<sup>93</sup> In this definition, Candolle might have earned the title of nature’s poet, too, just a different kind from Goethe.

### Conclusion

This chapter presented two sets of fiction and reality, through a case study comparing Goethe’s and Candolle’s botanical ideas, their receptions in France, and their actual texts. In the first set, we see a contrast between the cosmopolitan ideals of the republic of science on the one hand, and on the other, the political reality of the post-Revolutionary France in which the issue of nationality became part of both daily and scientific life. This clash produced a range of reactions among French scientists and readers when they encountered foreign scientific ideas and texts. In Goethe’s case, his German nationality, in connection with his pantheistic vision and with the general impression of the German *Naturphilosophie*, seems to have provoked a sense of incompatibility. In a way, the vague notions of the German nationality filled the gaps in their incomplete understanding of Goethe’s science. Candolle, who wrote in French and who was physically present in the French scientific community, was received much more seriously by his colleagues. The analytical aspect of his research was emphasized, even though he shared with Goethe an aesthetic and holistic view of nature, as well as the concept of the primitive type and its transformation. Still, Candolle was not free from the political reality of his time. He experienced (what he considered to be) unjust treatments when he tried to secure a career in

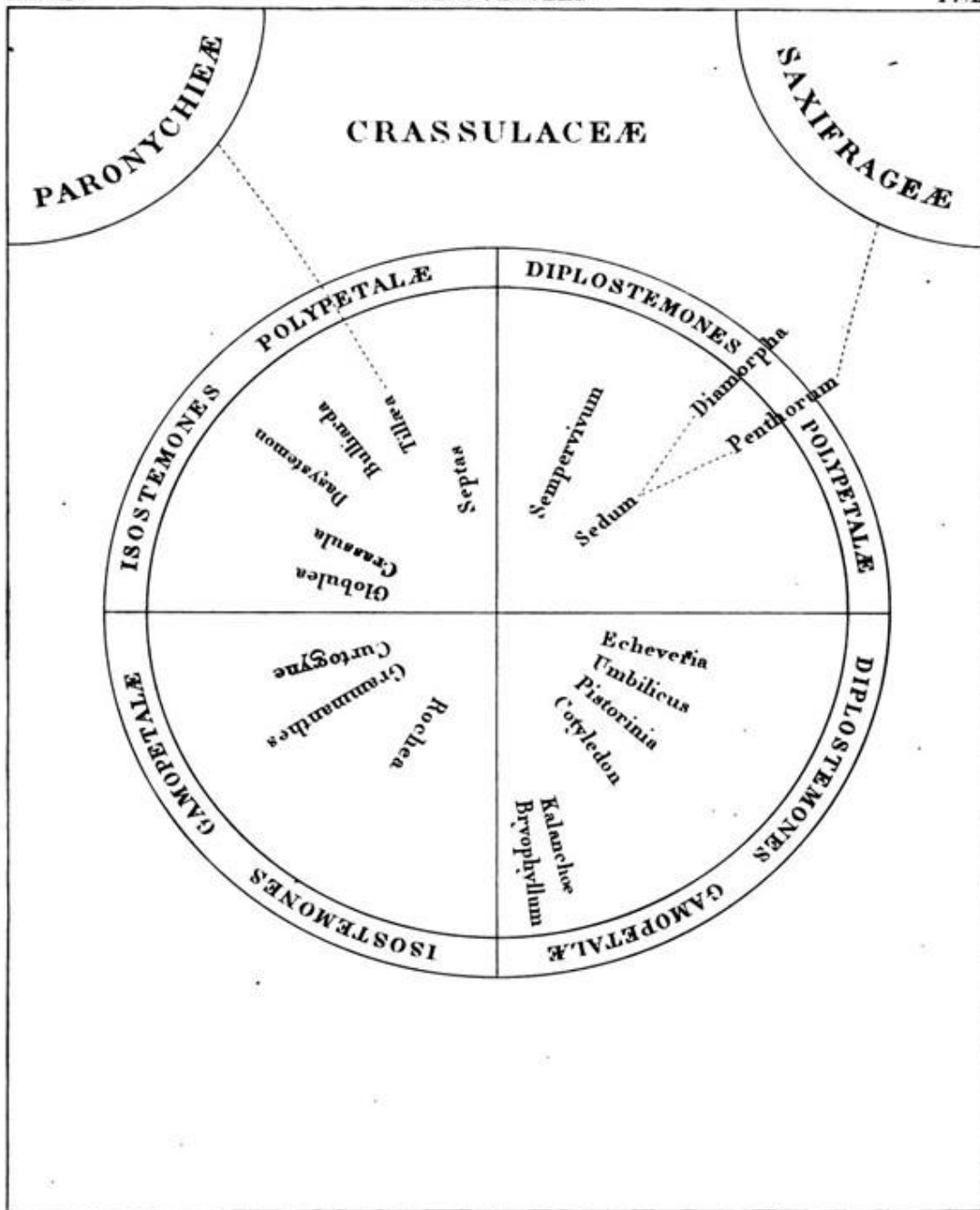
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<sup>93</sup> Friedrich Schiller, “On Naïve and Sentimental Poetry,” in *German Aesthetic and Literary Criticism*, ed. H. B. Nisbet (Cambridge: Cambridge University Press, 1985), 193.

France, which he suspected had everything to do with his status as a religious, political, and national foreigner.

In the second half of the chapter, the oversimplified image of national divides was put to the test by examining and comparing the actual forms of scientific texts that allegedly represented the German and French styles of science. There was a discrepancy between what French readers assumed they read and what they really read. By examining what kinds of thoughts composed Goethe's and Candolle's texts, I conclude that the difference between their sciences was not a simple matter of, for instance, the "French science" containing more empirical evidences or the "German science" exhibiting more Romantic elements than the other. Rather, the difference seems to lie in the varying ways that a given thought-category interacted with other categories—the varying ways it was handled and expressed. These complex differences transcend the perceived differences between German Romanticism and French Classicism, or between Germany and France overall.

I have shown the various kinds of obstacles and circumstances that the idea of nationality created when the members of the scientific community were communicating their ideas to each other. By focusing on the forms of scientific texts and locating there the sources of the perceived national differences, I hope to have offered a more precise and fair evaluations of the past actors and their ideas, without stereotyping their differences nor pretending that they do not exist.



**Fig. 1** A. P. de Candolle's metaphorical map of natural affinities  
 In this diagram, Candolle visualized the relations among the genera in the Crassulaceae family. Notice the use of a perfect circle and equal quadrants, by which Candolle sought to represent unity and diversity of plant genera. (Candolle 1828, Plate II)

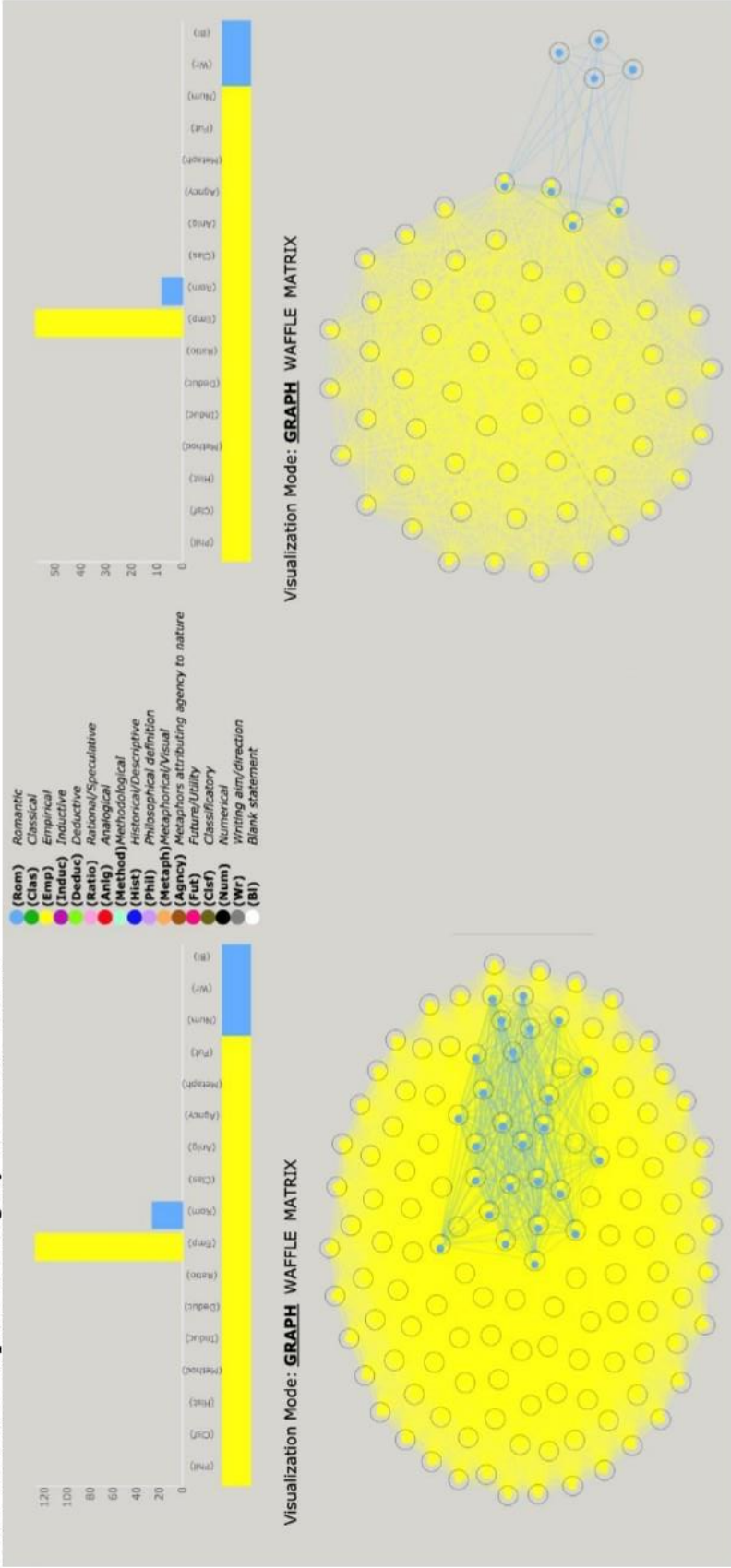
GOETHE		CANDOLLE					
<i>Metamorphosis of Plants</i> (1790/1831)		<i>Medical Properties of Plants</i> (1804)		"Botanical Geography" (1820)		<i>Organography of Plants</i> (1827)	
Categories	%	Categories	%	Categories	%	Categories	%
Empirical	52.23	Empirical	33.78	Empirical	38.85	Historical-Descrip.	48.72
Romantic	24.15	Inductive	19.84	Rational-speculative	23.31	Romantic	29.49
Inductive	12.60	Romantic	19.57	Inductive	14.41	Classical	23.08
Analogical	11.81	Historical-Descrip.	18.23	Historical-Descrip.			
Rational-speculative	8.92	Analogical	17.69	Romantic	8.52	Methodological	17.95
Agency to nature	7.87			Classificatory	7.77	Inductive	15.38
Historical-Descrip.	6.82	Rational-speculative	9.65	Methodological	6.52	Rational-speculative	12.82
Methodological	6.04	Methodological	9.12	Classical	5.14	Analogical	11.54
Classical	5.77					Future utility	
Classificatory	3.41	Classical	8.85	Analogical	5.01	Writing aim	
Deductive	2.01	Classificatory	7.77	Deductive	4.14	Philosophical def	8.97
Future utility	1.31	Writing aim	7.51	Numerical	4.01	Classificatory	3.85
Metaphorical-Visual						Deductive	2.56
Philosophical def.	0.26	Future utility	6.97	Writing aim	3.26	Empirical	
Numerical	0.00	Philosophical def.	5.36	Future utility	3.13	Agency to nature	1.28
Blank						Numerical	0.00
		Deductive	4.56	Philosophical def	1.38	Metaphorical-Visual	
		Metaphorical-Visual	3.22	Blank	0.38	Blank	
		Blank	1.61	Agency to nature	0.13		
		Agency to nature	1.07				

**Fig. 2** Table of categories

Every sentence in Goethe's and Candolle's texts was tagged with one or more of the seventeen categories. Then, for each text, these categories were ranked from those that occupied the most space of the text to those occupying the least space.

Percentage calculation = Number of sentences containing a given category ÷ Total number of sentences in each text × 100

**Fig. 3** Interaction between the Romantic and the Empirical categories, in Goethe's and Candoalle's scientific texts. In the network graphs below, each circle represents a sentence; the colored dots represent the categories with which the sentence is tagged. The lines connect the same categories across different sentences. This set of network graphs compare the interaction of the Empirical and the Romantic categories in Goethe's (left) and Candoalle's (right) texts. The bar graphs at the top indicate that the ratio between the two categories is almost identical in the two texts. However, the network graphs reveal that these categories interact in very different manners. For Goethe, the Romantic category (sky blue) is completely absorbed into the Empirical category (yellow). For Candoalle, there is a clear separation between the two groups, while the Romantic category has an unusually strong bond with the Empirical category in Goethe's text.



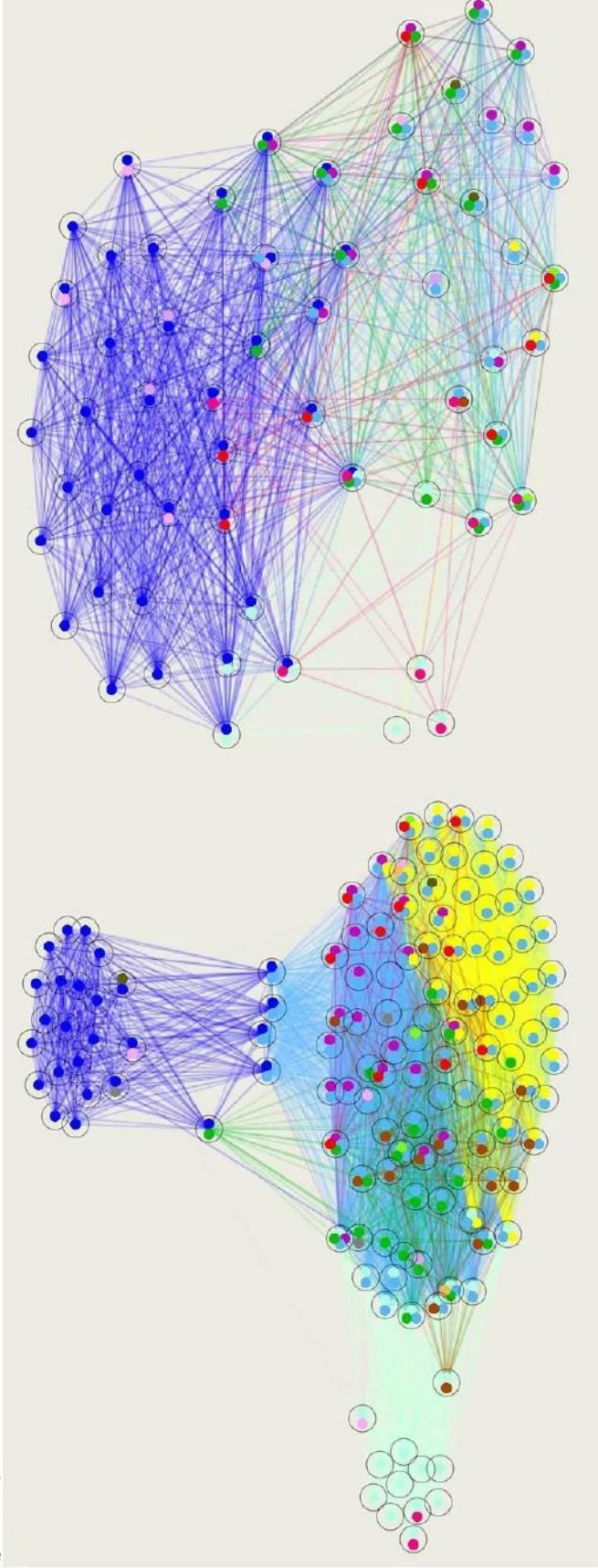
The on-line interactive tools at <https://goetheandcandalle.rcc.uchicago.edu/> visualize the behaviors and interactions of different categories that compose each scientific text. Visuals created by Andrew McNutt (Department of Computer Science, UChicago), with support from Kazutaka Takahashi and Sergio Elahi (Visualization for Understanding and Exploration, UChicago).



**Fig. 5** Role of the Romantic and the Classical categories in relation to the Methodological and the Historical categories

These visuals compare Goethe's text to Candolle's chapter from *Organography of Plants*. The Historical/Descriptive category and especially the Methodological category play a negligible role in Goethe's text, but they are dominant in Candolle's text, where he outlined his theory of plant symmetry and method.

In Candolle's text (right), much of the Romantic (sky blue) and Classical (green) elements of the text seem to be absorbed by methodological (mint green) and historical (dark blue) purposes. On the contrary, in Goethe's text (left), the Romantic and Classical categories are more independent and distant from the Historical (dark blue) and Methodological (mint green) groups. Instead, Romantic elements tend to be associated with the categories that directly involve the observer such as the Empirical category (yellow).



Visuals created by Andrew McNutt (Department of Computer Science, UChicago), with support from Kazutaka Takahashi and Sergio Elahi (Visualization for Understanding and Exploration, UChicago).

### Chapter 3 Goethe in France, after *On the Origin of Species*

The previous chapter examined the French reception of J. W. von Goethe (1749-1832)'s theory of organic metamorphosis in the first half of the nineteenth century. It showed how readers received similar scientific works by the naturalists of different nationalities. It also attempted to locate more precise points of divergence between the French and German scientific texts in question, by determining whether their characteristics indeed corresponded with the distinctive styles of science that readers assumed for different nations.

This chapter examines the French reception of Goethe's natural science in the second half of the nineteenth century. Toby Appel cautioned in *The Cuvier-Geoffroy Debate* against interpreting the earlier natural scientific ideas as culminating in the Darwinian evolutionary theory.<sup>1</sup> And yet the publication of *On the Origin of Species* was without doubt a major event in the scientific community. Even in France—the nation which, according to both the nineteenth-century scholars and many of contemporary scholars, showed the least enthusiastic reception of Charles Darwin (1809-1882)'s ideas—a well-known naturalist like Alphonse de Candolle (1806-1893) felt the need to revise his book on the history of sciences after the diffusion of Darwin's ideas.<sup>2</sup> Earlier ideas may or may not have been directly connected to Darwin's ideas, but many of the late nineteenth-century audience began to relate and re-evaluate them in light of the Darwinian concepts, and vice versa. After the publication of the *Origins of Species*, Darwin was

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<sup>1</sup> Toby A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin* (New York: Oxford University Press, 1987), 2-3.

<sup>2</sup> Théodule Armand Ribot, "Analyses et comptes-rendus," *Revue philosophique de la France et de l'Étranger* (Jan.-June, 1885): 328. Alphonse de Candolle was the son of Augustin P. de Candolle, the main subject of the previous chapter. Ribot, in this review of Alphonse de Candolle's *Histoire des sciences et des savants depuis deux siècles*, noted that the first edition of the book (1873) was rapidly sold out, but that the author revised it quite a bit for its second edition 11 year later, by replacing the studies on transformism with new researches on heredity. Indeed, the 1885 edition of the book features a 180-page chapter on the "influence of heredity, variability, and selection" at the forefront, which used to be a 100-page chapter at a later part of the first edition.

frequently discussed in relation to earlier naturalists, including Goethe. Thus, taking Appel's caution as well as the indisputable impact of Darwin's works, I will focus on the following questions:

1. What were the notable changes and continuities in the reception of Goethe and his morphology, after the publication of the *Origins of Species*?
2. In these receptions during this period, what new role did Goethe come to play in scientific discussions?
3. What can the receptions of Darwin and of Goethe together inform us about the general shape of transformism that the French scientific community came to embrace, in response to the build-up of the transformist and/or evolutionary ideas?

While answering these questions, I will also examine how the national images of France and foreign nations—which were very much present in scientific discussions in the first half of the century, as the previous chapter showed—came to be expressed in a new form.

### 1. Goethe the naturalist

In Chapter 2, the case study comparing the botanical texts authored by Goethe and A. P. de Candolle (1778-1841)—representative of the German and French styles of science, respectively—showed that their differences had little to do with the assumed national characteristics. And yet reviews of Goethe's work established him as an amateur naturalist at best,<sup>3</sup> and his concepts of the primitive type and its metamorphosis as poetic daydreams or even

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<sup>3</sup> By the early nineteenth century, it seems that the distinction between “amateurs” and “professionals” was commonly made. A. P. de Candolle and several others emphasized either that Goethe's scientific work came by luck rather than by a rigorous scientific research, or that it was Goethe's momentary hobby. A. P. de Candolle, “Essai sur la métamorphose des plantes,” *Bibliothèque universelle* t.40 (1829): 263. Likewise, L.-F. de Ronchaud grouped Goethe with Jules Michelet—French historian who wrote on natural scientific topics—and described them as “foreigners and travelers in the cantons of science.” L.-F. de Ronchaud, “D'une nouvelle philosophie de l'histoire naturelle,” *Revue de Paris* t.32 (June 1856): 259. See the previous chapter for more examples.

irreligious imaginations. Did this portrayal change at all, as the Darwinian theories of variation and natural selection gained traction in the second half of the nineteenth century?

At the simplest level, several writers from the 1870s onward noted that Goethe's theory of metamorphosis had been proven correct over time. Nicolas Joly (1812-1885), a professor of zoology at the Faculty of Sciences of Toulouse and correspondent of the Institute, was reported to have confirmed the "new proofs, in addition to many others, in favor of Goethe's ingenious theory of metamorphosis, which is to plant morphology what vertebral theory is to comparative anatomy of higher animals."<sup>4</sup> According to Henri de Boissieu (1871-1912), a French botanist, the theory of metamorphosis—"this fortunate imagination of an ingenious dreamer"—was subjected to the control of methodical experiment, and "science elevated a seductive hypothesis to the height of a demonstrated fact."<sup>5</sup> He went so far as to claim that various botanical facts supported the evolutionist theory, "where Goethe preceded Darwin."<sup>6</sup> Edmond Perrier (1844-1921), a renowned French zoologist, likewise credited Goethe for the concept of an organic individual unit, an archetype, that repeated and transformed itself indefinitely to construct all parts of a whole organism. Perrier added: "What Goethe predicted solely by the consideration of flowering plants was demonstrated since then by the study of vascular cryptogams."<sup>7</sup> Several others, too, credited Goethe for having distinguished early on between "normal ascending metamorphosis" and "accidental descending metamorphosis" of plants.<sup>8</sup>

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<sup>4</sup> "Classe des sciences," *Mémoires de l'Académie des sciences, inscriptions et belles-lettres de Toulouse ser.8 t.7* (1885): 389.

<sup>5</sup> Henri de Boissieu, "Un cas de tératologie végétale," *Bulletin de la Société des sciences naturelles et d'archéologie* n.10 (Jan.-Mar. 1898): 28. Boissieu was referring to a widely accepted argument that there was no essential difference among the verticils constituting a flower, which all derived from a common origin, the leaf.

<sup>6</sup> *Ibid.*, 28.

<sup>7</sup> Edmond Perrier, *La terre avant l'histoire* (Paris: Renaissance du Livre, 1921), 129.

<sup>8</sup> Botanists Michel-Félix Dunal (1789-1856) and Auguste Trécul (1818-1896) were among those who credited Goethe for making this distinction. Dunal, "Végétal, vegetation," in *Encyclopédie du dix-neuvième siècle t.24* (Paris: Bureau de l'encyclopédie du XIX<sup>e</sup> siècle, 1872), 16-17. Auguste Trécul, "Anatomie végétale – Observations sur la nature des diverses parties de la fleur," *Comptes rendus hebdomadaires des séances de l'Académie des Sciences t.75*

Others noted how some of Goethe's ideas developed into the key concepts in modern biology. French zoologist Henri Milne-Edwards (1800-1885) traced the modern study of cells to Goethe (among others), who viewed an animal or plant body as an association of individual parts, each of which had its own life.<sup>9</sup> Several scholars attributed to Goethe the establishment of morphology as a formal branch of biology. A major encyclopedic dictionary of the time, the *Grand dictionnaire universel du XIXe siècle* directed by Pierre Larousse (1817-1875), used Goethe's definition for botanical metamorphosis and credited him for the morphological concept in botany.<sup>10</sup>

Some re-affirmed Goethe's study as a biological research by explicitly distancing it from philosophy. In a dictionary entry "Plant biology," Ernest Germain de Saint-Pierre (1814-1882), a French botanist, defined biology as a study of phenomena of life in their relations among each other. Leading from observations to inductions to conclusions, biologists did not attach themselves to scholastic philosophy, but appreciated and cultivated philosophy of science. He concluded: "Linnaeus, Goethe, Étienne Geoffroy-Saint-Hilaire were biologists."<sup>11</sup> Alfred Giard (1846-1908), a well-known French zoologist, went further and argued that *experimental* biology—which he claimed was France's forte—was the future of the study of evolution.<sup>12</sup> Science needed its philosophy, but it really progressed by experiments, laboratories, and the mechanical explanations emerging from them. Although France fell behind other nations in its

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(Jul.-Dec. 1872):649. By "normal ascending metamorphosis," Goethe meant the progressive growth of a plant through alternate processes of expansion and contraction of forms, from a seed to a fruit. The "accidental descending metamorphosis" referred to the changes to this pattern of development, brought on by external influences such as insect pollination and weather changes.

<sup>9</sup> Henri Milne-Edwards, *Leçons sur la physiologie et l'anatomie comparée de l'homme et des animaux* t.14 (Paris: G. Masson, 1880-1), 266-267.

<sup>10</sup> See the following entries (by unknown contributors): "Botanique," *Grand dictionnaire universel du XIXe siècle* t.2 (1867): 1031. "Métamorphose," *Grand dictionnaire universel* t.11 (1874): 136. "Morphologie," *Grand dictionnaire universel* t.11 (1874): 579.

<sup>11</sup> E. Germain de Saint-Pierre, *Nouveau dictionnaire de botanique* (Paris: Baillière, 1870), 1351.

<sup>12</sup> Alfred Giard, *Controverses transformistes* (Paris: Masson, 1904), 3.

reception of transformism, France took the first rank in its positive, experimental spirit—a key factor for turning the philosophical theory of evolution into a positive biological study.<sup>13</sup>

Although Giard did not discuss Goethe in depth, he considered Goethe to fit this modern spirit of experimental biology, and concluded that Goethe, along with Darwin and Lamarck (1744-1829), constructed the edifice of biological science.<sup>14</sup>

These reviews are a sampling of a much larger group of similar evaluations of Goethe the naturalist. If the view that Goethe’s botanical ideas were poetic and metaphorical was dominant in the earlier part of the century, the later period seems to have more readily recognized the scientific validity of his ideas. Still, as in the first half of the century, Goethe was better known for his literary works than for his scientific works: he was almost always introduced first as a poet, even when the discussion was about his scientific works; the entry “Goethe” in the *Grand dictionnaire universel* almost exclusively discussed his literary activities, only mentioning that he was interested in various fields such as painting and exact sciences.<sup>15</sup> However, the overall discussions of Goethe in scientific contexts increased, a large portion of which was in connection with the discussions of Darwin in some way or another.<sup>16</sup> The growth in the awareness of Goethe the naturalist, thus, was correlated with the developments in morphology or transformism, largely impacted by the spread of Darwin’s ideas. This shift was not lost to the nineteenth-

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<sup>13</sup> Ibid., 3-4.

<sup>14</sup> Ibid., 9 & 25. Giard noted that Goethe rightly focused on, for example, the question of *how* the horns emerged on cows, rather than the question of *why* cows had horns.

<sup>15</sup> “Goethe,” *Grand dictionnaire universel t.8* (1872): 1346-1347.

<sup>16</sup> Gallica, the digital library of the *Bibliothèque nationale de France*, exhibits the following numbers of documents, as of Sept. 17, 2020:

	<b>1790-1859</b>	<b>1859-1928</b>
Documents that mention “Goethe”	2,957	12,319
“Goethe” + “Metamorphose des plantes”	72	163
“Goethe” + “Metamorphose” within 1,000 words	375	1,352
“Goethe” + “Darwin” within 1,000 words	26	890
“Goethe” + “Darwin”	<164	2,722

century reviewers themselves, who discussed the intellectual relation (or lack thereof) between Goethe and Darwin, or between Goethe and other figures who contributed to transformism.

### a) Goethe the precursor of Darwin

Among those who discussed Goethe and Darwin together, the most common view was that Goethe's theories of archetype and metamorphosis were a precursor to Darwin's evolutionary theory. Ernst Haeckel (1834-1919), a renowned German zoologist and evolutionist who likened Darwin's scientific "reform" to Martin Luther's reform of the Church,<sup>17</sup> argued that Lamarck, Goethe, and Darwin were part of the same intellectual lineage. Despite the German nationality of the author, this writing was reviewed, quoted, translated, and introduced in multiple French journals. Haeckel considered the basis of Darwin's ideas to be the monist view of the world, as was that of Goethe's.<sup>18</sup> Through different research methods, Lamarck, Goethe, and Darwin all arrived at the same conclusion, which challenged superstitions and orthodoxy of their time: the vision of a unitary and coordinated evolution of all organic bodies, directed by natural causes.<sup>19</sup>

If Goethe was acknowledged in a general manner for having played a role in the development of transformism across centuries,<sup>20</sup> others made more nuanced analyses of Goethe

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<sup>17</sup> Ernst Haeckel, "Darwin, Goethe et Lamarck," *Revue scientifique de la France et de l'étranger* v.30 (Dec. 2, 1882): 705.

<sup>18</sup> *Ibid.*, 711. In the following few pages, Haeckel further explained this "monist view" that Goethe and Darwin shared. In general, a monist view upheld a vision of indissoluble unity between God and the world. Instead of staying outside of the world, God worked it from inside; God encompassed nature in him, and nature encompassed God, so that every living being would be immersed in the divine presence. This philosophy permeated into natural scientific theories as well. If Cuvier explained the history of geological transformations with a series of violent revolutions of the earth that truncated natural history, Charles Lyell—Darwin's compatriot and contemporary—proposed a theory of a progressive, uninterrupted evolution of the earth. This theory was in the same vein as Goethe's understanding of the world as a whole, which participated in a continuous, uninterrupted evolution. The monist idea of evolution was even more explicitly expressed in Goethe's botanical and zoological studies: Goethe derived numerous species, all of which were analogous but not identical to each other, from a unique primitive form—harmonious diversities all converging on unity.

<sup>19</sup> *Ibid.*, 714-715.

<sup>20</sup> Clémence Royer walked through a history of transformism beginning with the ancient thoughts, their interactions with the Christian beliefs, their rejection in the Renaissance, and then the theories of modern figures such as Benoît

and Darwin. Many recognized their connection, but viewed Goethe as a philosophical version of the other.<sup>21</sup> Jules Soury (1842-1915), a French theoretician and historian of science, classified Denis Diderot (1713-1784), Goethe, Lamarck, Pierre Louis Maupertuis (1698-1759), Saint-Hilaire, and Bory de Saint-Vincent (1778-1846) as the “men of the eighteenth century,” regardless of their actual timelines. Although their “eighteenth-century” manner of understanding had been largely discredited, in Soury’s eyes they were prophets of modern scientific theories on the verge of the 20C.<sup>22</sup> Equating transformism to the theory of descent, Soury defined its history as beginning with Lamarck, who expounded it, and then traced its path to Darwin and Haeckel, who formulated and developed it. Goethe was assigned an intermediary role of purveyor, in which he *philosophically* conceived and *imagined* it.<sup>23</sup> Likewise, the entry on

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de Maillet, Jean-Baptiste Robinet, Goethe, Geoffroy Saint-Hilaire, Lamarck, and Darwin. Similarly, in the introduction of the 1884 edition of Buffon’s *Oeuvres complètes*, J.-L. Lanessan equated Goethe’s ideas to the “theory of variability” and “evolution” of organisms, and claimed that Michel Adanson, Lamarck, Bonnet, Goethe, and Saint-Hilaire were founders of modern science. Charles Dollfus, a French philosopher and essayist, grouped together Goethe and other figures, including Cuvier, whom most scholars had considered as a major opponent of the ideas of Goethe and Saint-Hilaire. Regardless of their disagreement, they were part of a broad movement shaping the study of organic relations. Another reviewer took up a similar argument from a more philosophical angle, arguing that this group of thinkers—Lamarck, Goethe, Cuvier, Saint-Hilaire, Milne-Edwards, Darwin, Virchow, Haeckel, etc.—all challenged the Cartesian system, changing the general orientation of minds. Another writer voiced the same point that Darwin, Goethe, and Saint-Hilaire were all against the mechanical Cartesianism—but associated their ideas with foreign religious beliefs, like the Hindu and Greek legends on the metamorphoses of animate beings. Clémence Royer, “Darwinisme,” in *Dictionnaire encyclopédique des sciences médicales s.1 t.25*, ed. A. Dechambre (Paris: G. Masson, 1880), 698-767. Buffon, *Oeuvres complètes de Buffon. Nouvelle édition t.1* (Paris: Abel Pilon, 1884), 1 & 421\*. Charles Dollfus, “Essai sur le XIX<sup>e</sup> siècle: la crise religieuse,” *Revue germanique t.27* (Sept.-Dec. 1863): 401-402. Jean Izoulet, *La cité modern: métaphysique de la sociologie* (Paris: Baillière, 1895), 63. Jean-Marie Guyau, “Un problème d’esthétique: l’antagonisme de l’art et de la science,” *Revue des deux mondes t.60* (Nov.-Dec. 1883): 370-371.

<sup>21</sup> I put together here only primary sources, but for more details from a contemporary work on the German and English understandings of the concept of the organic types, see: Robert J. Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago: University of Chicago Press, 2002). Supporting the view that Goethe anticipated the evolutionary theories of Lamarck and Darwin (ibid., 210-211), Richards describes differences and continuities between the German and English views on the archetype. Goethe considered that mind’s eye, rather than senses, could recognize the archetype, and that the instantiations of its potential variations took place through the organism’s formative drive. For English scholars like Richard Owen and Darwin, the archetype had a more physical reality; the variations of few primitive forms took place, for Darwin, through the organism’s interactions with its environments, or the natural selection. Despite these differences, Darwin adopted the German Romantic idea that nature (rather than God) harbored the creative force. Ibid., 517-518, 532-533.

<sup>22</sup> Jules Soury, *Philosophie naturelle* (Paris: Charpentier, 1882), 8-9.

<sup>23</sup> Ibid., 115-116. Another source reported on the exchange between Soury and Haeckel at a banquet. To Soury’s comment that Haeckel was less celebrated in France due to his mechanical explanation of the world, Haeckel responded in affirmation. In defending the monist or mechanical concept of the world against the doctrine of final

“Geoffroy Saint-Hilaire” in the *Dictionnaire des sciences philosophiques* noted that Goethe considered the doctrine of unity of composition—which Saint-Hilaire was the first to develop rigorously—to be favorable for the philosophy of nature.<sup>24</sup>

In contrast to these views, others stressed that Goethe’s ideas were more than philosophical musings, thereby even more strengthening their connection to Darwin’s. While Perrier understood the famous debate between Georges Cuvier (1769-1832) and Geoffroy Saint-Hilaire (1772-1844) as a catalyst that shifted the general spirit of Goethe’s era in a *philosophical* sense,<sup>25</sup> he did not consider Goethe himself to be philosophical or outdated. He separated Goethe from other German nature-philosophers (whom he partially defended as well,) and argued that the concept of the archetype was not as philosophical and imaginary as people made it out to be—it was a *result* from comparative studies, not an *apriori concept*.<sup>26</sup> In fact, Goethe was the first to offer a methodical concept of transformational relations among living beings, when the idea of a common organic form was already prevalent in Germany.<sup>27</sup> For Perrier, Goethe was a transformist and partisan of variability of species, along with Buffon, Saint-Hilaire, Lamarck, and Erasmus Darwin.<sup>28</sup> Giard, too, implied that Goethe, along with Lamarck, Saint-Hilaire, and Darwin, transformed a spectacle to behold into a problem to solve.<sup>29</sup> Giard even drew a parallel between the French and German paths of the development of the theory of evolution. Although

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causes, Haeckel commented that modern morphology was established with Lamarck’s theory of descent and later developed with Darwin’s theory of selection; Goethe, too, conceived the idea *very philosophically*. “Discours de M. Haeckel: l’évolution et le transformisme,” *Le Temps* (Aug. 30, 1878): 3.

<sup>24</sup> Albert Lemoine, “Geoffroy Saint-Hilaire,” in *Dictionnaire des sciences philosophiques, par une société de professeurs et de savants*, ed. Adolphe Franck (Paris: Hachette, 1875), 613.

<sup>25</sup> Perrier, *Les Colonies animales et la formation des organismes* (Paris: Masson, 1881), 6.

<sup>26</sup> Perrier, *La philosophie zoologique avant Darwin* (Paris: Baillière, 1884), 161 & 180-181.

<sup>27</sup> Perrier, *La transformisme* (Paris: Baillière, 1888), 17-18. Another reviewer described Goethe in the same way: Goethe was the first in Germany to formulate the evolutionary ideas in an explicit manner and to successfully provide scientific observations. Ludovic Carrau, “Le transformisme et Charles Darwin,” *Journal des débats politiques et littéraires* (May 25, 1882): 3.

<sup>28</sup> Perrier, *La philosophie zoologique avant Darwin*, 270-271.

<sup>29</sup> Giard, *Oeuvres diverses réunies et rééditées: Biologie générale* (Paris: Laboratoire d’évolution des êtres organisés, 1911), 479.

France was best suited to promote evolutionary ideas, it ended up ostracizing such ideas; and Germany, despite the works by Goethe and Kant, which should have logically led to transformism, strayed into anti-empiricist philosophy of nature.<sup>30</sup> With this view of the history of transformism—which Giard established as a legitimate field of science—he, like Perrier, separated Goethe from the more philosophical group of his contemporaries, aligning him with Darwin and the French naturalists. Finally, Mathias Duval (1844-1907), a French professor of anatomy and histology, defended Goethe by explicitly addressing the question of intellectual lineage:

One sees ... how closely all Goethe's research in natural sciences is related to the essential object of the transformist studies today, and on how many points his results agree with the doctrine of evolution. Was Goethe truly and explicitly a precursor of Darwin? One should respond affirmatively ... Without doubt he did not publish the treatise on the origin of species, on adaptation ... we see him approach and resolve in a transformist sense the questions of origin and of kinship of organisms.<sup>31</sup>

In these reviews that identify a positive connection between Goethe and Darwin, the evaluation of Goethe the naturalist in the latter half of the century hinged upon the stature of transformism. Even if Goethe was considered a precursor to Darwin's evolutionary theory, if transformism itself failed to convince the reviewers of its scientific quality, then Goethe's reception would not be much different from that of the first half of the century. For example, one reviewer grouped Goethe and Darwin together for the "grandiose concept of the unity of plan in nature" at the basis of their thoughts, but dismissed Darwin's theories as mere hypotheses.<sup>32</sup> Similarly, another reviewer, when discussing Haeckel's work, asserted that Lamarck, Goethe,

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<sup>30</sup> Ibid., 119.

<sup>31</sup> Mathias Duval, "Le transformisme," *Revue d'anthropologie* (1883): 453.

<sup>32</sup> F. Baudry, "Histoire des plantes par H. Baillon," *Journal des débats politiques et littéraires* (Nov. 27, 1875): 3.

Darwin, and Haeckel all had to rely solely on their observations, which were bound to be incomplete and uncertain—certainty and progress lay in experiments and not in observations.<sup>33</sup>

#### **b) Goethe the non-Darwinian transformist**

The various conceptions of transformism also influenced the evaluations of Goethe. Although there seems to have been an easy consensus that Goethe was a transformist, it was not so straightforward with Darwin. How Darwin's ideas were understood within or outside the development of transformism, and how transformism itself was defined, often had varying impacts on Goethe's reception.

First, those who drew a hard line between Goethe and Darwin tended to emphasize the ideas relating to natural selection as an essential mark of the modern transformist thought. The entry on "Transformism" in the *Grand dictionnaire universel* provided a detailed history of transformism, which did include Goethe along with Saint-Hilaire, Lamarck, and Darwin. At the same time, it reported that many—even in Germany—were skeptical about Goethe being the German precursor to transformist theory because he never considered the idea of an effective metamorphosis of species.<sup>34</sup> Indeed, this claim is supported by the entry on "Goethe" in the *Dictionnaire encyclopédique des sciences médicales*. In this entry, François-Louis Hahn (1844-1921), the author, stressed that Goethe deserved to be appreciated as the naturalist and physician, not as a poet or novelist, and credited Goethe for providing the "general ideas which have acquired citizenship in science."<sup>35</sup> Even so, Goethe's key concept, the primitive type, was a poetic device which could be linked back to Diderot from the eighteenth century. If Goethe were

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<sup>33</sup> A. Vernier, "Causerie scientifique: *Histoire de la création des êtres organisés d'après les lois naturelles*, par Ernest[sic] Haeckel," *Le Temps* (Feb. 17, 1874): 1.

<sup>34</sup> "Transformisme," *Grand dictionnaire universel t.17 Sppl.2* (1890): 1939.

<sup>35</sup> F.-L. Hahn, "Goethe," in *Dictionnaire encyclopédique des sciences médicales ser.4 t.9*, ed. A. Dechambre (Paris: G. Masson, 1883), 741-742.

to be Darwin's precursor, then Diderot would be one, too.<sup>36</sup> Hahn also quoted Emil du Bois-Reymond (1818-1896), who had stated that Goethe's contribution was not essential for the establishment of Darwin's ideas: Goethe led the German science further off the course and certainly did not grasp the theory of selection.<sup>37</sup> The French newspaper *Le Temps* also published a review of *Descendance et Darwinisme* by Oscar Schmidt (1823-1886), a German zoologist, who rejected Haeckel's view that Goethe was one of the founders of the theory of descent. Again, the theory of natural selection became the litmus test: Goethe did not understand the principle of evolution of species, and Lamarck was much closer to understanding the system, even though he did not explicitly elucidate it.<sup>38</sup>

If these reviews identified the "true" transformism with Darwin and his theory of natural selection—which would have allowed them to dissociate Goethe and the majority of other transformists of the earlier decades—other reviews took different paths. They, too, identified Darwin with transformism and placed Goethe at some distance, but did not use the *system* or *process* of selection as the determining criterion. Instead, they used either the *precondition* of natural selection—a primitive form capable of producing variations—or the *outcome* of natural selection—the resulting transformations across time—as the determining feature of Darwin's thought. Depending on with which element the reviewers chose to identify Darwin and Goethe, and depending on whether they agreed or disagreed in these regards, the location and status of Goethe and Darwin in the history of transformism varied.

Let us take the article on "Philosophical anatomy" in the *Dictionnaire encyclopédique des sciences médicales* by Dominique A. Lereboullet (1804-1865), a French zoologist. The

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<sup>36</sup> *Ibid.*, 742.

<sup>37</sup> *Ibid.*, 744.

<sup>38</sup> A. Vernier, "Causerie scientifique," *Le Temps* (Oct. 14, 1874): 2.

author clearly indicated what he considered to be the legitimate boundary of the study of organic relations. He grouped together Lamarck and Darwin and criticized them for their “philosophical manners of envisaging the animal kingdom, which birthed eccentric theories” and “false judgments.”<sup>39</sup> This “philosophical manner” consisted of the idea of the animal kingdom as a progressive chain from beasts to men, and each animal as an individualization of animality, or of transformations across this chain.<sup>40</sup> On the other hand, the author approved of the naturalists who researched analogous relations among animals, including the French naturalists in the earlier period—Buffon, Daubenton, Vicq-d’Azyr, Saint-Hilaire, and even Cuvier—and Goethe, who was the only German naturalist mentioned in a positive light.<sup>41</sup> Any hypothesis beyond the study of analogies in animal compositions, the author viewed as excessive and false. Lereboullet identified Lamarck and Darwin with the concepts of primitive form and of transformation across different species—with both of which he disagreed—while identifying Goethe with neither, thereby grouping the latter with the giants of French natural science. On the other hand, Auguste-Frédéric Suchard (1841-1905), a French doctor in medicine, separated Goethe and Darwin by distinguishing evolutionism from Darwinism. According to Suchard, the trademark of Darwinism—or the doctrine of transmutation—was the concept of progressive metamorphosis of forms, while evolutionism emphasized the concept of simple primitive common forms.<sup>42</sup> The evolutionist school was represented by Buffon, Lamarck, Saint-Hilaire, Goethe, and Lyell, to name just a few; among these, Lamarck and Lyell were the ones who also paved way for the development of Darwinism, which provided a solid basis with facts and most plausible

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<sup>39</sup> Dominique A. Lereboullet, “Anatomie philosophique,” in *Dictionnaire encyclopédique des sciences médicales ser. I t.4*, ed. A. Dechambre (Paris: G. Masson, 1870), 273.

<sup>40</sup> *Ibid.*, 272-273.

<sup>41</sup> *Ibid.*, 260.

<sup>42</sup> Auguste-Frédéric Suchard, “Darwinisme,” in *Encyclopédie des sciences religieuses t.3*, ed. F. Lichtenberger (Paris: Sandoz & Fischbacher, 1878), 601. With these definitions, Suchard criticized Haeckel for merging two kinds of thought that should not have been conflated.

explanation for transformism.<sup>43</sup> In this case, Suchard identified Darwin with the concept of transformation across species, and Goethe with the concept of primitive form. The author viewed them as sequential stages of an intellectual history, although he did not seem to have adopted them.<sup>44</sup> In this way of understanding, Goethe was not a direct intellectual precursor to Darwin.

## 2. Goethe the German naturalist

I have considered the French reception of Goethe the naturalist after the publication of Darwin's *Origin of Species*. Previous chapters highlighted how national images, or the idea of national science, had influenced Goethe's reception during the first half of the century. In this section, I will consider the French evaluations of German science in general and of Goethe as the prototype of the *German* naturalist.

As several of Darwin's contemporaries noted, France was not as open to receive Darwin's theories as Germany and England were.<sup>45</sup> The ongoing military rivalries between France and the rest of Europe, especially the one between France and Germany culminating in the Franco-Prussian war (1870-1871), might have contributed to France's mistrustful attitude towards foreign scientific ideas.<sup>46</sup> This behavior was paired with the continuing critical view of Germany and German intellectual life in general. An unknown author gave a backhanded compliment when he wrote that Germany excelled in the realm of the ideal, giving birth to new concept of the universe and new methods of science, as well as to the Romantic movement,

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<sup>43</sup> Ibid., 601-602.

<sup>44</sup> In a different writing, Suchard explicitly rejected Darwinism, and made a more detailed distinction between Goethe and Darwin, which will be discussed later in this chapter. Suchard, "Une nouvelle explication de l'origine des êtres," *Revue Chrétienne* a.25 (1878): 261-283.

<sup>45</sup> For example, see: Giard, *Controverses transformistes*, 1. More detailed information on France's lukewarm reception of Darwin is discussed later in this chapter (pp.20-24).

<sup>46</sup> The Franco-Prussian War will be discussed in detail later in this chapter, in the section "Darwin and the French national self-awareness" (p.25).

which compensated for Germany's lagging in terms of everyday practical matters.<sup>47</sup> Another blamed some Germans who, in contrast to the French reviewers who regarded Darwin's ideas as a mere hypothesis, disliked the English naturalist because he completely lacked philosophical spirit and was too factual; Darwin, as a "man of facts," was considered the "enemy" of ideas.<sup>48</sup> Some were more explicit in their criticism of the German scientific style. For example, in 1878, Suchard expressed relief that "our French spirit, our good practical sense, preserved us from the Germans' enthusiasm for Darwinism."<sup>49</sup> Finally, Perrier wrote a scathing commentary on Germany during the first World War. In his article for *Le Figaro*, he defined the "German Kultur" with two negative concepts: pride and mysticism. According to Perrier, Germany was guilty of its egoistic sense of superiority; they believed they had the mission to regenerate the rest of the world. In the realm of science, Germany despised French science for paying attention only to isolated facts and ignoring the "whole," while the nineteenth-century science—French science being its representative—rested on immovable and independent facts. Perrier also criticized Germans for warming up to Darwin's theories only after they recognized their utility in strengthening the German nationalistic belief, as if the doctrine of survival of the fittest could justify the prophecy of the German victory.<sup>50</sup>

#### a) Goethe and German identity

The image of the excessively philosophical, self-centered style of German science had prevailed even before *On the Origin of Species* and did not seem to have changed much afterwards. What then of the reception of Goethe as a *German* naturalist? Previous chapter showed that Goethe was strongly associated with the image of German characteristics during his

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<sup>47</sup> "Bulletin de l'Étranger: le crépuscule des dieux," *Le Temps* (Aug. 5, 1895): 1.

<sup>48</sup> "Un mois à Berlin," *Le Temps* (Jan. 31, 1888): 2.

<sup>49</sup> Suchard, "Une nouvelle explication de l'origine des êtres," 282.

<sup>50</sup> Perrier, "Le Bluff de la science allemande," *Le Figaro* n.115 (Apr. 25, 1915): 3.

time—for example, a majority of French reviewers assumed that Goethe’s morphological studies were philosophically oriented, based on his pantheistic belief and on the popular image of German nature-philosophers, even when his work was filled with no fewer empirical elements than the works of his French counterpart. In the second half of the century, however, the association between Goethe and the image of Germany appears to have become less explicit.

As mentioned earlier, some authors separated Goethe from the German nature-philosophers. Others still identified Goethe with a German intellectual style, but also recognized that he represented more than a typical German style. An article devoted to Goethe’s pedagogy made a point that Goethe had been exposed to both French and German styles of education: in Strasbourg, he received practical learning intended for fostering lawyers and physicians, while in Leipzig he received an education oriented towards fostering scholars.<sup>51</sup> The author speculated that Goethe might have preferred the German method because it allowed him to dive deeper into the subjects of his study,<sup>52</sup> but admitted that Goethe never made a clear judgment regarding the two different national styles of education.

On the contrary, Ernest Faivre (1827-1879)—one of few who extensively analyzed Goethe’s scientific works in the latter half of the nineteenth century—made a slightly different distinction. In parallel to the division between practical and scholarly knowledge, Faivre also distinguished between the school of positive, experimental science and the school of speculative science. Goethe, while striving to be part of the former school, was closer to the latter.<sup>53</sup> However, Faivre made this distinction within the German community, and thus, Goethe’s scientific style was not characterized in a national context, but with one of several types of

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<sup>51</sup> L. E. Hallberg, “La pédagogie de Goethe, d’après ses mémoires,” *Mémoires de l’Académie des sciences, inscriptions et belles-lettres de Toulouse ser.9 t.9* (1897): 134-135.

<sup>52</sup> *Ibid.*, 135.

<sup>53</sup> Ernest Faivre, *Oeuvres scientifiques de Goethe* (Paris: Hachette, 1862), 17.

scientific approach shared across Europe. Faivre stressed that, while Goethe did embody the more speculative than positive approach, his work—specifically his study on the metamorphosis of plants—was also not typical of the speculative science in Germany at that time.<sup>54</sup> The author highlighted the pan-European nature of Goethe’s work by noting that Goethe actively corresponded with naturalists from Germany, France, and England.<sup>55</sup> Whether German or pan-European, however, Goethe’s work was above all a unique blending of artistic and scientific qualities, which was the mark of a unique genius.<sup>56</sup> Faivre’s evaluation focused on Goethe as an individual, especially when it came to his scientific works, in contrast to an earlier evaluation from Benjamin Constant (1767-1830), which was typical of the more nationalistic evaluation of Goethe in the earlier time: “I always feel ill at ease with foreigners. I indeed have a discomfort with Goethe in every conversation. What a shame that Germany’s mystical philosophy has carried him away! ... The abuse of analogy can be seen many times in Goethe, and above all in his prejudices towards chemistry and exact sciences.”<sup>57</sup>

Despite this shift that brought Goethe slightly away from the national images of science, Goethe did not fully escape from his association with German identity in the latter half of the century. That Goethe’s philosophical and scientific views were based on a pantheistic belief—one of key points with which French reviewers had characterized and criticized German thought—was an established fact, which was confirmed by Goethe himself and which continued to be mentioned in reviews. However, Goethe’s pantheism did not attract any more attention as a tool for criticism, compared to the earlier periods. In fact, the digital library of the *Bibliothèque*

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<sup>54</sup> Ibid., 21.

<sup>55</sup> Ibid., 21.

<sup>56</sup> Ibid, 22-23.

<sup>57</sup> Constant was quoted in: Charlotte Lady Blennerhassett, *Madame de Staël et son temps (1766-1817) t.3* (Paris: Louis Westhausser, 1890), 53-54.

*nationale de France* exhibits the following numbers of documents (as of January 3, 2021), which indicate a marginal decrease of the mentions of pantheism in the scientific discussions of Goethe.<sup>58</sup>

	1790-1859	1859-1928
Documents containing [ <b>panthéisme</b> within 1,000 words of <b>Goethe + science</b> ] / Documents containing [ <b>science</b> within 1,000 words of <b>Goethe</b> ]	150 / 1561 (9.61%)	595 / 6476 (9.19%)
Documents containing [ <b>panthéisme</b> within 1,000 words of <b>Goethe + métamorphose</b> ] / Documents containing [ <b>métamorphose</b> within 1,000 words of <b>Goethe</b> ]	37 / 381 (9.71%)	94 / 1374 (6.84%)

Goethe was characterized with other German qualities, too, but it was not necessarily in a negative light. For instance, Alphonse de Candolle saw Goethe as representative of German science and literature, but unlike the reviewers from the early nineteenth century, he did not invoke any criticism of literary or philosophical language dominating over the scientific language. On the contrary, Goethe’s literary style was thought to be in support of his scientific works:

The difficulty of [German language] for foreigners come from the constructions of phrases and words ... I asked myself if this was a good German style. So I recalled Goethe, one of the greatest writers in Germany and also a profound naturalist. I opened his *Metamorphosis of Plants*. I read some fragments. They made me feel, in comparison, a joy ... Indeed, our German brothers are more fortunate than the French and English: they have a model of style, for Goethe wrote on botany and nobody of his contemporaries can say that he was a mediocre writer.<sup>59</sup>

<sup>58</sup> The search around the term “transformiste” yields a different outcome, however. The percentage of the documents containing [**panthéisme** within 1,000 words of **Goethe + transformiste**], out of the documents containing [**transformiste** within 1,000 words of **Goethe**], increased by around 4% from the first to the second half of the century. However, this increase was partly due to the fact that the documents containing the terms “transformisme” or “transformiste” in connection with “Goethe” were almost non-existent (only 2 documents)—and zero documents containing both “panthéisme / panthéiste” and “transformisme / transformiste” in connection with “Goethe”—in the first half of the century.

<sup>59</sup> Alphonse de Candolle, *La phytographie ou l’art de décrire les végétaux considérées sous différents points de vue* (Paris: Masson, 1880), 256-257.

While the image of Germany, German culture, and German science continued to be antagonistic, Goethe's association with this national image became less definitive, and Goethe was increasingly viewed as a unique individual naturalist. Even when Goethe was discussed in a national context, he was often paired with what were considered beneficial, rather than negative, qualities of German identity.

#### **b) Goethe and the French school**

If Goethe was evaluated in a less explicit national context in the second half of the century, his connection to French science seemed to have been highlighted inversely. Countless reviewers remarked that the French school, supported by Goethe from Germany, paved the way for Darwin's theories. Duval was one of few who went into more detail. According to Duval, Lamarck and Saint-Hilaire were the "two glorious precursors" who played a major role in the initial attempts to establish the transformist doctrine, but Goethe also played an honorable role and deserved to be discussed before examining Darwin.<sup>60</sup> There was a similar pattern between France and Germany, too: efforts by both Goethe and the early French transformist school were obstructed by nature-philosophers and Cuvier, respectively, who re-directed the transformist movement to England where it fully bloomed with Darwin.<sup>61</sup> Duval went on to discuss the aforementioned criticism of Goethe given by Du Bois-Reymond, "whose study subject and nationality do not seem to qualify him to make such judgments."<sup>62</sup> Quoting Haeckel's defense of

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<sup>60</sup> Duval, "Le Transformisme," 448-449 & 460.

<sup>61</sup> Ibid., 460-461.

<sup>62</sup> Ibid., 456. Du Bois-Reymond, a German physiologist, was a descendant of a French Huguenot family which moved to Germany after the Revocation of the Edict of Nantes (1685). Both French and German scholarships influenced him, as he grew up speaking French and studied in the French Gymnasium in Berlin before enrolling in the University of Berlin. Du Bois-Reymond held a balanced view towards both German and French cultures of science, the different aspects of which he admired and criticized. In the quoted text, Duval highlighted Du Bois-Reymond's German nationality and his critical attitude towards French science (see footnote #64,) as well as his main field of study, electrophysiology, which generally differed from the organicist view of biology such as Goethe's. For more on Du Bois-Reymond, see: Gabriel Finkelstein, *Emil du Bois-Reymond: Neuroscience, Self, and Society in Nineteenth-Century Germany* (Cambridge, MA: The MIT Press, 2013).

Goethe—that Goethe did not simply propose the banal argument that living species could be traced to an original kinship but made it acceptable by demonstrating it—Duval argued that Goethe’s value lay in his support for the pre-Darwinian partisans of transformism.<sup>63</sup> Apart from this defense of Goethe, however, Duval offered an interesting speculation for the motivation behind Du Bois-Reymond’s disapproval:

... it is without doubt partly because his compatriot Haeckel tried several times to place Goethe next to Lamarck as principal precursors of Darwin, and so [Du Bois-Reymond] felt the need to assess things differently from Haeckel; it is also because Goethe showed throughout his scientific works his admiration for French scholars ... and Du Bois-Reymond, whose hostility for French science is well known, felt the need to extend his sentiments to those who expressed so much interest in Geoffroy Saint-Hilaire and followed his debate against Cuvier.<sup>64</sup>

Duval’s speculation possibly reveals the author’s own national bias. For Duval, who provided a France-centered interpretation of the history of transformism, Goethe could have earned a value as a Francophile naturalist. As mentioned earlier, Giard, too, took Goethe under his French wing by presenting the experimental spirit as the defining feature of both Goethe and French scientists, in his attempt to portray France as the future of transformism.<sup>65</sup>

The views of Goethe as a supporter and follower of the leading French naturalists existed before, too. In the second half of the century, however, the focus of the discussion seems to have

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<sup>63</sup> Ibid., 457.

<sup>64</sup> Ibid., 457. By “hostility for French science,” Duval was referring to Du Bois-Reymond’s bitter experience with the French Academy of Sciences and French scientists in general. Du Bois-Reymond recognized Paris as the capital of nineteenth-century science and traveled to Paris in 1850 to earn recognition there. However, the reaction he received was a mistrustful one, as French scientists could not at first replicate his experiment which sought to demonstrate the electrical nature of nerve signals. Du Bois-Reymond blamed France’s inferior technical approach to physics and physiology, and even took their criticism as a matter of national honor. He left Paris “in disgust,” as he wrote to his family. However, Finkelstein’s biography of Du Bois-Reymond illustrates a gradual evolution of his attitude. In the early part of his career, Du Bois-Reymond was attracted to German nature-philosophy and Romanticism, but later moved towards realism and mechanical view of nature (while still recognizing the importance of fundamental questions). For more on the complex journey of Du Bois-Reymond’s views on nature, science, and history, see Finkelstein.

<sup>65</sup> Giard, *Controverses transformistes*, 3.

shifted to the question of what role France had played and would play in the development of transformism, which in turn modified their view of Goethe as well. The discussion moved away from simple evaluation of foreign scientific knowledge, towards figuring out where French science stood in relation to the rapid development of the diverse lines of transformism. In this context, the past naturalists such as Lamarck, Saint-Hilaire, Goethe, etc. were still as relevant and useful as Darwin for the French audience to define themselves. The ways in which Goethe was reconfigured to this new national purpose will be discussed in the later part of this chapter.

### **3. Darwin in France**

We have seen that, in the process of responding to the development of transformist ideas in the second half of the nineteenth century, some aspects of France's reception of Goethe's natural science, as well as of German science and Germany in general, changed while other aspects remained the same. What do these shifts and continuities mean for the bigger questions: the boundaries of the French biological science, its place in the late nineteenth-century international scientific landscape and in the history of morphological ideas, and Goethe's place in it? In the next section, I will examine the specific criteria by which the reviewers evaluated Goethe and Darwin—the foreign naturalists whom the French scientific community tried to dismiss or surpass at different points of the century. The parallels and differences in their evaluations can help define the version of transformism that France came to adopt by the late nineteenth century, which in turn would illuminate Goethe's place in the new scientific landscape. To achieve this goal, a brief look at Darwin's own reception in France is in order.

### a) French reception of Darwin

The commonly accepted view has been that France, among all European nations, exhibited the least enthusiasm for Darwin's ideas on evolution and its mechanisms. This view prevailed within and outside of France, from the time of the publication of *On the Origin of Species*. The English journal *Nature* took interest in the unusually cold reception of Darwin in France, the "most conservative in science of any country in Europe," and analyzed why this was the case: the scope of Darwin's scientific activities was too broad for their liking and Darwin was an amateur by their standard.<sup>66</sup> Belgian experimental psychologist, Joseph Delboeuf (1831-1896) wrote that France, the birth place of the defenders of transformism, rejected Darwin's theory while England, Germany, and Russia almost immediately embraced it: "France, indolent, rested on the literary and scientific laurels."<sup>67</sup> According to the author, the general French audience had a very shallow understanding of Darwin—in a similar fashion to their misunderstanding of Goethe's natural science, as demonstrated in the previous chapter. The author blamed this lack of understanding for the failure of the Academy of Sciences in Paris to elect Darwin as its corresponding member: "Atheism, materialism don't have any point of contact with the theory of evolution ... The superficial idealism of the French places them at an inferior rank, in the face of the practical tendency of the English and Germans' brutal faith in scientific truth."<sup>68</sup> Charles Martins (1806-1889), a well-known French botanist, similarly explained to Darwin that the

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<sup>66</sup> "Mr. Darwin and the French Institute," *Nature* 2 (Aug. 18, 1870): 309. The author used this observation for an in-depth discussion of the different national styles of scientific knowledge. According to the author, France treated science as a pursuit of national importance, and thus, established a systematic discipline and organization for science. England was the opposite, allowing freedom and individuality of those who pursued science, whether they were amateur or professional—"we must hope for men who cannot be repressed." But the English scientific culture had its drawback, as it lacked organization or continuous schools of knowledge. Finally, Germany of the nineteenth century served as a model for England.

<sup>67</sup> Joseph Delboeuf, "Léon Dumont et son oeuvre philosophique," *Revue philosophique de la France et de l'Étranger* (Jan.-Jun., 1877): 610.

<sup>68</sup> *Ibid.*, 611 & 626.

established French scientists often equated Darwin's ideas to atheism, materialism, and communism, which silenced younger French scientists' support for Darwin.<sup>69</sup> Indeed, the skeptical attitude towards Darwin is confirmed at several points. One noted that the first formal defense of the doctrine of evolution by a biologist at the Academy of Sciences took place only in 1896, nearly four decades after the publication of the *Origins of Species*.<sup>70</sup> Another writer reported that Darwin's works were studied only by few scholars, and the "least reactionary movement was enough to bring the defenders of evolution to *police correctionnelle* and be condemned."<sup>71</sup> The story of how the Academy of Sciences in Paris refused to elect Darwin as its corresponding member in zoology in 1870 was a famous anecdote, repeated by several writers.<sup>72</sup>

Recent studies have attempted to pinpoint the reasons behind such lack of enthusiasm in France. Peter Bowler and Robert Stebbins fall into the group of scholars who believe that Darwin did not play a major role in the French scientific community. Bowler lists several factors behind this phenomenon: France's centralized academic culture strengthened its conservative tendency under Cuvier's influence in the face of Darwinian evolutionary ideas; the rationalist tradition downplayed the empirical orientation of the new ideas; a majority of intellectuals, whether for or against Darwin, considered his ideas as a mere extension of Lamarck's; the political and social interpretation by Clémence Royer, Darwin's first French translator, was not conducive to

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<sup>69</sup> Darwin Correspondence Project, "Letter no. 8197" & "Letter no. 10990," accessed on 22 October 2020, <https://www.darwinproject.ac.uk/letter/DCP-LETT-8197.xml>  
<https://www.darwinproject.ac.uk/letter/DCP-LETT-10990.xml>

<sup>70</sup> "Herbert Spencer et Lord Salisbury," *Le Temps* (Feb. 12, 1896): 3.

<sup>71</sup> "Création des êtres organisés d'après les lois naturelles par M. Ernest Haeckel," in *Dictionnaire universel illustré, biographique et bibliographique de la France contemporaine*, ed. Jules Lermina (Paris: Boulanger, 1885), 386.

<sup>72</sup> Delboeuf reported that the Academy rejected Darwin's election because the campaign which portrayed him as an Anti-Christ was too strong (Delboeuf, "Léon Dumont et son oeuvre philosophique," 611.) Henri de Lacaze-Duthiers (1821-1901) expressed disbelief at this event, writing that, even though he had some disagreements with Darwin's ideas, Darwin should have been elected (Henri de Lacaze-Duthiers, "Notes et Revue XVI: une élection à l'académie des sciences dans la section de zoologie," *Archives de zoologie expérimentale et générale* (1872): xlix-l.)

forming real discussions for or against Darwin.<sup>73</sup> Thus, according to Bowler, Darwinism was never strong enough in the first place, and always figured as an alien philosophy of nature.<sup>74</sup> Stebbins assigns more weight to Darwin's presence in France, but considers it as one of many factors that contributed to the gradual shift towards transformism. According to Stebbins, there were indeed French partisans of transformism, but they did not necessarily adopt the Darwinian ideas—Darwin was no torchbearer in the French eyes, and thus, there was no active discussion of Darwin and transformism.<sup>75</sup> Darwin did not intend to be involved in the materialist-spiritualist debate, but his presence in France was weak enough to be swallowed by it.<sup>76</sup> Patrick Tort's and Joy Harvey's studies fall under the similar argument, in that Tort defines French biology as a transformism without natural selection,<sup>77</sup> and Harvey implies that Darwin's works were translated, read, and discussed mostly outside of the mainstream French science and against the right-wing conservatives.<sup>78</sup>

If these studies reject the idea that Darwin had a significant presence in French science, others argue the opposite. For Cédric Grimoult, Darwin was indeed the true catalyst to France's adoption of transformism and evolutionary theories. Grimoult builds his case by contradicting the view (like Stebbins's) that transformism developed in France mainly under Lamarck's

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<sup>73</sup> Peter J. Bowler, *The Eclipse of Darwinism: anti-Darwinian Evolution Theories in the Decades around 1900* (Baltimore: Johns Hopkins University Press, 1983).

<sup>74</sup> *Ibid.*, 117.

<sup>75</sup> Robert E. Stebbins, "France," in *The Comparative Reception of Darwinism*, ed. Thomas F. Glick (Chicago: University of Chicago Press, 1988), 117, 151-152, 163.

<sup>76</sup> *Ibid.*, 158.

<sup>77</sup> Patrick Tort, "The Interminable Decline of Lamarckism in France," in *The Reception of Charles Darwin in Europe, volumes 1 & 2*, eds. Eve-Marie Engels & Thomas F. Glick, trans. Matthew Cobb (London & New York: Continuum, 2008), 329-353. Tort highlights how Darwin was almost always absorbed by, or discussed in context of Lamarck's ideas, where the concept of selection mechanism was absent.

<sup>78</sup> Joy Harvey, "Darwin in a French Dress: Translating, Publishing and Supporting Darwin in Nineteenth-Century France," in *The Reception of Charles Darwin in Europe, volumes 1 & 2.*, eds. Eve-Marie Engels & Thomas F. Glick (London & New York: Continuum, 2008), 354-374. Harvey argues that Darwin was mostly supported by less well-known publishing houses and provincial universities. Like other scholars mentioned above, Harvey also notes that many French intellectuals considered themselves transformists rather than Darwinists.

influence, independently of Darwin's ideas. According to the author, the evidence shows that French naturalists remained within the Creationist paradigm before 1859, even if they accepted transformations between different organic beings—the concept of *true* transformism on the basis of a common ancestor began to spread after 1859, not earlier.<sup>79</sup> Claudine Cohen's study is one of the more recent studies on Darwin's reception in France, especially in relation to the discussion of nationalism. Cohen argues that, instead of ignoring Darwin's ideas, France slowly developed a better understanding of them and attempted to integrate them into French paleontology and paleoanthropology, despite adverse factors (similar to those listed by Bowler.)<sup>80</sup> Unlike Tort, who does not view Darwin's and Lamarck's methods as nationally characteristic approaches,<sup>81</sup> Cohen views France's resistance to Darwin's ideas as the result of a particular French scientific style.<sup>82</sup> Even though the title of the study highlights the theme of nationality, however, this theme is not very prominent throughout the article.<sup>83</sup>

#### **b) Darwin and the French national self-awareness**

General consensus then and now, and within and outside France, was that Darwin's ideas were not received with unanimous enthusiasm in late nineteenth-century France. It did not mean, however, that Darwin had a minor enough presence that French scholars could go around him. As discussed earlier in this chapter, many scientists felt the need to interpret previous theories, including Goethe's, and to formulate their own theories in the light of Darwinian ideas. The attempt to carve out a place for France in the ongoing development of transformist ideas became manifest in varying manners. Criticizing Darwinian ideas was one way; looking for their earlier

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<sup>79</sup> Cédric Grimoult, *Le Développement de la paléontologie contemporaine* (Geneva: Droz, 2000), 38-39.

<sup>80</sup> Claudine Cohen, "How nationality influences Opinion": Darwinism and palaeontology in France (1859-1914)," *Studies in History and Philosophy of Biology & Biomedical Science* 66 (2017): 8.

<sup>81</sup> Tort, "The Interminable Decline of Lamarckism in France," 332.

<sup>82</sup> Cohen, "How nationality influences Opinion," 17.

<sup>83</sup> The theme of nationalism appears only when the author mentions at the end how Darwin took note of the varying temperatures of his reception in different nations and complained that "nationality influences opinion." *Ibid.*, 17.

traces in the French history was another. Be it in the form of criticism of the other or in the form of a look back at the self, these attempts to define France's stance and status in the scientific realm were often motivated by a sense of urgency that was not prominent in the earlier critiques of German science.

The Franco-Prussian War in 1870-1871 must have contributed to this sense of urgency and anxiety in France. The advantages and importance of this war was manifold for Germany: under the arrangements of the Prussian chancellor Otto von Bismarck (1815-1898), the German states finally came into a unified nation—Wolf Lepenies aptly described it as a transformation of Germans from a *Kulturvolk* into a *Kulturstaat*<sup>84</sup>—which successfully checked the French domination of Europe. The war was equally impactful for France, in a much more negative sense. Not only did France shoulder five billion francs of indemnity and lose Alsace and most of Lorraine to Germany, but a series of humiliating defeats and capture of Napoleon III wounded France's national pride; the crowning of the King William I of Prussia as the German emperor at France's own Versailles near the end of the war was also a blow. The change of regimes and insurrection within France added to the sense of instability and chaos.<sup>85</sup> With waning confidence and growing resentment and urge for retribution after the Franco-Prussian War, France was naturally led to take a hard look at itself and others, engaging with philosophical, scientific, and social theories that could help make sense of the past and future. The Darwinian theory was one such tool that could be easily appropriated beyond natural science. It renewed the question of who we are—the central question behind the major intellectual movements in the past, such as

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<sup>84</sup> Wolf Lepenies, *The Seduction of Culture in German History* (Princeton: Princeton University Press, 2006), 19. The terms *Kulturvolk* and *Kulturstaat* were quoted from Hugh Trevor-Roper.

<sup>85</sup> For general history of the Franco-Prussian War, see: The Editors of Encyclopaedia Britannica, "Franco-German War," *Encyclopedia Britannica*, July 12, 2020, <https://www.britannica.com/event/Franco-German-War>.

the French Enlightenment and the German Romanticism—in a more concrete, physical manner, and extended it to the question of where we were possibly heading to.<sup>86</sup>

As we saw in the previous chapter, the French naturalist Candolle proposed already in the early nineteenth century that the primitive organic types had undergone modifications over time through external influences, and applied the term “degeneration” to these changes. This concept of biological degeneration developed over the century into a pessimistic theory of social degeneration. Many scholars, notably Max Nordau (1849-1923), voiced their anxieties over the decline of arts, morals, and humanity in general, and the Darwinian (and pre-Darwinian) ideas of evolution were often associated with them. The idea of degeneration was expressed in a nationalistic tone as well. For example, *Le Péril national*, a book published in 1881 by a French journalist and writer Raoul Frary (1842-1892), began by referring to the “humiliation” of the Franco-Prussian War in 1870.<sup>87</sup> Citing Darwinian and Malthusian theories, the author went on to problematize among other things the stagnant population in France, which would make France vulnerable to attacks and influences from foreign nations like Germany.<sup>88</sup> A response to Frary’s critique of the French situation exhibited as much nationalistic sentiment as preoccupation with the idea of evolution. Henry Aron, a political essayist rejected the popular application of the evolutionary theory to political history, asserting that France was not destined to make the “mistakes” it made:

This is a lesson of moral politics, rather than the necessary manifestation of some law of evolution. What took place could have not taken place. We have committed a mistake, not an inevitable one, thus reparable with skill, courage, and time; we

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<sup>86</sup> In regards to how this question of collective identity manifested in the field of linguistics in a more politically chaotic time and environment, stemming from (and against) the Darwinian idea of evolution, see: John A. Goldsmith and Bernard Laks, *Battle in the Mind Fields* (Chicago: University of Chicago Press, 2019), chapters 2 & 9, but more specifically pgs. 59, 505, 530, 545-6.

<sup>87</sup> Raoul Frary, *Le Péril national* (Paris: Didier, 1881), 1.

<sup>88</sup> *Ibid.*, 339.

were not at all pre-determined victims of historical evolution of the struggle for existence, and it is truly an exaggeration to trace till the beginning of history to find there the past causes of our disaster; it is playing too good a part for German pedants. But that is a very common idiosyncrasy today, and what we can reproach the best of the French minds for, above all the younger generation. Darwin is considered like God ... he rules over politics as over natural sciences; men of letters above all abuse him.<sup>89</sup>

This passage not only reveals the then-common misunderstanding of Darwin's theories as a branch of determinism. There were, as well, three other points: 1) Darwin's ideas indeed had a noticeable impact in France in multiple fields, triggering anxieties and suspicion; 2) the attempt to apply these new ideas to other disciplines was somehow interpreted as a German way of thinking; 3) there seems to have been a dissatisfaction, or even a sense of guilt, with the historical, political, scientific, and moral standing of France as perceived from inside. A similar sentiment was visible in another journal, which quoted J. L. Armand de Quatrefages (1810-1892), a respected French biologist, on the motto "By science, for the homeland (*Par la science, pour la patrie*)":

I am neither pessimist nor chauvinist. I cannot accept the strange assertions against us from Germany, which portray the role of France in the intellectual world as done and over. ... Those who argue this know well that France has guarded its rank. But if we do not fear comparison with any country ... we must recognize on the other hand that the general scientific level is much higher in several of our neighbors than in ours.<sup>90</sup>

Balancing between national pride and the recognition of the need to take lessons from foreign nations, Quatrefages clearly had Germany and England in mind. Not wishing to draw examples from Germany, France's apparent rival, he instead discussed how science penetrated all levels of the English society: one could be a banker or a brewer and still direct scientific societies, just as

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<sup>89</sup> Henry Aron, [Article without a title], *Journal des débats politiques et littéraires* (May 5, 1881): 2.

<sup>90</sup> Em. Alglave, "Association Française pour l'avancement des sciences: Congrès de Bordeaux," *Le Temps* (Aug. 5, 1895): 2.

Darwin was an amateur scholar by the French standard, and thus would have been unacceptable in the French scientific community.<sup>91</sup> A French naturalist Henri de Lacaze-Duthiers (1821-1901) did not shy from a direct comparison of the dynamics between physiology and zoology in France and Germany. In France, physiologists tended to consider zoology as a second-rank science and opposed any sign of its rise; in Germany (and other foreign nations), physiologists did not limit themselves to their narrow domain and embraced zoological researches—Müller, Darwin, and Haeckel were some of the examples whose voyages became the basis of their influential works on general morphology.<sup>92</sup> Another writer, too, recognized the achievements of foreign nations, while still highlighting the role of France as the starting point of these achievements: although the questions of origin, genealogy, and metamorphoses were elucidated in Germany (Goethe) and demonstrated in England (Darwin), this scientific revolution was set off and universalized by Buffon, Lamarck, and Saint-Hilaire during the revolutionary period in France.<sup>93</sup> The sense of competition against Germany and other foreign nations was still present. For the author, Haeckel was an exception and a mediator who could spread the scientific enlightenment from France to Germany: Haeckel's book brought to light the unitary concept of nature (which was owed to France) for the German audience “whose brain opens up only by scientific hammer blows,” unlike their French counterpart who had an intuitive understanding.<sup>94</sup>

Darwin's reception in France seems to have involved a heightened awareness of the national self and the other, as well as a heightened urge to define French science. If this awareness had manifested in the earlier part of the nineteenth century in simple arguments for

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<sup>91</sup> Ibid., 2.

<sup>92</sup> Lacaze-Duthiers, “La morphologie et l'histologie aident puissamment le zoologiste,” *Archives de zoologie expérimentale et générale* (1872): 61-62.

<sup>93</sup> Eugène Noël, *Les loisirs du père Labêche: plantes et bêtes* (Paris: Bécus, 1891), 97-99 & 446-447.

<sup>94</sup> Ibid., 97-99.

France's scientific superiority over other nations, it took a different form in the second half of the century. In the face of the Darwinian ideas of evolution—which could not be simply brushed aside as “unscientific” or “un-French” as had been Goethe's morphological ideas—France had to define its scientific identity around them. In the process, Goethe—another foreign naturalist whose ideas were being linked to the ideas of both Darwin and the earlier French naturalists—had to be brought back to the scientific discussions, as I will argue next. If his German identity appeared to be somewhat underplayed during this period, it might have been a necessity for France in order to partake in a new form of national consciousness.

#### **4. French Response**

I have discussed the changes and continuities in the French reception of Goethe as the (German) naturalist after the emergence of Darwin's ideas, and the general scientific and societal atmosphere in France when these shifts occurred. Now, I examine the receptions of Goethe and Darwin together—who were frequently discussed together, along with other French naturalists—through three different perspectives: methodological, religious, and philosophical. Examination and comparison through these categories will not only help define the type of transformism that France came to adopt, but also the new role that was assigned to Goethe. Finally, I will show that the reaction or evaluation through each of the perspectives corresponds to different aspects of the reformatting process of French nationalism.

##### **a) Diluted nationalism: empiricism and language**

One of the most common criticisms that Goethe had faced was that he was not a rigorous, professional scientist, and that his morphology was more philosophical and metaphorical than empirical, even though the textual analysis of his work in the previous chapter suggests that this

was an assumption based on the image of German science at that time. Despite the vast amount of research that he presented, Darwin faced a similar criticism. According to *Le Temps*, the committee of the Academy of Sciences raised serious doubts about Darwin because they wished to limit their attention strictly to things that were demonstrable—the theory of natural selection was not one of them.<sup>95</sup> Other than Quatrefages and Milne-Edwards, very few defended Darwin at the Academy. Émile Blanchard (1819-1900), a French zoologist, found his ideas brazen and considered him a mere amateur; Charles-Philippe Robin (1821-1885), a French anatomist and biologist, implied that Darwin’s works were “fairy tales”; another claimed that, if one removed from his work anything that could not be verified, there would remain a work inferior to that of a German biologist.<sup>96</sup> André Sanson (1826-1902), a French veterinarian and professor of zoology and zootechnics, was critical of Darwin for the same reason: “... on the subject of heredity, [Darwin] has not told us anything new. All that is true in his work has already been known and published... One can admire the transformist doctrine as much as one wishes. It is the matter of philosophical sentiment, foreign to the positive science. In the domain of science, facts alone have an incontestable value.”<sup>97</sup> These comments suggest that, across Goethe’s and Darwin’s times, the French science did not veer from its definition of true science foremost as a *demonstrable* science.

The form of language that presented one’s scientific ideas was another major point of criticism that made a reappearance. If French reviewers had characterized Goethe’s *Metamorphosis of Plants* as a science inappropriately veiled with a poetic language, or as a metaphor disguising as a science,<sup>98</sup> Darwin, too, was criticized for his language. However, the

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<sup>95</sup> A. Vernier, “Causerie scientifique,” *Le Temps* (Aug. 23, 1870): 3.

<sup>96</sup> *Ibid.*, 3. The German biologist in this claim was referring to Theodor L. W. von Bischoff (1807-1882).

<sup>97</sup> André Sanson, *L’Hérédité normale et pathologique* (Paris: Asselin et Houzeau, 1893), 14.

<sup>98</sup> See the previous chapter for more detailed accounts of criticism that Goethe’s *Metamorphosis* encountered.

nature of linguistic criticism changed from the time of Goethe's morphology to that of Darwin's evolutionary theories. The criticism was no longer simply a view that French language was more direct and clear, and thus more suitable for science, than the foreign nations' convoluted and philosophical languages. The theme of nation was less directly tied to the linguistic criticisms, although it was not entirely absent. Both Félix le Dantec (1869-1917), who supported the Lamarckian doctrine and participated in experimental biology, and Quatrefages offered insightful views in this regard.

Le Dantec was not an outright opponent of Darwin, as he took Darwin to be an intellectual descendant of Lamarck—whom Le Dantec described as “one of our greatest national glories”—in establishing transformism as a formal science.<sup>99</sup> He also appreciated that teleology had no place in Darwin's work.<sup>100</sup> However, in many ways Darwin fell short of Lamarck in his eyes. While Lamarck's principles provided a “complete and scientific interpretation of the formation of living beings” by demonstrating the “phenomena of direct adaptation to the environmental conditions,” Darwin offered the “interpretation of a progressive evolution” which appeared to explain everything when he was simply narrating what had happened in nature.<sup>101</sup> What Darwin described as the “law” could be summarized as the following: “those that will persist are *the fittest*, best armed for the competition *in the present conditions*; those which will disappear are the least armed; there will be natural selection, or natural elimination of the least fit, for the benefit of the fittest.”<sup>102</sup> Le Dantec called this type of explanation an “artifice of

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<sup>99</sup> Félix le Dantec, *Les limites du connaissable: la vie et les phénomènes naturels* (Paris: Félix Alcan, 1914), 170. Le Dantec credited both Lamarck and Darwin for their contribution to transformism: “It is only in 1859 that Darwin's book made [transformism] come out of its grave; it had such a brilliant renaissance that one forgot the efforts by Lamarck and Saint-Hilaire, mistaking the new theory as Darwin's daughter; however, the illustrious English naturalist was merely its adoptive father, but one that can always offer his morally abandoned child the citizenship in the scientific domain.” (ibid., 185.)

<sup>100</sup> Ibid., 174.

<sup>101</sup> Ibid., 199 & 201.

<sup>102</sup> Ibid., 191.

language” or “*a posteriori* language.”<sup>103</sup> Darwin’s principles were a truism that could never be incorrect, and his ardent opponents like J. P. Flourens (1794-1867) were behaving like a “physicist who, to undermine the wave theory, would have attacked the differential calculus.”<sup>104</sup> There was nothing wrong with the narration of historical facts. The problem with Darwin’s *a posteriori* language was that it made it seem possible to foresee the events; it gave historical facts—which could not be a sufficient explanation based on itself—an appearance of proof and philosophy of history.<sup>105</sup> For the critic, Darwin’s ideas did not completely fit into the model of a good science, not because they were metaphorical, philosophical, (ir)religious, or foreign, but because the ideas completely depended on the form of language in which they were presented.

Le Dantec was not the only one who was concerned with the language of Darwin’s ideas. In *Les émules de Darwin*, Quatrefages discussed the pitfalls of transformism in general, namely the confusion between the terms “race” and “species,” as well as between “variation” and “transmutation.”<sup>106</sup> Perrier, who wrote the preface of the book, wrote that Quatrefages, as a former mathematician and physicist, understood both organic and physical worlds to be governed by mathematics, and refused to endorse the doctrine of descent unless there was an incontestable proof based on experience and observation.<sup>107</sup> Perrier recalled Quatrefages’s feedback for his own book, *Les colonies animales*:

neither facts nor your method obliges you to be a transformist. You may find all possible transitions between the simplest and highest forms in the animal kingdom; this only reveals the principle of continuity ... experience shows that ... one cannot mix the nearest

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<sup>103</sup> Ibid., 191 & 193-194.

<sup>104</sup> Ibid., 188.

<sup>105</sup> Ibid., 192-194.

<sup>106</sup> Unlike Le Dantec, who supported the Lamarckian transformism against the Darwinian transformism, Quatrefages was critical of transformism altogether (while crediting Lamarck, rather than Darwin, as its true founder.)

<sup>107</sup> J. L. A. de Quatrefages, *Les émules de Darwin t.1* (Paris: Baillière, 1894), lii & c. Another work by Quatrefages ends with the following remark: “let us guard ourselves from sacrificing positive knowledge that our predecessors have amassed to hypotheses, under the pretext of progress. Let us not dream *what could be*; let us accept and search for *what is*.” Quatrefages, *Charles Darwin et ses précurseurs français* (Paris: Baillière, 1870), 375.

species; one can never succeed at breaking a species into several others; species thus has its own existence; all that one says on the possibility of modifications of species results from a confusion between the two absolutely distinct things: *race* and *species*.<sup>108</sup>

Quatrefages did not stray from this view and used it as a criterion to evaluate the diverse transformist theories.<sup>109</sup> While “the *races of a same species* could unite and fertility was not impacted,” the author wrote, “*species* did not melt into one another, or only temporarily.”<sup>110</sup> Using analogies with the concepts of crystallography in a manner reminiscent of Candolle,<sup>111</sup> Quatrefages further clarified the word “species” as the following:

In animals and plants, the term carries the idea of *external* and *anatomical* form, and the idea of filiation at the same time; in minerals, the idea of *form* and the idea of *chemical composition*. The organic and inorganic species thus have in common a *morphological notion* to which is added a *physiological notion* in the first, and a *chemical notion* in the second. ... In both, *filiation* and *chemical composition* can be altered only accidentally and temporarily. But the *form* can vary in the extremely extended limits, without species being affected. In other words, *variation is everywhere* in the organic and inorganic worlds; *transmutation is nowhere*, neither in organic nor inorganic world.<sup>112</sup>

Thus, the confusion between race and species stemmed from the confusion between variation and transmutation. In Quatrefages’s eyes, transformists mistook the general synonymy of the two words for their synonymy in scientific sense, which led to an exaggerated concept of evolution. The author went as far as criticizing transformists as “sophists” and “alchemists” who thrived on a play of language:

Transformists’ belief that *Nature* is more powerful than man, and if man can make *races* everyday, it can surely make *species*—this

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<sup>108</sup> Ibid., lxxi-lxxii.

<sup>109</sup> Ibid., lxxi-lxxii.

<sup>110</sup> Ibid., 31.

<sup>111</sup> A.-P. de Candolle, whom I treated as Goethe’s French counterpart in the previous chapter, developed his concept of plant type and symmetry based on René-Just Haüy’s study of crystal forms. Like Quatrefages, Candolle also rejected the idea of transgression between different types of organic beings.

<sup>112</sup> Quatrefages, *Les émules de Darwin t.1*, 21-22.

is true sophism, concluding from particular to general, neglecting a collection of facts.<sup>113</sup>

... in organic world and in regards to *variation*, man has proved himself remarkably more powerful than Nature. Thus the latter cannot do what man has done. Even though he has shaped at his will the *forms* of certain species, man could not obtain a single *transmutation*.<sup>114</sup>

Holding on to morphology in the study of these complex questions is like seeing sulfur change its color and resistance in a melting pot and saying: it is not sulfur, it is a new species, an artificial species ... In sum, *transformists* are *alchemists*.<sup>115</sup>

After reading these passages, it comes as no surprise that Quatrefages had already insisted in another work, *Charles Darwin et ses précurseurs français*, that Darwin's ideas—commonly characterized by the term “evolution” then and now—should have been associated with the term “transformation.” Here again, Quatrefages pointed out the need to distinguish between the two similar words. For him, “evolution” in its classic sense referred to the development of preexisting germs; the focus of transformism was, on the other hand, on a series of considerable changes that organic beings have undergone.<sup>116</sup> By these definitions, “The name of *transformism*, used since some years ago by Abbé Bourgeois, Vogt, Dally, etc., adopted by a great number of other writers, seems to render much better than other proposed names, the notion shared by all theories” that the author examined.<sup>117</sup> By clarifying these terms, Quatrefages placed Darwin within a long tradition of transformism, rather than at the beginning of a new one. Not only that but, based on his definitions of “variation” and “transmutation” above, the author was grouping Darwin's ideas with those he considered as sophistry or alchemy. Finally, the author also distinguished between “progress” and “adaptation,” which Darwin himself—and

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<sup>113</sup> Ibid., 32.

<sup>114</sup> Ibid., 36.

<sup>115</sup> Ibid., 39.

<sup>116</sup> Quatrefages, *Charles Darwin et ses précurseurs français*, 10-12.

<sup>117</sup> Ibid., 12.

Goethe, too—would have welcomed: “The term *progress* easily seduces minds which, placing themselves exclusively with the human perspective and taking it for the norm, understand the march forward only in one direction. It is not so in nature, both in organic and inorganic worlds. ... All things considered, Darwinism is far less a doctrine of what we call progress, than a doctrine of *adaptation*.”<sup>118</sup> Quatrefages had doubts about Darwin’s ideas themselves, but he seemed to have been more critical about how easily they attracted philosophical interpretations that could distort their contents. While several French scholars had criticized Goethe and German naturalists in general for creating philosophical attachments, Quatrefages was in a sense defending Darwin by distinguishing his ideas from their possible exaggerations.

Le Dantec’s and Quatrefages’s comments on Darwin suggest that, although language continued to be a common point of criticism against foreign scientific works, the association between a form of language and a national character became less explicit. When Goethe’s morphology was evaluated in France in earlier decades, Candolle, Saint-Hilaire, and to a lesser degree Lamarck were the usual French naturalists who were discussed alongside. The previous chapter has shown that all of them—except Candolle, who, as a contrasting figure to Goethe, was considered as part of the mainstream French school—were criticized for their unorthodox and non-French manners of thinking and expressing. When Darwin emerged later in the century, however, there were noticeably fewer mentions of Candolle—who was, after all, a Swiss—but much more frequent mentions of Saint-Hilaire and especially Lamarck. Moreover, these new discussions of the earlier French naturalists were in a more favorable light than they were in Goethe’s time. It is as if the French community started to embrace Lamarck and Saint-Hilaire as the true matches or even predecessors of the scientific giant from England. To uphold them as

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<sup>118</sup> Ibid., 101.

French representatives, and to discuss their ideas alongside or against Darwin's, the discussions could no longer rely on simple national images—they required deeper understanding of the ideas and terms in question than before, as Le Dantec's and Quatrefages's commentaries above illustrate, to guard the national stature in science. Ironically, this shift would have led the discussions away from explicit uses of national images.

**b) Affirmation of the French belief: religious evaluation**

A naturalist's religious belief continued to be a common point of criticism. If Goethe had been discredited partly because of his pantheism—a trait almost always considered a German intellectual trait—Darwin was characterized by deism. As far as the French reception of Darwin was concerned, however, Deism was mostly associated with the materialist and mechanical view of the world, rather than with the image of the English nation.<sup>119</sup> Like other commentators, André Lefèvre (1834-1904) wrote that, while transformism belonged to Lamarck, the theory of descent came to prominence only by Darwin's time.<sup>120</sup> Unlike those who saw the main feature of Darwin's ideas to be the concept of chance, the author offered a different view on Darwin's role:

Darwin, at least, all the while remaining faithful to the inveterate deism which seems to form an integral part of the English mind, reduced to the minimum the role of chance in nature. After having created a cell, his God went into the background, leaving his work to itself. ... The transition from the inorganic to the organic, to the vegetable or living state, will present nothing more supernatural than the evolution of a gland, cell, or an egg. There are merely

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<sup>119</sup> I found very few evidences among the late nineteenth-century French sources that directly and explicitly linked deism and/or materialistic/mechanistic view to the English nation. Later in the early twentieth century, however, some intellectual groups outside the Western Europe considered this type of approach as a specifically Western characteristic (this chapter shows however that this characterization did not entirely describe the nineteenth-century French reaction to Darwin's ideas.) Against this characteristic, they built a teleological approach with an emphasis on the internal goal of an organic group that the linear causal relations could not explain (which I think also differed from the French teleological view with an explicit emphasis on God,) and sought to solidify a non-Western identity around this approach. The developments of Eurasianism and structuralism by the Moscow Linguistic Circle show how the Darwinian theories impacted the later thoughts in and outside natural science, and how they came to be linked with nationalism. For more on this later intellectual development, see: Goldsmith and Laks, *Battle in the Mind Fields*, chapters 2 & 9.

<sup>120</sup> André Lefèvre, *La Philosophie* (Paris: Reinwald, 1879), 484-486.

facts and nothing more. ... By eliminating from nature theodicy and metaphysics, Darwin served, more than he was aware, to totally emancipate the thought.<sup>121</sup>

The author saw in Darwin's ideas the God who set off a self-operable, mechanical world that had very little room for chance—a world that men could comprehend and explain. The complex phenomena resulting from its operation was the evolution of nature, which the author emphasized to be a scientific fact that only looked like supernatural phenomena. Haeckel, too, was unapologetic of the association between deism and the mechanical view of the world.

The time has come to replace the antique dualist and theological concept of the universe, life, and mind, with the monist or mechanical concept of the world. ... The doctrine of final causes is naïve. The theories of Lamarck and Darwin gave a final blow to this outdated doctrine.<sup>122</sup>

Many reviewers would have responded that God was going nowhere. Paul Janet (1823-1899), a French philosopher and writer, composed a critical essay against Darwin's materialism, where he adamantly defended final causes. Janet disapproved of Lamarck's hypothesis because it proposed to explain nature without final causes, and among the similar "specious hypotheses," of which materialism readily took advantage, "the most interesting and ingenious was the hypothesis by a celebrated English naturalist, Darwin."<sup>123</sup> Janet argued that "Final causes are not miracles," and presented them as a logical explanation that was compatible with the evidences available in their time.<sup>124</sup>

We are neither for nor against the transmutation of species, neither for nor against the principle of natural selection. The only positive conclusion from our discussion is this: no principle up to now, neither the action of environments, nor habit, nor natural selection, can explain the organic adaptations without intervention of the

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<sup>121</sup> Ibid., 489-490.

<sup>122</sup> "Discours de M. Haeckel," 3.

<sup>123</sup> Paul A. R. Janet, "Le Matérialisme contemporain. Une théorie anglaise sur les causes finales," *Revue des deux mondes* 48 (1863): 559.

<sup>124</sup> Ibid., 557.

principle of purpose. ... but natural selection, guided in advance by a foreseeing will, directed towards a precise purpose by intentional laws, can well be the means that nature chose to pass gradually from one being to another, from one form to another, to improve the life in the universe, and develop by continuous progress from monad to humanity. Now, I ask Darwin, what interest does he have in supporting that natural selection is not guided? What interest does he have in replacing all final causes by accidental causes?<sup>125</sup>

Materialist philosophy, “so uncouth and clumsy,” attributed to chance all the harmonious cooperation between organic beings and environments, from which one could not fail to recognize a purpose.<sup>126</sup> The doctrine of unity of type across a series of animals was no more than a hypothesis or an ideal, and not a positive expression of reality: “No, we should see this organ pass from one form to another. If not, analogy does not prove the transition.”<sup>127</sup> For the author, if the doctrine of final causes could not be proven directly, at least it provided the only logical explanation after eliminating the materialist and mechanical interpretation of organic transformations. Quatrefages, who mentioned Janet in the introduction of *Charles Darwin et ses précurseurs français*, also emphasized at several points that one could be a free thinker and still oppose transformism, just as one could be religious in varying degrees and still accept any theory of transformism.<sup>128</sup> Janet in his turn invoked Quatrefages’s authority to support his criticism of Darwin, and like him, turned Darwin’s own words against Darwin: if there were a true parallel between natural and artificial selections, nature could not have been blind. Nature had to be capable of choice, to achieve the more advantageous characteristics that men could obtain by intent and calculation.<sup>129</sup>

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<sup>125</sup> Ibid., 584.

<sup>126</sup> Ibid., 559 & 564.

<sup>127</sup> Ibid., 566.

<sup>128</sup> Quatrefages, *Les émules de Darwin t.1*, 8-20.

<sup>129</sup> Janet, “Le Matérialisme contemporain,” 571. This view seems to have led the author to a similar vision as Goethe’s, where Nature embodied art and science at the same time: “nature is no longer a kind of game where, all things falling to chance, whatever effect is produced; it has a plan, a reason, a thought. ... it is a poem, a wisely

These reviews suggest that the evaluations through the religious lens continued to form a significant part of the reception of a scientific work. In Goethe's time, however, criticism of Goethe's pantheism tended to be coupled with incomplete understanding of his natural science, as well as with the popular national images of German scientific and religious culture. Criticism of Darwin's religious belief had a different character. His deism was discussed, but rarely in connection to the image of the English culture. Reviewers also tended to have more than superficial understanding of Darwin's ideas, to be able to criticize them, associate them with, or separate them from those of Darwin's French counterparts. Instead of coupling the religious criticism directly with national images, reviewers often turned it into a discussion of materialism. This kind of discussions may have been relevant to Darwin's scientific ideas, but were of a different order—the philosophical discussions which could be traced back to seventeenth-century France, and which French scientists themselves have attempted to steer clear of since then.<sup>130</sup> In other words, the reviewers' basis of evaluating the foreign scientific works shifted from the images of foreign nations to France's own history and belief system. If the reception of Goethe

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directed drama, where all threads of action, however complicated they may be, are connected towards a determined purpose. It is an ascending series of means and ends." (Ibid., 585)

Both Janet and Quatrefages argued that organic transformations were a means to *conserve* species, not a means of *competition* and *destruction*, which they thought was the outcome of Darwin's mechanical system of nature. Janet, "Le Matérialisme contemporain," 574. Quatrefages, *Les émules de Darwin t.1*, lxiii-lxiv.

While Janet and Quatrefages both asserted the validity of religious outlook to explain nature, its history, and its purpose, they seem to have had different understandings when it came to the very nature of Darwin's ideas. As discussed above, Quatrefages saw their most defining feature to be a series of changes—hence, Darwin was a *transformist* rather than an evolutionist. Janet, on the other hand, understood the focus of Darwin's system to be on the common primitive origin, rather than successive changes. Janet, "Le Matérialisme contemporain," 570-571.

<sup>130</sup> If France returned to its philosophical debate from previous centuries and gave it a new life in the process of dealing with the Darwinian ideas, the contest between materialism and idealism also took on different forms elsewhere, often in association with political life. The dominant stance in France seems to have been rejection of materialism and affirmation of the Creationist belief (at least when it came to discussing the transformist ideas). Germany—the nation that France had accused of excessive idealism—took up the opposite path, as the experience of the 1848-1849 revolutions turned it away from the religious and the ideal, and towards material realism in the second half of the century. See: Timothy Lenoir, *Instituting Science* (Stanford: Stanford University Press, 1997), 77. Michael Rossi, *The Republic of Color* (Chicago: University of Chicago Press, 2019), 37. As discussed in footnote #114, the Moscow Linguistic Circle during the political unrest also participated in the debate, rejecting materialism (which they took to be a Western trait) and supporting teleology both in linguistic and political contexts. See: Goldsmith and Laks, *Battle in the Mind Fields*, chapters 2 & 9.

in earlier part of the century was a mirror to how France viewed the outside world, the reception of Darwin revealed more about France's own tradition and belief. The French audience was aware of the key concepts and the major points of debate in Darwin's ideas, but their religious-philosophical interpretation was prioritized as it was more useful and necessary when defining the French science. This was a quieter affirmation of France's national science compared to the beginning of the nineteenth century, without explicit national rhetoric within scientific discussions. Take for an example Quatrefages's comments. His explicit argument was that "the transformist doctrines have nothing to do with philosophy or dogma at its basis; that they are in reality essentially and only scientific."<sup>131</sup> And yet, Quatrefages devoted the first twenty pages of his work to reinstate the religious nature of the works by Darwin's French predecessors (Lamarck and Saint-Hilaire) while highlighting Darwin's agnosticism. Moreover, his implied message was that one did not have to accept the materialist view of the world, ruled by chance, to be a freethinker; that one could still be one while believing in the divine design. These points suggest that one's religious belief, readily placed in the context of France's perennial debate of materialism, became an important standard in evaluating the foreign scientific works—which inevitably led their attention back to where France stood.

How then were the ideas of transformism generally taken by the French audience, and where did they see themselves in relation to these ideas, especially from the religious perspective? This question does not yield a straightforward answer, as there was a range of reactions to the transformist ideas, which became even more complicated by the varying uses of terms. One writer reported that Paul Broca (1824-1880), a French anthropologist and pathologist, defined the term "transformism" as "any theory of gradual transformation of species today."<sup>132</sup> In

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<sup>131</sup> Quatrefages, *Les émules de Darwin t.1*, 19.

<sup>132</sup> Vernier, "Causerie scientifique," *Le Temps* (Aug. 9, 1870): 2.

this sense, Lamarck, Saint-Hilaire, and Darwin all belonged to transformism, each highlighting different causes for transformations. Lamarck argued that an individual organism was transformed by some necessity of its own nature; Saint-Hilaire placed focus on environmental actions; Darwin emphasized the organic competition among individuals.<sup>133</sup> Transformism also encompassed different beliefs on the origin of these transformations. According to the author, German and English followers tended to accept the unitary or monogenetic transformism, while the French school, following the traditions of Buffon, was more favorable towards polygenism.<sup>134</sup>

While many scholars treated Darwin's ideas simply as a variation of transformism, others made more specific differentiations between them. The *Dictionnaire universel des sciences, des lettres et des arts* included the entries on "Metamorphosis" and "Unity."<sup>135</sup> As with Broca, the *Dictionnaire universel* provided a basic definition for "Transformism"—any opinion that rejected the fixist belief and accepted transformations of species. Under this general definition, Lamarck, Goethe, and Darwin all belonged to the same group.<sup>136</sup> On the other hand, the *Dictionnaire universel* offered more detailed definitions of Evolutionism, in a similar manner to Quatrefages, discussed earlier. Evolution originally referred to the "physiological system which supposed that the germ of a new being resulting from a generative act preexisted that act"; in late nineteenth century, however, the term was increasingly used to express the continuous progression over time, from an inferior to the complex forms of the present, or the development

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<sup>133</sup> *Ibid.*, 2.

<sup>134</sup> *Ibid.*, 2.

<sup>135</sup> The Dictionary defined "Metamorphosis" as the "term used in mythology, fables, and natural sciences," mentioning Goethe's study for the metamorphosis of flowers in particular. "Métamorphose," in *Dictionnaire universel des sciences, des lettres et des arts*, ed. J. Tannery & E. Faguet (Paris: Hachette, 1896), 1029. "Unity" was discussed in both mathematical/physical and literary/artistic senses. Goethe was mentioned again (along with Candolle) as a natural historian who applied the concept of unity to the plant kingdom. "Unité," *Dictionnaire universel des sciences*, 1669.

<sup>136</sup> "Transformisme," *Dictionnaire universel des sciences*, 1642.

of an embryo from an egg to an adult.<sup>137</sup> In both entries “Evolution” and “Transformism,” the authors viewed Darwin as one of the naturalists who established transformism in natural science, which expanded later to evolutionism in other sciences and philosophy.<sup>138</sup> Although the *Dictionnaire universel* defined both terms in natural scientific context, it treated “evolution” more as a novelty emerging from transformism that could yield discoveries and theories in other disciplines. More importantly, it tended to include Darwin in the transformist group, along with Lamarck, Goethe, Leibniz, and Haeckel, but not in the evolutionist camp. The *Dictionnaire universel* was neutral to the diverse branches of transformism, including evolutionism. Many other sources were not, and tended to separate Darwin’s ideas from the comparable views present in France—and they did so most definitively from the Creationist perspective.

There were several scholars who distanced Darwin *from evolutionism*. Although not a scientist, Étienne Vacherot (1809-1897), a French philosopher, wrote on scientific topics, including transformism. Vacherot defined transformism as the process of evolution in the organic world, in its successive degrees from the simplest to the human form.<sup>139</sup> Unlike most other sources which treated evolutionism as a branch emerging from transformism, the author reversed the relationship: evolutionism was the class and transformism a member of the class. Evolution was a process that embraced the inorganic as well as organic world, and moreover, it could have taken place in the organic world by mechanisms other than transformations.<sup>140</sup> Organic transformations, as argued by Darwin and his disciples, did not yet have facts to support them. With an implication that evolution was a development of nature without literal

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<sup>137</sup> “Évolution,” *Dictionnaire universel des sciences*, 617.

<sup>138</sup> *Ibid.*, 617. Also: “Transformisme,” *Dictionnaire universel des sciences*, 1642.

<sup>139</sup> Francisque Bouillier, [No title, review of *Le nouveau spiritualisme* by Étienne Vacherot], *Le correspondant* (Paris), *Nouvelle ser. t.101* (1884): 872.

<sup>140</sup> *Ibid.*, 872.

transformations of organic beings, this kind of view constituted the older, more restrictive argument against transformism in general, and the Darwinian transformism was placed well outside acceptable science.

For some, Creationism added support for the distinction between evolutionism and Darwin's transformism. Céline Renooz (1840-1928), a Belgian feminist and scientific writer in France who corresponded with Royer, was mostly dismissed in the French scientific community, but her Creationist argument seems to have been well taken.<sup>141</sup> Gaston d'Hailly, an author who claimed to be familiar with and impartial to the Darwinian ideas, discussed Renooz multiple times in the journal *Revue des livres nouveaux*.<sup>142</sup> Agreeing with Renooz, d'Hailly argued that those who supported evolutionism but not Darwin's transformism—as opposed to those who rejected all new ideas or those who rashly affirmed everything—were the true scholars who were knowledgeable enough to distinguish between evolution (which was a “law of nature”) and transformation (an “error” or “hypothesis that has not been observed in nature.”)<sup>143</sup> For the author, Darwin's theory was a “naturalist novel,” no more scientific than the Bible.<sup>144</sup> The author then implied that the evolution they accepted was completely compatible with the theory of Creation: “The Creator didn't suddenly create, he has always been doing it, he never stopped, and as time doesn't exist for him, he doesn't do things in one day nor in a century: he creates, and that is it. His goal will always be achieved by evolution of the body.”<sup>145</sup>

I discussed earlier that Suchard distinguished between evolutionism and transformism, placing Darwin with transformism—which provided support for classifying Darwin's theory as

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<sup>141</sup> For more details on Renooz, see: Mary R. S. Creese, *Ladies in the Laboratory II* (Lanham, MD: Scarecrow Press, 2004), 87-88.

<sup>142</sup> Gaston d'Hailly, “Chronique: Paris, Janvier 1, 1891,” *Revue des livres nouveaux* (1891): 320. The author also reviewed Renooz's book, *L'évolution de l'homme et de animaux* in the same journal, two weeks later.

<sup>143</sup> *Ibid.*, 322.

<sup>144</sup> *Ibid.*, 341.

<sup>145</sup> *Ibid.*, 341.

materialistic, whether Darwin intended it to be so or not.<sup>146</sup> Refusing to group Buffon, Saint-Hilaire, and Goethe with Darwin, Suchard particularly paid attention to the comparison between Goethe and Darwin. According to the author, Goethe was interested in the different modes by which nature realized its primitive type, and in finding the original type first created by God.<sup>147</sup> Goethe's focus allowed room for the Creationist explanation, unlike Darwin's interest in the transformations of species.

It is telling that Louis Lescoeur (1825-1910), a French Catholic theologian, took the opposite route by defending Darwin against the evolutionists, but on exactly the same reasoning as the views above: "Darwin, so often cited victoriously by evolutionists as their own, clearly affirms his belief in the creation of the first living germ. ... Thus it is wrong to look for in Darwin an authority to contradict the great law that there is a non-transgressive barrier between the inorganic and organic worlds."<sup>148</sup> As discussed earlier, Quatrefages, too, proposed to re-label Darwin as a transformist rather than an evolutionist, while refuting transformism *and* defending the religious scholars who did not fully accept the transformist ideas.<sup>149</sup>

There was yet another, completely different evaluation of Darwin, as some separated Darwin *from transformism*—as opposed to the authors discussed above, who located him in the transformist group—as well as from materialism. Henri Grignet, who participated in the sessions at the Scientific Society of France at Sorbonne, proposed to give a more just evaluation to Darwin, who had been misunderstood and yet became the topic of so many discussions.<sup>150</sup>

Grignet sought to correct the view that Darwin was a materialist: Darwin did not argue for the

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<sup>146</sup> See p.12 of this chapter.

<sup>147</sup> Suchard, "Une nouvelle explication de l'origine des êtres," 269.

<sup>148</sup> L. Lescoeur, "L'évolution et la vie," *Le correspondant (Paris), nouvelle ser. t.109* (1886): 700-701.

<sup>149</sup> See p.33 of this chapter.

<sup>150</sup> Henri Grignet, "Le livre parlé: revue des conférences," *Le livre. Revue mensuelle. Bibliographie moderne* (1880): 275.

simian origin of man, and in fact, he was criticized by Haeckel for placing God at the basis of his system.<sup>151</sup> Darwin was not responsible for establishing transformism (which, the author argued, really belonged to Benoît de Maillet), but only for coming up with the theory of selection.<sup>152</sup> Many of those who rejected Darwin, according to the author, acknowledged variability of species but did not fully support him because of the lack of conclusive evidence.<sup>153</sup> The journal *La revue politique et littéraire* introduced a writing by Max Müller (1823-1900), in which the German-British philologist likewise defended Darwin's science by highlighting its compatibility with the Creationist doctrine. Just a year before, in 1872, Müller had argued against Darwin that there was a definite and true barrier between the emotional animal language and the rational human language (between "the neigh of the horse" and "the poetry of Goethe")—that the distance between these extreme ends could not be explained simply by the passing of time.<sup>154</sup> A year later, however, Müller seemed to have turned around. According to Müller, Darwin did not go beyond the argument that all animals and plants had descended from eight or so ancestors; he did not actually admit a single unique prototype for all living forms.<sup>155</sup> Even when Darwin alluded to a common descent from a primordial form, he suspected that the Creator must have given life to this primordial form—which was a stark contrast, Müller wrote, to the views like Haeckel's that the idea of the Creator was obsolete and unscientific.<sup>156</sup>

These views together, although confusingly diverse and sometimes arguing in opposite directions, nonetheless indicate the shared standard for what French audience took to be the "correct" or "true" science. It needed to be empirically supported, and for the aspects that could

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<sup>151</sup> Ibid., 275.

<sup>152</sup> Ibid., 275.

<sup>153</sup> Ibid., 275.

<sup>154</sup> "Max Muller on Darwin's Philosophy of Language," *Nature* 7 (Dec. 26, 1872): 145.

<sup>155</sup> Max Müller, "La philosophie du langage d'après Darwin," *La revue politique et littéraire* (1873-1874): 245.

<sup>156</sup> Ibid., 245.

not yet be observed, logical enough to explain the development and history of nature. The term “logical” here seems to have substituted for “compatible with the Creationist belief,” as many French reviewers seemed to have accepted the Creationist theory as the more logical explanation than Darwin’s theories. **Fig. 6** on the following page summarizes the various interpretations of Darwin’s position in relation to French naturalists’ and Goethe’s positions.

### c) Reformatted nationalism & Goethe’s role: philosophical evaluation

If many sought to separate Darwin from the French naturalists, usually in a negative light, others treated his ideas as a repetition or extension of the French ideas, especially those of Diderot and Lamarck. Joly, who seems to have generally supported Darwin’s theories of natural selection, argued that the earlier French naturalists had similar ideas—Lamarck, Saint-Hilaire, and their German parallel, Goethe.<sup>157</sup> Joly even implied that Darwin’s only original contributions were the law of struggle for life and an (exaggerated) view of the simian descent of man; Darwin’s main role was merging the bold ideas that had been scattered until then.<sup>158</sup>

Others were more explicit in their preference for Lamarck and in their doubts about Darwin. Alfred Espinas (1844-1922), a French thinker, was reported to have argued that one should “correct and complete Darwin’s theory by that of our Lamarck.”<sup>159</sup> Janet, who we saw earlier defended the doctrine of final causes, rejected both Darwin and Lamarck for their mechanistic explanation of evolution, but did show preference for Lamarck. While Lamarck argued that species would remain fixed after adapting to their environment as long as the

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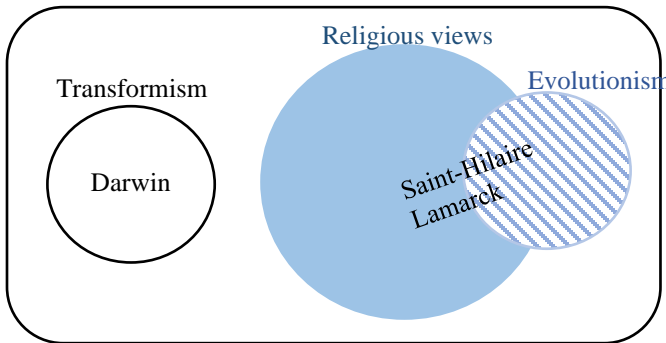
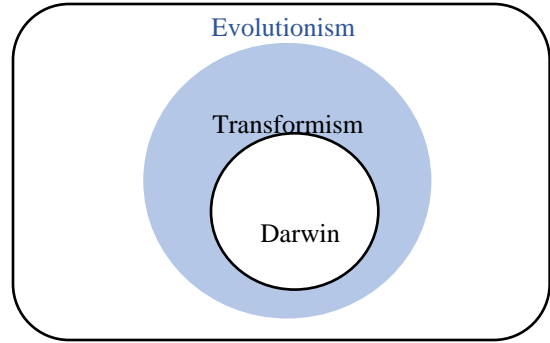
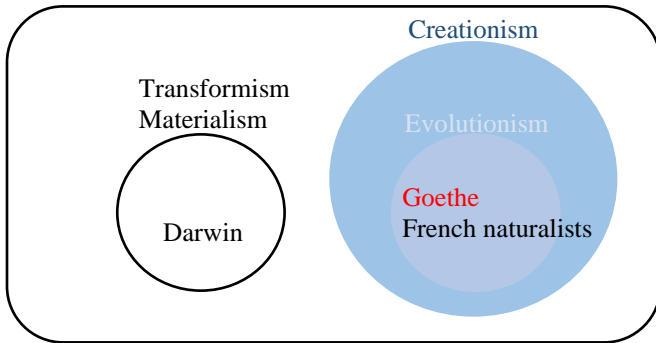
<sup>157</sup> Joly, “Exposé sommaire de la doctrine de Charles Darwin,” *Mémoires de l’Académie des sciences, inscriptions et belles-lettres de Toulouse ser.8 t.2* (Jan.-Jun. 1880): 170-171. Joly particularly stressed Goethe’s role in the coming of Darwin’s ideas, but as a parallel and confirmation of the French ideas: “Goethe himself must be regarded as one of predecessors of Darwin. In fact, without the knowledge of his contemporary Lamarck’s ideas, and by the power of his genius alone, Goethe arrived for his part at the conclusion which offer the greatest parallel to those of the French naturalist.”

<sup>158</sup> *Ibid.*, 170-171.

<sup>159</sup> Beurrier (first name unknown), “Questions philosophiques: la sociologie animale (1),” *La revue politique et littéraire* (1877): 184.

**Fig. 6** Various interpretations of Darwin's position in relation to French naturalists and Goethe

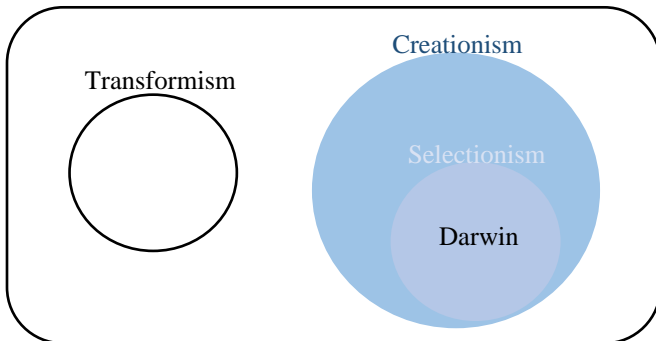
**Interpretations *against* Darwin**



\*Colored shape = The group favored by the reviewers  
 \*Striped shape = The group implicitly favored by the reviewers  
 \*Goethe is highlighted in red

These diagrams summarize few patterns:

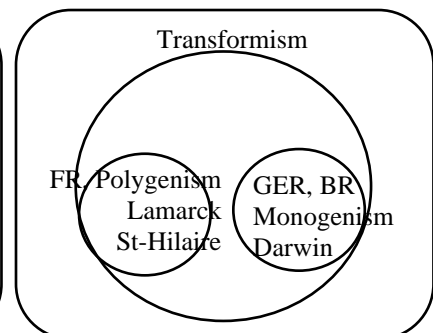
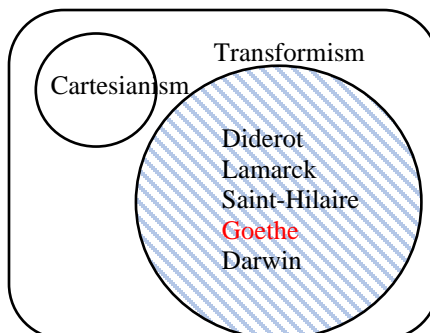
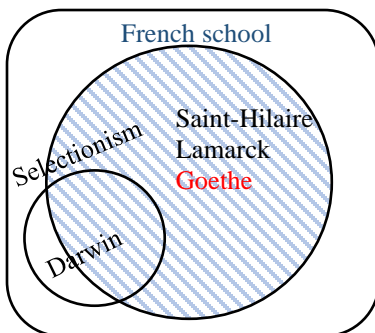
**Interpretations *in favor* of Darwin**



1. Goethe was almost always grouped with French naturalists, both in the reviews against Darwin and the more neutral reviews. This pattern was especially pronounced (a) when the reviewers portrayed Darwin, too, as continuing the French legacy, and (b) when the discussion of religious aspect was not prominent in the reviews.

2. In both the reviews criticizing Darwin and those defending him, Creationism was the favored view.

**Neutral interpretations**



environment did not change, Darwin's theory of natural selection implied that species would continue to change even in a fixed environment—if this were true, then we should have been able to see the evidences of variation processes, and since we don't, Darwin's theory was likely false.<sup>160</sup> Royer clearly supported transformism as a “scientific truth,”<sup>161</sup> and yet, considered Darwin to have made a minimal addition to Lamarck's theory: the condition that the acquired changes would be transmitted through generations if the changes were favorable to the conservation of individuals or species.<sup>162</sup> In Royer's opinion, Lamarck implied the same condition, even if he did not explicitly state it.<sup>163</sup> Darwin merely added facts, proofs, and testimonies to Lamarck's original views and rebutted all the objections that had been made against the French philosophe.<sup>164</sup> In fact, Royer considered it unreasonable that “the theory of transformation, born and developed in France at the end of the eighteenth century, and represented by De Maillet and Robinet, then by Goethe, Saint-Hilaire, and Lamarck, exclusively carries and protects the English name Darwinism.”<sup>165</sup>

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<sup>160</sup> Janet, “Le Matérialisme contemporain,” 573.

<sup>161</sup> Royer, “Darwinisme,” 767.

<sup>162</sup> *Ibid.*, 726-727. Interestingly, Paschal Grousset (1844-1909, under the pseudonym Philippe Daryl), who supported the idea of biological evolution and regarded natural selection as its “true agent,” made almost the same point, only substituting Lamarck's name with that of Erasmus Darwin: “All that Charles Darwin added to his grandfather's opinions is that the accidental characteristics had a tendency to persist if they were advantageous in the struggle for life. This coronation of the theory of natural selection is the only cardinal point of the system that the penetrating genius of Erasmus Darwin did not foresee.” The author's view of Erasmus Darwin was strikingly similar to Goethe's reception in the first half of the nineteenth century: “The great misfortune of Erasmus Darwin was being a poet, and a rather celebrated poet, although with a dash of fantasy and even extravagance ... People do not accept that a physician capable of rhyming the fleeting poems also had the common sense in matters of general physiology.” In this same review, the author also described Goethe as an “enlightened amateur.” Philippe Daryl, “Une étude sur la vie de Darwin,” *Le Panthéon de l'Industrie* (1886): 6-7.

<sup>163</sup> *Ibid.*, 727.

<sup>164</sup> *Ibid.*, 728 & 731.

<sup>165</sup> *Ibid.*, 698-699. Several other reviewers also assigned priority to France. Abel Hovelacque asserted that Lamarck was the first to formulate with scientific proofs the doctrine of transformism: “The name *Darwinism* was given to the very doctrine of evolution of species. If one were to create a word of this kind ... it was not the name of Darwin that should have been borrowed, but that of Lamarck.” Abel Hovelacque, *Nore ancêtre* (Paris: Leroux, 1877), 6. Jules Assézat (1832-1876), a French journalist and literary historian, claimed that the “transformist idea is entirely French. It appeared first in our land” as a philosophical hypothesis of Lamarck, the “true naturalist.” The author also complained that Haeckel assigned too much importance to Goethe “like all Germans.” Jules Assézat, “*La descendance de l'homme et la selection sexuelle*, par Ch. Darwin—*Histoire de la Création des êtres organisés*, par

While Lamarck was the most mentioned French naturalist within the discussions of Darwin's theories, there was another figure whose name suddenly came to make frequent appearances in scientific discussions: Diderot, who, according to Goethe, was "the most German of the French philosophes."<sup>166</sup> Paschal Grousset (1844-1909), a French writer and supporter of the theory of biological evolution, placed Diderot at the top of the precursors of Darwin; other eighteenth-century encyclopedists were the tacit precursors, while Lamarck, Saint-Hilaire, and Goethe had a more direct influence on Darwin's ideas.<sup>167</sup> France was too politically and militarily distracted to realize its own birthing of the study of evolution,<sup>168</sup> but it all began in the eighteenth-century France, possibly with Diderot. In the eyes of these reviewers, Darwin served as a continuator of the great French Enlightenment, solidifying the theory which Diderot had first foreseen and Lamarck had developed.<sup>169</sup>

The significance of Diderot's appearance in the discussions of Darwin is manifold. Diderot was an eighteenth-century philosophe, who preceded Darwin almost by a century and who had been mostly discussed in philosophical and literary contexts. Moreover, in the late nineteenth-century discussions, Diderot's name tended to be accompanied by that of Goethe, whose discussions in the early nineteenth century had rarely involved Diderot.<sup>170</sup> The fact that

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Ernest Haeckel," *Journal des débats politiques et littéraires* (Jun. 21, 1874): 3-4. Lanessan, too, wrote that Lamarck did the most for the triumph of the doctrine of evolution. Lanessan, *Oeuvres complètes de Buffon*, 421\*. Another writer described the theory of descent as having been created by Lamarck and then "monopolized by Darwin." F. Nivelet, *Loisirs de la vieillesse, ou l'Heure de philosopher* (Commercy: Carasse, 1887), 40.

<sup>166</sup> "Inauguration de la statue de Diderot," *Le Temps* (July 15, 1886): 4.

<sup>167</sup> Daryl, "Une étude sur la vie de Darwin," 6.

<sup>168</sup> *Ibid.*, 7.

<sup>169</sup> "Mort de Ch. Darwin," *Bulletin de la Société d'anthropologie de Paris ser.2 t.5* (1882): 348. Another reviewer made a similar point: Diderot had expressed the transformist ideas when Lamarck was only fifteen years old; Lamarck got hold of them, and then Darwin developed them afterwards. Charles Joliet, "Mlle. Volland: poignée de paradoxes," *Le Pays a38 n224* (Nov. 1886): 3.

<sup>170</sup> There was one French writer, Jules Barbey d'Aureville (1808-1889), who wrote on Goethe and Diderot together, although most of his discussions concerned their literary works. Aureville wrote on Goethe and on Diderot separately before, but felt the need to put them together in one book later: "despite the difference of nations and time, of language and idea, of influence and destiny, Goethe and Diderot ... are of the identical nature." While Goethe had greater reputation than the other, Aureville considered Diderot as the predecessor and figurative father

the French readers retraced a century to excavate a French figure to compare to Darwin, as well as to Goethe, confirms the following. First, Darwin's ideas had enough impact on natural science in France that the audience felt the need to bring in new figures—in addition to the usual representatives of French transformism such as Lamarck and Saint-Hilaire—as Darwin's parallels. This point in turn also implies that the nationalistic sentiment was not absent in the receptions and discussions of foreign scientific works in the late nineteenth-century France. Second, Goethe's morphology continued to be an important reference for comparison when defining the French morphology. Goethe did not at all disappear, even decades after his death and with the emergence of Darwin's theories from England. On the contrary: if, in the early nineteenth century, Goethe was a German counterpart for a direct comparison to the French morphology, he seems to have become an important bridge between French transformism and the Darwinian theories. One could even say that Goethe was a mediator and time traveler, between the then-current foreign domination in biology and the French identity rooted in the older tradition.

The newly forged connection between the French and the Darwinian natural sciences, with Goethe as their intermediary, is visible in several discussions. Jean-Félix Nourrisson (1825-1899), a Catholic philosopher who wrote on the philosophy of nature, grouped Lamarck, Goethe, and Darwin as the “illustrious promoters of the evolutionary doctrine,” and then connected them to Diderot. Diderot's initially fantastical ideas, according to Nourrisson, were later supported

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for Goethe. (Jules Barbey d'Aureville, *Goethe et Diderot* (Paris: E. Dentu, 1880), ii.) In his initial writing on Goethe, the author highlighted the foreign nature of Goethe by criticizing his “oriental philosophy” and pantheism based on the Hindi idea of the God; the author also characterized French audience's fascination with Goethe as that of a “Chinese character.” (Aureville, *Contre Goethe* (Bruxelles, France: Éditions Compelxe, 1999 [1873]), 37-38 & 67.) The author did credit Goethe's scientific works more than his literary works, but still argued that his scientific achievement was more by luck than by his true talent. (ibid., 67.) Aureville was aware that his criticisms of Goethe looked like a nationalistic rant. His writing on Goethe was published right after the French defeat, which made it seem like a vengeance against Germany, but he insisted that it was not his intention. (Aureville, *Goethe et Diderot*, iii-iv.)

with facts by Lamarck, the “father of evolutionism”; Goethe came very close to Diderot’s and La Mettrie’s philosophy of nature,<sup>171</sup> but retained his cautious attitude towards the idea of metamorphosis, as both a gift and danger that could possibly derail science; finally, Darwin wholeheartedly took up the doctrine of evolution to restore science.<sup>172</sup>

The reviewers in the scientific field highlighted even more Goethe’s role as a connector between the different periods of scientific knowledge. The *Dictionnaire encyclopédique des sciences médicales* included the entries “Goethe” and “Diderot,” both contributed by the same author, Hahn. While the author agreed that Goethe was one of the precursors of Darwin, he asserted that Diderot should be credited as well. Diderot, as a Leibnizian savant, played “an important role from the point of view of the development of natural sciences, in particular the development of scientific theories of a great German poet Goethe.”<sup>173</sup> Accepting Haeckel’s argument that Goethe was one of the precursors of transformism, Hahn claimed “the same honor for our Diderot, who preceded Goethe and expressed in the same terms the latter’s idea on universal dynamism, on the continuity and evolution in nature, on animal prototype, etc.”<sup>174</sup> The author’s motivation was not wholly nationalistic, however. He understood that Diderot’s ideas were, unlike Lamarck’s, of a different order from that of Darwinian ideas: “All we can say is that, in the eighteenth century, these ideas were in the air in some way: Buffon, Bonnet, de Maillet and many others, would have the same rights as Diderot and Goethe to be among the precursors of transformist theories, for all were subject to the influence of the Leibnizian

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<sup>171</sup> Jean-Félix Nourrisson, *Philosophie de la nature: Bacon, Boyle, Toland, Buffon* (Paris: Perrin, 1887), lxxxiii. Nourrisson pointed out that both Goethe and La Mettrie compared nature to “a player, who, playing all-or-nothing, produced stones, plants, animals by lucky dice rolls ... man himself was merely the success of a roll that aimed very high.”

<sup>172</sup> *Ibid.*, lxxx-lxxxv.

<sup>173</sup> Hahn, “Diderot,” in *Dictionnaire encyclopédique des sciences médicales ser. I t.29*, ed. A. Dechambre (Paris: G. Masson, 1884), 276.

<sup>174</sup> *Ibid.*, 276.

philosophy.”<sup>175</sup> By highlighting the influence of the Leibnizian philosophy coursing through the recent development of transformist ideas, the author did not seem to have been too concerned with the French priority. Still, the author presented a broader theme of the transition between philosophical ideas and natural science, from one century to the next. This theme was represented by a more specific role that Goethe played, whose life literally spanned the eighteenth and the nineteenth centuries, and who bridged Diderot, Lamarck, and Darwin, or the French Enlightenment and the later scientific developments taking place beyond France.

Fernand Papillon (1847-1874), a French member of the Chemical Society of Paris and author of dozens of books on natural science and philosophy, offered a detailed analysis of the philosophies shared by Diderot and Goethe at the basis of their natural science. Although Papillon did not explicitly mention Darwin, he focused on the biological idea of the ideal type. The author identified the key feature of Diderot and Goethe in their emphasis on experience over abstract science, as well as on the question of *how* over *why*. Above all, Papillon recognized, as did the *Dictionnaire encyclopédique*, their shared rejection of Cartesianism and attraction towards “the intuitive, Leibnizian philosophy, more suitable for speculations in biology and psychology,” which led both to see the whole reflected in the microcosm.<sup>176</sup> This philosophy also allowed Diderot and Goethe to embrace a more dynamic and fluid kind of realism:

Their ideas are always in perfect harmony with their sentiments. One could not have said the same, if, instead of being Leibnizians, they were Cartesians. The fact is that the Cartesian philosophy is hardly poetic. Precise, methodical, rigid, it imposes on mind the most austere discipline, and authorizes neither freedom of dialectics, nor rush of imagination, nor abandonment of sensibility, nor contemplative emotions. ... The Leibnizian does not reject the

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<sup>175</sup> Ibid., 277.

<sup>176</sup> Fernand Papillon, “Des rapports philosophiques de Goethe et de Diderot,” *Séances et travaux de l’Académie des sciences morales et politiques* (Jan.-Jun. 1874): 248, 257, 262, 246. While the author saw their shared emphasis on experience, he identified different reasons behind it: Goethe opposed analysis and mathematics because he did not know mathematics, while Diderot knew mathematics but opposed it by his reasoning and philosophy.

existence of an inflexible mechanism and he accepts its indisputable theorems, but he observes that of another, connected higher world, where a more varied initiative, a more sumptuous meaning, a more cheerful order to the soul reign, and the metaphysics that he draws from it is a poetry.<sup>177</sup>

And yet, Papillon did not hide which Leibnizian he thought should have been prioritized.

Generally, Goethe was very familiar with French literature and sought to adopt French grace and clarity.<sup>178</sup> Goethe's scientific works exhibited the ideas on method, types, metamorphosis, force, life, etc. that often recalled those of the French thinker.<sup>179</sup> More specifically, Goethe borrowed from Diderot the transformist ideas:

We should recognize that Goethe's concepts relating to the metamorphosis of plants were received by all botanists under the same form that the poet had given them and that the analogous doctrines that he proposed for animals became the basis of comparative anatomy, without considering the solid support they lent to the transformist doctrines. All ideas that the Weimarian poet developed on this subject are explained with deliberate clarity by Diderot ...<sup>180</sup>

Papillon recognized that these transformist ideas, stemming from the Leibnizian philosophy, could not be claimed by Diderot or Goethe, but "Diderot expressed them at the same time as Maupertuis and other Leibnizian naturalists, with precision that Goethe did not exceed."<sup>181</sup> To the author, Goethe was a connection, and popularizer, between the great eighteenth-century French natural philosophy and modern biology that was now represented by a British scientist.

The development of multiple threads of transformist and evolutionary ideas in the late nineteenth century summoned, or continued to need, Goethe as a historical and national

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<sup>177</sup> Ibid., 261-262.

<sup>178</sup> Ibid., 251.

<sup>179</sup> Ibid., 260.

<sup>180</sup> Ibid., 252-254.

<sup>181</sup> Ibid., 254-255. However, the author thought that these ideas were better received when Goethe presented them, compared to when Diderot expressed them. The author further speculated why, and credited Goethe for having had "a good sense to study the metamorphosis first in his most confident domain, the plant kingdom," which he studied with utmost caution before expanding the doctrine to other domains.

intermediary. Retracing the history of ideas through and beyond Goethe, the eighteenth-century French philosophes like Diderot could be called back into scientific discussions; with Goethe as a connector among the French, German, and English biological thought, the natural scientific discussions shed nationalistic rhetoric, at least the explicit kind that used to ask which nation held the highest scientific prestige. In other words, Goethe's ideas from decades ago were multifaceted and fluid enough to tie together the century's biological ideas across Europe. Darwin's ideas, too, offered room for varying interpretations and unintended confusions, as several reviewers pointed out. The reviewers themselves were hardly on the same page when they attempted to define what Darwin's ideas or transformism in general were, as well as where the French biology stood in relation to them. In this pool of ideas, the fluidity that Goethe and his natural science represented was being highlighted more than ever, for better or for worse.

From a philosophical point of view, Elme-Marie Caro (1826-1887), who proposed to examine Goethe's scientific works in relation to his philosophical belief, concluded that Goethe's philosophy was marked by the lack of system, or fluidity.<sup>182</sup> The French journal *Revue philosophique de la France et de l'Étranger* also pointed out how Goethe had been labeled a Spinozist, pantheist, Leibnizian, realist, empiricist, idealist, Platonist, etc. and concluded that Goethe was a relativist, not a systematic philosopher.<sup>183</sup>

In a more scientific context, the ideas that Goethe formulated were literally about the metamorphosis of organisms. Not only did Goethe adopt the idea of an organic type, a fluid

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<sup>182</sup> Elme-Marie Caro, *La philosophie de Goethe* (Paris: Hachette, 1866). The author emphasized the absence of a fixed philosophical system throughout the book. This gave Goethe a "flexible liberty," who freely absorbed parts of different systems, conducive to creative ideas that challenged authorities. (iv-vi) However, as Goethe's eclecticism merged with pantheism, the freedom became an "irresponsible" one, leading the study of history and of the perceptible reality into obscurities: "It seems that, to accomplish in himself the law of evolution which is in his eyes the master law of nature, he transforms himself through the ideas which please him, and it becomes difficult at certain moments to follow his undulating thought in the infinite caprice of its metamorphoses." (212, 218-219)

<sup>183</sup> "Revue des périodiques étrangers," *Revue philosophique de la France et de l'Étranger* (Jan.-Jun. 1885): 109. This was a review of Adolf Harpf's *Le principe de la connaissance chez Goethe*.

concept that allowed him to see the visible world as its extensions in varying degrees,<sup>184</sup> but he also envisioned a serial homology in an individual plant—an even more raw sense of metamorphosis than the concept of the type. Caro, who characterized Goethe’s science with the absence of a fixed philosophy, made an important distinction that Goethe’s morphology placed more emphasis on the idea of *Bildung*, or perpetual mobility of beings in their development, rather than on that of *Gestalt*, or a fixed form.<sup>185</sup>

As Goethe’s concept of organic type straddled philosophical and scientific interpretations, the question of whether this type was virtual or real continued to drive the discussions of Goethe’s natural science, and in greater depth than before. Several reviewers who were concerned with this question argued that Goethe’s primitive type was a physical reality in one way or another. Most representative of this view was Haeckel, whose work was introduced and reviewed very often in French journals: Goethe’s objective tendency and realist concept of nature left no doubt that he was speaking of a real primitive type from which all organic forms descended, and not a metaphorical, poetic, or ideal one.<sup>186</sup> Émile Beaussire (1824-1889) was a French reviewer who came to a similar conclusion—that Goethe’s concept of the type was more than an idea—through, ironically, a philosophical consideration. The archetypal plant was an

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<sup>184</sup> *The Great Universal Dictionary of the Nineteenth Century* included an entry “Archetype,” where the author categorized naturalists into Platonians, Aristotelians, and Epicurians. Goethe belonged to the first group, along with Oken and Saint-Hilaire, and was the first to understand the fruitfulness of the concept of the organic type. “Archétype,” *Grand dictionnaire universel du XIX<sup>e</sup> siècle t.1* (1886): 573.

<sup>185</sup> Caro, *La philosophie de Goethe*, 135. Although Caro considered *Bildung* (formation), rather than *Gestalt* (form), as the concept that best defined Goethe’s natural science, the later development of Gestalt psychology in the twentieth century also had its root in Goethe. Gestalt psychology argued that, for a perceiver, a whole (of an object, pattern, melody, etc.) existed as a positive content that was more than, and different from, the sum of its units—just as Goethe’s morphology sought to ultimately understand the organic whole through the study of diverse organic forms and their relations. In this sense, Goethe’s “organic whole” was the Gestalt of Gestalts, encompassing the forms that could be perceived in a given moment as well as their *Bildung*, or their process of development. For more on the school of Gestalt psychology, see Goldsmith, chapter 5.

<sup>186</sup> Haeckel, “Darwin, Goethe et Lamarck,” 712.

idea, not a directly perceivable form, as Schiller had criticized Goethe<sup>187</sup>—but it did not mean, according to Beaussire, that the idea was false.<sup>188</sup> If Hegel viewed transformations purely in an ideal sense, Beaussire rejected the separation between the ideal and the material, in support of Goethe’s idea of the plant type as well as of the idea of successive metamorphoses of species.<sup>189</sup> The author noted that it was Germany, where younger generations abandoned this Hegelian separation, which has most favorably received Darwin’s theory.<sup>190</sup> As for France, the author quoted Goethe: “What above all pleases the French is our philosophical idealism; for every ideal serves the revolutionary cause.”<sup>191</sup> The author confirmed the national difference in Darwin’s reception and found its cause in the reception of philosophical views of realism, thereby also directly aligning Goethe with Darwin’s ideas.

Even those who did not agree with (what they thought to be) the nature of Goethe’s type recognized the relevance of this concept to modern biology. Camille Dareste (1822-1899), a French zoologist and experimental embryologist, recognized the connection between Saint-Hilaire’s and Goethe’s ideas and modern teratology. Although Dareste went on to partially correct Goethe—on the assumption that Goethe did not mean the type to be a physical, real form—his discussion confirmed the flexible, transitional position that Goethe represented in the biological ideas across the century:

If we can no longer accept Geoffroy Saint-Hilaire’s idea of the unity of organic composition for all vertebrate animals, we should however accept, for the animals of this branch, the unity of type. And this type is not a virtual/potential type as Goethe had envisioned it, but it is clearly achieved in the embryo during the

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<sup>187</sup> Goethe reminisced his first conversation with Schiller as a “fortunate encounter”: at a chance meeting, Goethe discussed his idea of the metamorphosis of plants and made a quick sketch of a plant archetype. Schiller commented that Goethe’s archetype was not a real observation, but an idea. Goethe replied: “Then I may rejoice that I have ideas without knowing it, and can even see them with my own eyes” (Goethe, *Goethe: Scientific Studies*, 20).

<sup>188</sup> Émile Beaussire, *Antécédents de l’Hégélianisme dans la philosophie française* (Paris: Baillière, 1865), 85.

<sup>189</sup> *Ibid.*, 95.

<sup>190</sup> *Ibid.*, 95.

<sup>191</sup> *Ibid.*, x.

first periods of its development, as we know since the important discoveries by Baer. All these animals have at the origin a common form and go through a certain number of similar forms at the beginning of their lives, before entering the different paths which lead them to the definitive organization of fish, batrachian, reptile, bird, mammal.<sup>192</sup>

On the other hand, a majority of reviewers held a contrasting view that Goethe's primitive type remained strictly within the ideal realm. For example, Albert Gaudry (1827-1908), a French geologist and paleontologist, wrote that the vertebral theory was favored by pantheists like Goethe because it supported the philosophy that the parts of different forms were connected by a common identity.<sup>193</sup> The philosophical focus was visible in several other reviews, which usually expressed doubts about the very concept of type, be it real or ideal. Royer was against the concept of a fixed type in general (for species), although it was evident that the author supported Goethe's idea of the perpetual metamorphoses of individuals: "We must conclude that none of our classifications is absolute, that all our ideas on the fundamental importance of what we call type are only a misuse of our mind, born from the habit of always referring to similar things with a same name and the same images."<sup>194</sup> Hahn, too, dismissed Goethe's concept of the type and its metamorphoses as a wishful imagination that straddled the ideal and the physical, in the same way artists produced artworks.<sup>195</sup> The *Grand dictionnaire universel* adopted Goethe's definition of metamorphosis in botanical studies, and yet it cautioned readers that his concept of metamorphosis should be taken not in an absolute sense, but only metaphorically.<sup>196</sup> Auguste Trécul (1818-1896), a French botanist, also expressed doubt about the concept, even while

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<sup>192</sup> Camille Dareste, "Mémoire sur la tératogénie expérimentale," *Archives de zoologie expérimentale et générale* (1873): 412-413.

<sup>193</sup> Albert Gaudry, *Les enchaînements du monde animal dans les temps géologique* (Paris: Savy, 1883), 246.

<sup>194</sup> Royer, 743.

<sup>195</sup> Hahn, "Goethe," 742-743.

<sup>196</sup> "Métamorphose," *Grand dictionnaire universel t.11* (1874): 136. The author for this entry also mentioned that Goethe's French counterpart—Auguste de Saint-Hilaire—was able to escape this danger of metaphor.

embracing Goethe's theory of ascending and descending metamorphoses of appendicular organs of plants: "There is however a room for doubt if ... in the particular circumstances of vegetation, we can conclude that all parts of the flower are merely and really the modified leaves. It seems to me that it is giving to the word "leaf" a much extended significance."<sup>197</sup>

All these discussions around Goethe's fluid biological concept were rooted in how Goethe defined reality itself. Caro picked up on Goethe's definition of scientific experiment as intermediary between mind and the external world, between truth and reality.<sup>198</sup> What others commonly saw as reality was thus only part of Goethe's vision of reality, which became accessible through scientific experiments: "This is what Germany called Goethe's *realism*, and what himself calls the *intellectual empiricism*"—an empiricism guided by intuition, to realize the "synthesis of the world and the mind."<sup>199</sup> Those like Caro who held a balanced view of Goethe's philosophy and science realized that Goethe's definition of reality would not be conventionally approved in the scientific community. Darwin's ideas were thought to be much more scientific than Goethe's, and even they could not escape being labeled as hypotheses: Goethe's ideas of the type and its metamorphosis "dissolve and destroy everything, science and reality. It is not a scientific theory, but a poetic Spinozism."<sup>200</sup>

Faivre, another scholar who analyzed Goethe's ideas in a detailed monograph, more explicitly criticized Goethe's realism. Like Caro, Faivre recognized the particular place Goethe occupied, of which the author approved. Goethe's "intellectual empiricism" was "precise, practical, and fertile" in comparison to Schelling's idealism, in that it took the middle ground:

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<sup>197</sup> Auguste Trécul, "Anatomie végétale: Observations sur la nature des diverses parties de la fleur," *Comptes rendus hebdomadaires des séances de l'Académie des Sciences* t.75 (Jul.-Dec., 1872): 649.

<sup>198</sup> For Goethe's own writing on this theme, see: Goethe, "The Experiment as Mediator between Object and Subject," in *Goethe: Scientific Studies*, ed. Douglas Miller (New York: Suhrkamp, 1988), 11-17.

<sup>199</sup> Caro, 118-119.

<sup>200</sup> *Ibid.*, 139-140.

between the Kantian and Fichtean schools, between the subject and the object, between analysis and synthesis, between the particular and the universal, between external realities and human mind.<sup>201</sup> Goethe's efforts to maintain fluidity without indulging in either side, in turn implied his keen awareness of the separation between ideas and facts. Despite this awareness, Faivre observed, Goethe was overpowered more by ideas:

One of these pitfalls, the most serious one of all, is considering the isolated beings as the manifestation of a unique being, diversifying themselves constantly by infinite metamorphoses ... In science, such concept leads to the negation of the species and to spontaneous generation; in philosophy, it leads to pantheism. Goethe was led to these errors, and he firmly adopted them.<sup>202</sup>

In Faivre's eyes, Goethe's idea of the organic primitive type and its metamorphoses was a result of his failure to be truly fluid, a failure to maintain the middle ground. Specifically in regards to the idea of the type, Faivre recognized that there was a gap between Goethe's concept and the modern cell theory—which, from the structural viewpoint, considered a plant to derive from a cell. Goethe's view of the plant as reducible to external organs like the leaf, as the "type," was not entirely wrong, but acceptable only within the order of knowledge that Goethe was navigating.<sup>203</sup> Although Faivre's aim was to defend Goethe against the common objections regarding his concept of the type, the author implied that Goethe's vision of transformations was too fluid for reality, even while it helped make the history of biological ideas a coherent flow.<sup>204</sup>

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<sup>201</sup> Faivre, 366-367.

<sup>202</sup> *Ibid.*, 134-135.

<sup>203</sup> *Ibid.*, 387-389.

<sup>204</sup> *Ibid.*, 387-389.

## Conclusion

Regardless of the place one assigns to Darwin's ideas in the history of science, they ushered in changes in and outside of scientific communities. Goethe's reception in France was one of the places where these shifts could be observed. The theory of the organic primitive type and its metamorphosis, which Goethe had developed in 1790 and French scholars rediscovered in the 1830s, was once again renewed with the emergence of Darwin's evolutionary theory. At the individual level, reviewers showed more appreciation than before for Goethe's qualification as a naturalist. Many admitted that they saw a connection between Goethe's then-seemingly fantastical ideas and what later development in biology came to reveal. In particular, the view that Goethe was one of the intellectual precursors to Darwin prevailed (although there were a few who argued against this association), which prompted the reviewers to bring him back to the discussions of Darwin. At the same time, reviewers focused less on Goethe's foreign identity. Parts of the reviews showed that the images of German science continued to be that of an excessively philosophical and pantheistic culture, thus unsuitable for science, but Goethe as an individual was not as frequently associated with this image as before. Did this mean that France tossed away the nationalistic frame of scientific discussions—which focused on France's scientific superiority over foreign nations—that was very visible in the earlier part of the century? Darwin's reception in France, along with Goethe's, suggests that it was not the case. Darwin's and other transformist and/or evolutionary ideas were not only radical in themselves and attracted criticism from all directions, but their concept of competition and degeneration also triggered social and national anxieties, especially against the backdrop of the Franco-Prussian War. These combined factors seem to have forced France to take a look at and redefine itself and its science, as opposed to simply pointing their critical attention towards the outside. Be it

criticism of others or self-evaluation, it did not take the explicitly nationalistic tone. The simple binary view of France versus foreign nations would no longer work. Rather, it adopted a mode of asserting a Creationist belief when criticizing the foreign transformist ideas from the religious perspective. From the philosophical perspective, it took on a mode of incorporating the French history into the map of modern science, where Goethe served as a flexible, multi-faceted agent to bind together the centuries-old French philosophical tradition and the biological thoughts from abroad that were now dominating the scientific world. Again, the explicit nationalistic sentiment was toned down in these criticism and self-reflections, compared to the early nineteenth century. Nonetheless, they pointed to collective discontent, vigilance, and self-assertion that were motivated by a keen national awareness. In this sense, Goethe's reception in France over the nineteenth century did shift at the individual level, but from a broader perspective, Goethe continued to hold value for France in its attempt to define the French national science, initially as a comparative model representing the German science, and then as a binding agent of biological thoughts in different times and different nations.

## Chapter 4 The *alibi* of the future: Goethe's morphology in Michelet's histories

Jules Michelet (1798-1874), France's beloved national historian, was born on August 21, 1798. However, the Third Republic intentionally organized the official centenary of his birth for Wednesday, July 13, 1898—a day before France's national holiday, *le 14 Juillet* (the Bastille Day)—at the Panthéon in Paris, the mausoleum of the great French citizens such as Voltaire (1694-1778), Jean Jacques Rousseau (1712-1778), and Victor Hugo (1802-1885). The public portion of this commemoration, or the people's festival, was postponed to Sunday, July 24, 1898 to allow more workers to participate in the parade.<sup>1</sup> The municipal council of Paris had allotted 80,000 francs to the organization of this festival,<sup>2</sup> which included bell ringing, trumpets, cantata, ballet, mime, and parade. The widow, Madame Athénaïs Michelet (1826-1899), sat in the front among notable political figures; musicians and poets glorified the historian-writer-poet by reciting odes, where he was described as the “interpreter of the nation” to whom God gave the “prophetic voice.”<sup>3</sup> The mime featured a scene of human suffering, where the muse of the Universal Happiness came to rescue a protagonist from the egoistic people who abandoned him. Likewise, the parade showcased Michelet's bust, with two women—symbolizing history and poetry—standing on its sides and a young boy and a girl in 1830 costumes flipping through history books at its foot; an epic story was played out, too, with actors dressed as the French

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<sup>1</sup> The centenary commemoration of Michelet's birth was one of few celebrations of an individual figure that was approved by the parliament during the Third Republic. For more details on the French commemorations of Michelet throughout the late nineteenth century, see: Camille Creighton, “Commemorating Jules Michelet, 1876, 1882, 1898: the Productivity of Banality,” *French History* 33.3 (2019): 399-421.

<sup>2</sup> Armand Grébauval, *Rapport: Présenté, au nom du Comité du budget et du contrôle, sur le projet de Budget supplémentaire de 1898* (Paris: Conseil Municipal de Paris, 1898), 36.

<sup>3</sup> Eugène Ploughart, “Michelet,” *La Revue septentrionale* (1898): 294. The French poet Auguste Dorchain (1857-1930) had the honor of composing and reciting an ode to Michelet at the commemoration, which made a tour throughout France and were read at various schools and colleges.

heroes across centuries up to the Revolution. The whole festival lasted seven hours,<sup>4</sup> and “everyone ... opened their eyes, ears, and hearts”; the “success of the festival was colossal.”<sup>5</sup>

The festival, lavish and saturated with national symbols, indicated the prominence and respect that Michelet’s name carried decades after his death, and even after his clashes with a series of regimes across the July Monarchy (1830-1848), the Second Republic (1848-1852), and the Second Empire (1852-1870).<sup>6</sup> Michelet’s political turn from apolitical liberalism to anti-clerical republicanism and social romanticism in the late 1840s and early 1850s placed him in financially and emotionally dire situations, including dismissal from the *Collège de France* and the National Archives, followed by his voluntary exile from Paris.<sup>7</sup> Despite such fall, Michelet’s numerous historical works, most notably *History of France* (17 volumes, 1833-1867), firmly established his status as one of the top historians of nineteenth-century France.<sup>8</sup> The key themes of his historical works—organic unity and harmony of the nation, progress through changes, and love as their basis—were vague enough for different political regimes to take advantage of, as was the case in the 1898 commemoration described above, through which the government

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<sup>4</sup> Unknown, “Nouvelles diverses,” *Journal des débats politiques et littéraires* (July 26, 1898): 2-3.

<sup>5</sup> Unknown, “Au jour le jour,” *Journal des débats politiques et littéraires* (July 26, 1898): 1.

<sup>6</sup> Michelet was hostile to both the conservative Bourbon Restoration (1814-1830) and the July Monarchy (1830-1848), a liberal constitutional government, but his career soared under the latter. He became a professor at the *Collège de France* and head of the National Archives. By 1848, Michelet was one of the most popular professors at the College. However, at the dawn of the Revolution of 1848, Michelet’s course was suspended for allegedly fostering revolutionary unrest. His course was reinstated shortly after, but during the Second Republic, Michelet’s course was suspended again when his students participated in the anti-government demonstrations in 1851. As Louis-Napoleon Bonaparte proclaimed himself Emperor Napoleon III of the Second French Empire in 1851, Michelet refused to swear oath of allegiance to the emperor, which led to his dismissal from the College in 1852. He voluntarily exiled himself from Paris, staying in Italy, Switzerland, and French provinces.

<sup>7</sup> For more details on Michelet’s political transformation, see: Arthur Mitzman, “Michelet and Social Romanticism: Religion, Revolution, Nature,” *Journal of the History of Ideas* 57.4 (Oct. 1996): 659-682. Mitzman defines social romanticism in which Michelet participated as the “semi-religious quest for harmony in social existence, in nature, and in the cosmos of dissenting writers and ideologists during the 1840s,” which encompassed “diverse efforts ... to write the common people into society, politics, religions, and history.” (663)

<sup>8</sup> Not only Michelet’s compatriots, but also foreign scholars—including English philosopher J. S. Mill (1806-1873)—recognized Michelet, along with François Guizot (1787-1874) and Augustin Thierry (1795-1856), as France’s top national historian. See: J. S. Mill, “*Histoire de France*. Par M. Michelet,” *Edinburgh Review* 79. 159 (Jan. 1844): 3.

attempted to ease the political division that the Dreyfus affair had brought on.<sup>9</sup> These concepts were also flexible and productive enough for Michelet to apply to the series of books on nature, which became a substantial source of his income after his downfall. *The Bird* (1856), the first of Michelet's nature books, was a huge success without much criticism or adversaries,<sup>10</sup> going through ten editions and selling more than 33,000 copies in 11 years; three other books of the series, *The Insect* (1857), *The Sea* (1861), and *The Mountain* (1868), all went through multiple editions and were translated into English, also in multiple prints, during Michelet's lifetime.<sup>11</sup> These books were so successful that Athénaïs Michelet—who, as Michelet himself acknowledged, collaborated with him in researching and writing them—publicly and legally defend her rights to half of the profits,<sup>12</sup> which she confirmed again during an interview before the 1898 commemoration.<sup>13</sup> Therefore, natural history was not at all a secondary subject or a mere distraction to quench boredom for Michelet, as his close friends had initially worried.<sup>14</sup>

In fact, Michelet seems to have fully intended to incorporate scientific knowledge of his time into his books on nature. In *The Bird*, Michelet applied physiognomy and attempted to determine the moral characters of different bird species based on their skull structures; in *The*

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<sup>9</sup> The Dreyfus affair was centered on Alfred Dreyfus (1859-1935), a French army captain of Jewish lineage who was falsely accused of selling military secrets to Germans in 1894. The revelation of the military officials' attempt to suppress the contrary evidence led to the nation-wide division between the Dreyfusards (those supporting the exoneration of Dreyfus as well as republicanizing the military) and the anti-Dreyfusards (those supporting the initial conviction.) After several retrials, Dreyfus was exonerated in 1906. See Creyghton, who places Michelet's 1898 commemoration in the context of the Dreyfus affair.

<sup>10</sup> Michelet, *The Mountain*, trans. W. H. Davenport Adams (London: T. Nelson, 1872), v.

<sup>11</sup> Lionel Gossman, "Michelet and Natural History: the Alibi of Nature," *Proceedings of the American Philosophical Society* 145. 3 (Sep. 2001): 284-285.

<sup>12</sup> Athénaïs Michelet, *Ma collaboration à L'Oiseau, L'Insecte, La Mer, La Montagne* (Paris: Chamerot, 1876), 2-3. Alfred Dumesnil (1821-1894) was Michelet's pupil and son-in-law, whose dislike for Athénaïs (Michelet's second wife) was well known. After Michelet's death, the Dumesnils claimed that the four natural historical books were authored solely by Michelet, without Athénaïs's contribution. The court recognized Athénaïs's right to half of these books (Jan. 12, 1875).

<sup>13</sup> Adolphe Brisson, "Madame Jules Michelet," *Le Temps* (Jul. 9, 1898): 2-3. The interviewer was cautious in asking Athénaïs about the delicate issue of collaboration on natural historical books, especially *The Bird*, to which she responded that she wrote it, Michelet guided her, inspired her, and revised her prose, etc.

<sup>14</sup> Taxile Delord, "Les Poésies en prose de M. Michelet," *Les Matinées littéraires* (Paris: Charpentier, 1860), 246.

*Insect*, Michelet showed his fascination with the use of microscope,<sup>15</sup> as well as his knowledge of the 1830 debate between Georges Cuvier (1769-1832) and Geoffroy Saint-Hilaire (1772-1844), his contemporary biologists Charles Darwin (1809-1882) and J. L. A. de Quatrefages (1810-1892), and older preformationist theories of Marcello Malpighi (1628-1694) and Jan Swammerdam (1637-1680). His books on nature are filled with impressive descriptions of zoological and anthropological habits and interactions. Just as J. W. von Goethe (1749-1832) had been displeased with his reviewers who criticized (or praised) his *Metamorphosis of Plants* (1790) for being poetry, Michelet was sensitive to criticisms that his books were poetic and subjective. Again and again, Michelet emphasized that his books—whether historical or natural historical—were based on rigorous research and observation. Michelet wrote in the Preface of the last volume of his books on nature: “These little books, accepted as agreeable contributions to literature, owe their success, nevertheless, mainly to their truthfulness. They attempted, not to give a meaning of their own to Nature, but to penetrate hers. ... See, now, what really impressed the public in these books, far more than the picturesqueness or the magic of their style.”<sup>16</sup> Athénais Michelet, too, eagerly defended him during her interview: “Yes, he had a lot of imagination, but it was always directed to finding truths.”<sup>17</sup>

However, was it Michelet’s aim to write a scientific natural history? Although there is a remarkable overlap of morphological concept between Goethe and Michelet, who understood natural world and natural history as comprising varieties and continuous changes within an

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<sup>15</sup> Athénais confirmed that Michelet used to take his microscope throughout Europe, which was one of many ways he observed and communicated with nature. Brisson, “Madame Jules Michelet,” 3.

<sup>16</sup> Michelet, *The Mountain*, vi. According to historian John Hooper, Michelet was well aware of the positivist domination across disciplines around the mid-nineteenth century. As Michelet turned away from liberalism and the Church (hence losing the political liberal support,) and as the field of history increasingly came to be regarded as an experimental science, Michelet’s kind of history was more and more dismissed as poetry, until the Annales School re-evaluated his work in the 1930s. John Hooper, “Changing Perceptions of Jules Michelet as Historian: History between Literature and Science, 1831-1874,” *Journal of European Studies* 23. 3 (Sep. 1, 1993): 283-298.

<sup>17</sup> Brisson, “Madame Jules Michelet,” 2.

organic unity, most readers, then and now, would categorize them into distinct categories of writing. As discussed in Chapter 3 (Goethe in France, after *On the Origin of Species*), Goethe's *Metamorphosis of Plants* increasingly came to be regarded as a legitimate science by naturalists and public intellectuals towards the end of the nineteenth century, compared to the reception at the time of its initial publication and through the first half of the century. On the other hand, most of Michelet's reviewers, including his supporters and close friends, readily categorized his writing as poetry in prose. Those who were more cautious found it difficult to pinpoint the genre to which Michelet's books belonged. An English translator described them as neither entirely scientific nor entirely non-scientific, nor entirely poetic and sentimental, although clearly written by such an author.<sup>18</sup> French historian Gabriel Monod (1844-1912), Michelet's student and his first biographer, defended Michelet's nature books as a rescue of the soul of science:

Scientific men may discover in these books errors, inaccuracies, and exaggerations; but in spite of all, they have been a new revelation. They have shown that the physical sciences, though accused of withering the soul, and robbing nature of poetry and life of enchantment, contain the elements of a profound and varied poetry that never loses its charm because it does not depend on the caprices of taste and fashion, but has its source in the unchanging reality of things.<sup>19</sup>

As discussed above, Michelet did endeavor to base his nature books on scientific observations, just as he based his history books on historical facts,<sup>20</sup> and he was frustrated with reviews that did not recognize his efforts. However, unlike Goethe, who had fully intended and wrote his botanical book for a scientific contribution, Michelet seems to have viewed himself and his role

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<sup>18</sup> Michelet, *The Mountain*, viii.

<sup>19</sup> Gabriel Monod, "Michelet," *Macmillan's Magazine* 30 (May-Oct. 1874): 232.

<sup>20</sup> Michelet was, by his own claim, the first to use archival materials: "I was the first to remove history from the vagueness ... I established history from records, manuscripts, the enormous investigation of thousands of diverse documents. No historian that I know of, before the publication of my third volume ... had used unpublished items." Historian Edward Kaplan confirms that Michelet was "among the first to use original sources—such as manuscripts—to correct contemporary chronicles upon which most historical writings was then based." Michelet, *On History*, trans. Flora Kimmich (Cambridge: Open Book Publishers, 2013), 152 & 135-136.

in a different light. In *The Mountain*, which was published in 1868—and also in *History of France* before 1833—Michelet wrote: “It is not for the historian to explain the Pyrenees. It needs the science of Cuvier, a VonBuch, an Elie de Beaumont. Let *them* relate its pre-historic annals. They were present, and I was not, when Nature improvised her mighty epopoeia.”<sup>21</sup> Michelet was aware of the different roles that historians and naturalists were expected to fulfill, and consistently acknowledged that his task was a different kind from that of naturalists, while at the same time sensing the need to work with scientific knowledge of nature. Likewise, one of the most common lines appearing in the reviews was that Michelet did not pretend to be a natural scientist. Those who did not immediately label the author as poet treated his books as a strange combination of autobiography, travelogue, and natural history. In fact, French naturalist and anatomist Georges Pouchet (1833-1894), who was one of Michelet’s closest family friends, was the only reviewer who called them a natural *science*.<sup>22</sup> Such reception was reflected in the reviews of Michelet’s history books as well. English philosopher J. S. Mill (1806-1873), who admired, reviewed, and corresponded with Michelet, explicated three progressive stages in historical inquiry, and located Michelet in the middle stage,<sup>23</sup> implying that Michelet’s treatment of history lacked a scientific approach to history.

In short, neither Michelet nor his reviewers expected his nature books to be a straightforward scientific account of nature. And yet, his reviewers based their evaluations on the presence or lack of scientific elements in these books. Michelet, too, could not help but consider

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<sup>21</sup> Michelet, *The Mountain*, 97-98.

<sup>22</sup> Georges Pouchet, “La Montagne, par M. J. Michelet,” *L’Avenir national* (Jun. 25, 1868): 3.

<sup>23</sup> Mill, “*Histoire de France*. Par M. Michelet,” 6-7. According to Mill, the second stage was characterized by the attempts to regard former times through their contemporary eyes, instead of through modern eyes. This task required one to become a poet to some degrees, as the historian had to be able to compose a consistent whole out of the pieces handed down from the past, as well as exercise moral restraint not to abuse one’s gift of imagination. The third stage was characterized by construction of a science of history, not simply composing histories. Its task was to read the law according to which the facts of the past generations proceeded and influenced the facts of present generation, and to predict what future states of society could be expected based on that law.

natural science in all seriousness in his personal life and in his writing, as can be seen in his comment to a friend: “History and eternal history are now at the front of my thoughts, above all struck as I am with what is eternal in the mobile history of man and what is progressive in the history of the earth and nature, immovable in appearance.”<sup>24</sup> So, what relation between history, nature, and science did Michelet see and apply to his writing? Would he have aimed to reach the third and final stage of Mill’s historical inquiry—the science of history—to begin with? If not, what was the proper role of science for Michelet? Tying these questions into the previous chapters: how did Goethe’s *Metamorphosis of Plants* fit into Michelet’s understanding of the relationship between history and science? Chapter 2 showed, through a comparative study of Goethe and A. P. de Candolle (1778-1841), that French scientific community during the first half of the nineteenth century treated Goethe as an antithesis of what French science represented. Chapter 3 showed, through a study of Darwin’s reception in France in the second half of the century, that Goethe slowly became a useful agent who could connect the French philosophical tradition to the development of modern biology, validating France’s role in the history of European science. This chapter, through a study of overlaps and differences between Goethe’s and Michelet’s treatments of nature, asks how a French national historian might have utilized Goethe—with whom he shared much of the key Romantic conceptions—to complete his vision of France, and why France needed such use by the end of the nineteenth century. After all, as historian Lionel Gossman writes, “Michelet was an extremely self-conscious historian” who constantly pondered what contribution a historian could and should make to the people, to

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<sup>24</sup> Michelet’s letter to Eugène Noël (1816-1899) on August 9, 1855. Michelet, *Correspondance générale 1852-1855* t.VII, ed. Louis Le Guillou (Paris: Librairie Honoré Champion, 1997), 976.

France, and to humanity.<sup>25</sup> Michelet, who stated “I am *France*”<sup>26</sup> and whom France loved back, quoted Goethe’s alleged last words, “Light! More light!” in the first of his nature books, *The Bird*,<sup>27</sup> as did several reviewers in their reviews of Michelet. What did Goethe’s science and the philosophy behind it mean to Michelet and to France near the end of the century?

### 1. Romantic conceptions of Goethe and Michelet

As early as the 1820s through 1840s, before writing any of his nature books, Michelet was borrowing Goethe’s books from the libraries and visiting the house of Goethe’s father in Frankfurt.<sup>28</sup> Michelet also met with Goethe’s long-time friend Frédéric Soret (1795-1865), who told little details about Goethe (such as his secret to keeping fit) which Michelet noted in his journal: “Goethe was a naturalist from early on,” who “dove back into nature” whenever he had a moral crisis.<sup>29</sup> When Michelet was feeling depressed, reading an essay on Goethe by Charles Dollfus (1827-1913) lifted his spirit.<sup>30</sup> After the publication of the last of his nature books, Michelet’s admiration for Goethe did not waver: “Browsed Napoleon’s *Correspondance* and a biography of Goethe—a life so adroitly harmonized and balanced.”<sup>31</sup> Michelet’s acquaintances such as C. L. F. Panckoucke (1780-1844), a French publisher, and Isidore Saint-Hilaire (1805-

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<sup>25</sup> Michelet, *On History*, 6.

<sup>26</sup> Michelet’s letter to Noël on January 2, 1856. Michelet, *Lettres inédites à Alfred Dumesnil et à Eugène Noël (1841-1871)*, ed. Paul Sirven (Paris: Les Presses universitaires de France, 1924), 233.

<sup>27</sup> Michelet, *The Bird*, trans. A. E. (New York: T. Nelson, 1869), 171.

<sup>28</sup> Michelet, *Journal* t.I, ed. Paul Viallaneix (Paris: Gallimard, 1959), 53, 456. Journal entries for September 10, 1828 and July 20, 1842.

<sup>29</sup> *Ibid.*, 257-258. Journal entry for July 16, 1838.

<sup>30</sup> Charles Dollfus was a French philosopher, essayist, and co-founder (with French journalist Auguste Nefftzer) of *Revue germanique*. Michelet and Dollfus exchanged public letters on the political and philosophical theme of centralization, which will be discussed below. Michelet, *Journal* t.II, ed. Paul Viallaneix (Paris: Gallimard, 1962), 530. Journal entry for June 17, 1860.

<sup>31</sup> Michelet, *Journal* t.IV, ed. Paul Viallaneix (Paris: Gallimard, 1976), 132. Journal entry for October 31, 1869. Historian Oscar Haac argued, however, that Michelet’s view of Goethe turned sour by the 1840s—as an antithesis of French clarity, morality, and rationalism—and that Michelet began to situate Goethe in the nationalistic context, which reflected his own shift away from Romanticism and towards the Revolutionary ideals. Oscar A. Haac, “Michelet et Goethe,” *Revue de littérature comparée* v.23 (Apr. 1949): 364-368.

1861), a French zoologist and son of Geoffroy Saint-Hilaire (1772-1844), must have been well aware of Michelet's fascination with Goethe, for they often chose to gift or acquire translations of Goethe's work for him.<sup>32</sup> His student and son-in-law, Alfred Dumesnil (1821-1894), also shared Michelet's enthusiasm, as he wrote to Michelet after reading Darwin and Goethe, particularly the volume of *Scientific Works*: "This volume reproduces the *Essay on the Metamorphosis of Plants*. But Goethe did not stick to plants, and pursued this idea in the three kingdoms. The conceptions of this great man, which are not at all systematized but disseminated in all books, are unfortunately too little known in France."<sup>33</sup> Goethe made appearances in Michelet's publications as well. Michelet assigned several pages to discuss Goethe in *History of the Nineteenth Century*, where Goethe (particularly in respect to his literary sensibility) was described as "so much more French than German," whose memories and personal stories helped the French readers relate to him.<sup>34</sup> One of Michelet's nature books, *The Mountain*, also included Goethe among the "school of peace"—those who supported the theory of geological and biological "evolution without revolution"—along with the most renowned naturalists of his time,

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<sup>32</sup> See C. L. F. Panckoucke's letter to Michelet in 1838, where Panckoucke offered Michelet (in return for Michelet's present) an essay by Goethe, translated by his wife Madame Ernest Panckoucke. Michelet, *Correspondance générale* t.II, ed. Louis Le Guillou (Paris: Librairie Honoré Champion, 1994), 777. See Isidore Saint-Hilaire's letter to Michelet on February 9, 1839, where he sent Michelet a report on the scientific works by Goethe, along with two articles on the state of zoology and on a question of domestication of animals. In this letter, Isidore also drew a parallel between his own father, Geoffroy Saint-Hilaire, and Michelet. Michelet, *Correspondance générale* t.III, ed. Louis Le Guillou (Paris: Honoré Champion, 1995), 25.

<sup>33</sup> Dumesnil's letter to Michelet on February 3, 1863. Michelet, *Correspondance générale* t.X, ed. Louis Le Guillou (Paris: Librairie Honoré Champion, 1999), 283.

<sup>34</sup> Michelet, *Histoire du XIX<sup>e</sup> siècle* v.3 (Paris: Marpon & Flammarion, 1880), 150. Based on Michelet's journal entry on March 19, 1873 (Michelet, *Journal* t.IV, 354,) it seems that he originally planned to devote a whole chapter to Goethe, although the published editions do not have such chapter. Michelet also made a similar comment on Goethe in his correspondence: "Goethe is undoubtedly German ... with a singular mix of French spirit. In certain things, he reminded of Voltaire." Michelet's letter to M. Spitzmüller on February 23, 1872. Michelet, *Correspondance générale* t.XII, ed. Louis Le Guillou (Paris: Librairie Honoré Champion, 2001), 266-267.

Geoffroy Saint-Hilaire, Lorenz Oken (1779-1851), Charles Lyell (1797-1875), Richard Owen (1804-1892), and Darwin.<sup>35</sup>

Although these bits of evidence show Michelet's knowledge of and admiration for not only Goethe's literary but also natural scientific work, Michelet did not however explicitly discuss Goethe's philosophy and science in depth, at least not in writing. And yet, Michelet's nature books are clearly built on the same Romantic morphological conceptions that Goethe propounded in his *Metamorphosis of Plants*. Michelet gave his own flavor to these conceptions and imbued a new purpose, so that they could be flexibly applied to his visions of nature, humanity, and particularly France, which will be discussed in the next section.

Michelet's views of history and nature were based on the concept of progressive growth of a collective. Michelet perceived France as a "gigantic person composed of thirty million men" with its own personality adapted for sociability and action.<sup>36</sup> Michelet described geographical and geological aspects of other nations and continents in a language that resembled zoological and physiological descriptions. Modern Europe, too, was "an organism of great complexity" whose unity lay in the harmonious arrangements and relations among different parties with one another.<sup>37</sup> Even a non-physical entities such as history and humanity took on personal identities. Michelet described the process of reconstructing history as an almost visual phenomenon where the "limbs" of the great body, peoples, races, and regions came together for assemblage.<sup>38</sup> Furthermore, this personified identity was to undergo an adolescence, where France—and history in general, too—was to work on itself through all its struggles and conflicts, fabricate and

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<sup>35</sup> Opposed to this school was the "school of war," with supporters of catastrophism such as Abraham Werner (1749-1817) and Cuvier. Michelet, *The Mountain*, 116-118.

<sup>36</sup> In "Introduction to World History (1831). Michelet, *On History*, 50. Michelet claimed that he was the "first to have established France as a person" in "Preface to the History of France (1869). Michelet, *On History*, 150.

<sup>37</sup> *Ibid.*, 37.

<sup>38</sup> *Ibid.*, 141. In "Preface to the History of France (1869).

generate itself, and achieve spiritual freedom and an internal harmony and unity: “France itself has formed France ... France is the daughter of her freedom.”<sup>39</sup> These are reminiscent of the concept of *Bildung* that Goethe and other German Romantics had used in both literary and natural scientific contexts. Michelet emphasized the organic nature of these processes, which helped him transition effortlessly between human history and nature’s history: “Life’s unity is not that of a little five-act play, but (in an often limitless development) the harmonic identity of soul.”<sup>40</sup> Michelet’s reviewer Charles-Louis Chassin (1831-1901), a French historian, used a similar metaphor of humanity as a child when reviewing Michelet’s nature books, *The Bird* and *The Insect*, to connect history and nature, and to highlight the latter’s motherly role: “... in studying nature, the historian has still studied humanity ... The entire nature embraces its youngest born, reminds him of the first love, supports him even in his missteps, encourages him to walk like her, without ever giving up ... she shows him the universal goal, she aligns with him the supreme benefit by means of which the destinies of the earth will be achieved: *the unity of all life and harmony of beings*.”<sup>41</sup>

Understanding history and nature as a collective organic growth entailed the idea of continuous changes and variations for Michelet, as it did for Goethe. This concept of history as an organic process of dynamic movements—and the view that this process ultimately converged towards the full realization of freedom—recall the philosophy of a German philosopher G. W. F. Hegel (1770-1831). Michelet read, admired, and commented on Hegel’s philosophy in his journals and correspondences during his earlier years. Hegel’s model of history as a dynamic process of *conflicts* between opposing forces was indeed visible in Michelet’s earlier thought,

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<sup>39</sup> Ibid., 142.

<sup>40</sup> Ibid., 141.

<sup>41</sup> Charles Louis Chassin, “Naturalisme sentimental: J. Michelet,” *Revue française* (1857): 344.

where, for example, Michelet viewed nature as an enemy that humankind struggled to bring to submission.<sup>42</sup> However, as Michelet got more and more acquainted with the works of the naturalists of his time, his view shifted. A historical progress did not require externalized conflicts and struggles, as what he had considered as the antithesis (nature) was a parallel to, and co-participant as, the thesis (humanity and history) in a greater evolutionary project. The apparent divergences and conflicts were part of the inner work and expressions of nature's and history's self, to the point that the concept of antithesis became moot. At a more fundamental level, Michelet cherished and celebrated the raw experiences, feelings, and actions of the historical agents too much to agree with Hegel's absolute priority of rationalities. Michelet, like many Romantic thinkers of his time, contributed to the discussions on the relationship between the ideal and the real, but he did so from a position that encompassed much more than Reason. Thus, especially during the last two decades of his life in which he produced his nature books, Michelet's general view of the process of history came closer to Goethe than to Hegel.

All four of Michelet's books on nature were structured around the theme of transition at multiple levels; the second book in particular, *The Insect*, explicitly used the term "metamorphosis." In *The Insect*, Michelet discussed nature's changes in a literal sense, such as rocks being broken down to sand by ants' activities, then mingling with plants, and returning to the circulation of life;<sup>43</sup> or more extensively, insect's metamorphosis through the stages of larva, nymph, chrysalis, and imago, whereby it is "born thrice and dies thrice."<sup>44</sup> Michelet demonstrated his awareness of the discussions of organic metamorphosis in the scientific community, and supported the preformation position of Swammerdam and Malpighi. In these

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<sup>42</sup> For more on Michelet's shifting stances on the relationship between nature and humanity, see Gossman's, "Michelet and Natural History."

<sup>43</sup> Michelet, *The Insect*, trans. W. H. D. Adams (London: Nelson & Sons, 1883), 50-51.

<sup>44</sup> *Ibid.*, 110.

descriptions, Michelet's thought always returned to himself. The observation of the circulation of life from rocks to sand to plants threw him directly back upon himself: "What have I not lost of myself, in return for the few stones I have contributed to the great monument of the future! Sometimes, doubly stricken by the past and the present, I have felt as if I were crumbling into pieces ... into powder, into dust."<sup>45</sup> Again, in the discussion of insect's life stages, Michelet recognized the persistence of the same essence throughout the metamorphosis by identifying himself with the insect going through the seemingly difficult transitions: "Many and many times I have passed from the larva into the chrysalis, and into a more complete condition; and which, after a while, incomplete under other relations, has put me in the way of accomplishing a new circle of metamorphoses."<sup>46</sup> Feeling his father living in himself and him in his children, Michelet cried: "I am but the chrysalis of a man!"<sup>47</sup> In *The Sea*, the third of the nature books, Michelet described a similar physical metamorphosis of the crustaceans in their sloughing of shells.<sup>48</sup>

The theme of identity across metamorphoses of forms is a central theme of Goethe's *Metamorphosis of Plants*, where Goethe traced the serial homological development of the leaf—the protean plant organ that served as a type for Goethe—from cotyledons, to stem leaves, to calyx, to corolla, to stamen, and to fruit through the mechanisms such as vertical and spiral growth, and alternating contractions and expansions of the leaf. A note on this idea of the plant identity was found in his report during his journey in Italy: "in the plant organ we ordinarily call the leaf a true Proteus is concealed, who can hide and reveal himself in all formations. From top

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<sup>45</sup> Ibid., 51.

<sup>46</sup> Ibid., 114.

<sup>47</sup> Ibid., 115.

<sup>48</sup> Michelet, *The Sea*, trans. W. H. D. Adams (London: Nelson, 1875), 165.

to bottom, a plant is all leaf, united so inseparably with the future bud that one cannot be imagined without the other.”<sup>49</sup>

Michelet seems to have been well aware of Goethe’s botanical work. Although he did not explicitly mention Goethe, Michelet provided a description of the life cycle of a medusa (an invertebrate sea animal in a form of jelly fish) that was strikingly similar to Goethe’s account of the plant metamorphosis.

The medusa, to speak plainly, is an emancipated polype. ... It is only saying that at this stage the animal still follows the law of the vegetable kingdom. From the tree, a collective being, issues the individual—the detached fruit, which fruit will become another tree. ... In the same way ... that a plant when about to assume its garb of leaves pauses in its development, contracts itself, becomes an organ of love, that is, a flower, the polypier, by contracting some of its polypes, and transforming their contracted stomachs, produces the placenta, the eggs, whence issues its mobile flower, the young and graceful medusa.<sup>50</sup>

Michelet went on to define medusa as balancing between two states of existence, between the collective, vegetable life and the individual, mobile life—on the verge of, but not yet entering the state of complete freedom.<sup>51</sup> Assigning a moral goal, freedom, and organizational superiority to a physical growth process is absent in Goethe’s morphology, but is a key theme in Michelet’s history and nature books, as will be discussed below. Nonetheless, Michelet’s description of the alternation between contraction and expansion of an organ seems to be a mark of the influence of Goethe’s science. Michelet applied the mechanism of alternations to the organic unfolding of history as well, proposing to view a breakdown or a crisis as a seeming irregularity—a kind of

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<sup>49</sup> Entry on May 17, 1787, in Naples. Goethe, *Italian Journey*, trans. Robert R. Heitner (Princeton: Princeton University, 1994), 299.

<sup>50</sup> Michelet, *The Sea*, 131.

<sup>51</sup> *Ibid.*, 133.

metamorphosis—that was in reality a part of growth, a periodic passage “that is not without precedents and that returns in due course.”<sup>52</sup>

For both Michelet and Goethe, the point of these metamorphoses lay in the continuity of an identity despite the apparent transformations. For both, this identity persisted beyond an organism’s lifespan. As discussed above, Goethe defined this identity, in the plants kingdom, as a leaf—a protean type that was “united so inseparably with the future bud.” Goethe wrote to his friend Johann Gottfried von Herder (1744-1803) that this type organ was the basis of all existing and potential plant shapes.

The primordial plant is turning out to be the most marvelous creation in the world, and nature itself will envy me because of it. With this model and the key to it an infinite number of plants can be invented, which must be logical, that is, if they do not exist, they *could* exist, and are not mere artistic or poetic shadows and semblances, but have an inner truth and necessity. The same law will be applicable to every other living thing.<sup>53</sup>

Similarly, Michelet’s understanding of nature and its creations was based on a belief that variations in forms could be traced back to a unified, single identity. In *The Bird*, Michelet described the physical characteristics and habits of different bird species in detail, but he laid out in his Introduction the concept of “*the bird*,” a unity encompassing all the variations:

To reveal the bird as soul, to show that it is a person. *The bird*, then, *a single bird*—that is all my book; but the bird in all the variations of its destiny, as it accommodates itself to the thousand conditions of earth, to the thousand vocations of the winged life. Without any knowledge of the more or less ingenious systems of transformations, the heart gives oneness to its object; it neither allows itself to be arrested by the external differences of species, nor by that death which seems to sever the thread.<sup>54</sup>

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<sup>52</sup> Michelet, *On History*, 130. In the “Opening Address at the Faculty of Letters, 9 January 1834.”

<sup>53</sup> Goethe’s letter to Herder on May 17, 1787, from Naples. Goethe, *Italian Journey*, 256.

<sup>54</sup> Michelet, *The Bird*, 57.

Although not a living being, the vast ocean in *The Sea* also served for Michelet as a unified personality that metaphorically gave birth to the various forms of sea life. The circulation system of the sea—transformation from salt water to fresh water to vapor and back to salt water—was similar to blood circulation;<sup>55</sup> the tempests were spasms of the sea;<sup>56</sup> the sea was at once a “huge animal arrested in the first stage of its organization,” the “great female of the globe,” an often passionate and dangerous mother whose real work was to love and to multiply, and a vast nursery where all sea creatures suckled on its *mucus*, quoting Geoffroy Saint-Hilaire.<sup>57</sup> Here, Michelet’s sea as a single unified personality is broadly similar, but not the same as Goethe’s primitive type for plants, as Michelet’s sea served more as the metaphorical source and origin of sea creatures, rather than their shared fundamental plan. However, Michelet did further lay out how the ocean life might have emerged from a “primal monad”:

Shall this drop [of sea water] become the infusoria, the primal monad, which, by constant agitation and vibratory motion, shall soon develop into a vibron? Which, ascending step by step—polypus, coral, pearl—shall arrive, perhaps, in ten thousand years, at the dignity of insect? Shall there issue from the drop that vegetable thread, that light silky down which one would never suppose to be a creature, and which, nevertheless, is already the first-born hair of a young goddess—a sympathetic and amorous filament, rightly called, the hair of venus? I utter no fable, but state a fact in natural history. This hair of twofold nature, vegetable and animal, into which our drop of water thickens, is, in truth, the eldest-born of life.<sup>58</sup>

Rather than using the conception of a primitive organic unit as Goethe did—as a plan that is equally shared among the past, present, and future forms, but firmly rooted in its presence in the

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<sup>55</sup> Michelet, *The Sea*, 38.

<sup>56</sup> *Ibid.*, 55.

<sup>57</sup> *Ibid.*, 30, 49, 55, 95. Michelet quoted Geoffroy to define the mucus: “It is the animalisable substance, the first stage of organic bodies. There are no beings, animal or vegetable, which do not absorb it and do not produce it in the spring-time of their existence, however feeble they may be.”

<sup>58</sup> *Ibid.*, 95-96.

present state—Michelet used the concept more as a past form (Venus's hair,) with an emphasis on its potential to develop in the future into insects and more complex organisms. Likewise, in *The Bird*, Michelet described the egg—the beginning of all birds—as a “perfect form” that held harmony and mystery of life, from which life poured out and expanded in countless divergent ways.<sup>59</sup> This difference in temporal emphases of the concept of the organic type permitted Michelet to make more explicit, bolder, sometimes metaphorical claims that were visually effective across his nature books. For instance, penguins were “ambitious fish” or “emancipated eldest sons” of the ocean whose metamorphosis was not entirely successful;<sup>60</sup> the bird actually ranked higher than man in the hierarchy of life, as its wings liberated it from the “tyranny of gravitation”—man, chained to the material world, desired wings, freedom, and wanted to be angels.<sup>61</sup> The fact that Michelet went back and forth between these statements and more specific ones for which he often consulted the works of his contemporary naturalists—for example, that man probably did not directly evolve from the marine animals, but from a series of terrestrial developments parallel to the marine series<sup>62</sup>—indicates that Michelet was using the concepts of organic metamorphosis and of the varieties within unity in multiple senses, multiple timelines, and for different purposes, which will be discussed in the next section.

Michelet's multi-dimensional experimentation with the scientific topics of the origin of organic beings and their evolution and metamorphoses confused reviewers. The reviews almost always showed mixed feelings. Even Michelet's colleague and friend Ernest Bersot (1816-1880) gave very critical reviews of both *The Sea* and *The Mountain*.<sup>63</sup> Bersot recognized Michelet's

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<sup>59</sup> Michelet, *The Bird*, 65-66.

<sup>60</sup> *Ibid.*, 74.

<sup>61</sup> *Ibid.*, 81-82, 87.

<sup>62</sup> Michelet, *The Sea*, 196.

<sup>63</sup> Ernest Bersot and Michelet were members of the Academy of Moral and Political Sciences and read each other's works. Bersot's reviews of *The Sea* and *The Mountain* seem to have weighed on Michelet, who noted twice in his journal, in 1861 and 1868, how “hostile” Bersot's review of *The Sea* was. Bersot also reviewed Athénaïs Michelet's

originality and stated that the gift Michelet possessed as a historian, he possessed it also as a naturalist—as far as it concerned Michelet’s ability to understand the “soul” of his subject. But Michelet’s fluidity of expression between poetry and science, between past, present, and future must have bothered Bersot, when he wrote that “Michelet possesses some elements of ancient naturalism, but he often mixes primitive sentiment with modern sentiments.”<sup>64</sup> Bersot encouraged readers to enjoy, but at the same time be aware of, Michelet’s fluid, playful writing:

Certainly there are classifications that are not clear—it is difficult to determine where life begins or ends, where sensation begins or ends; between simple plant and zoophyte, the border is loose, almost imperceptible; it would be audacious to deny dull sensation and an early soul in plants; they seem to have instincts that are more than material attraction. But here poetry alone has the right to affirm so; as for reason, it is content to dream. We are carried by illusion, which is okay as long as we know implicitly that it is an illusion.<sup>65</sup>

For Bersot, Michelet was not only mixing temporal and disciplinary boundaries, but also genders of thinking and writing. If Michelet wanted to, he could fluently speak the “male” language of France, the language of reason as represented by Voltaire and Rousseau. But his imagination and passion too often created a nervous language with a dangerous charm: “He has a gift and he should guard it and guard himself from it.”<sup>66</sup> In a more sympathetic tone, Bersot attributed Michelet’s misuse of different types of language, imagination, and science to Michelet’s personal circumstance, implying that Michelet was himself a victim of the illusion created by his exile and dismissal from his teaching position.<sup>67</sup> Nonetheless, “the stronger the illusion, the more one

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*The Story of My Childhood* (1866). Michelet and Bersot frequently dined and discussed together, and Michelet voted for Bersot at the election at the Academy in 1865 to succeed Adolphe Garnier (1801-1864). Michelet, *Journal* t.III, ed. Paul Viallaneix (Paris: Gallimard, 1976), 7, 281.

<sup>64</sup> Ernest Bersot, “*La Montagne*, par J. Michelet,” *Journal des débats politiques et littéraires* (Jul. 2, 1868): 3.

<sup>65</sup> *Ibid.*, 3.

<sup>66</sup> *Ibid.*, 3.

<sup>67</sup> See footnote #6 for more details on how Michelet’s political entanglement influenced his career as a history professor.

should resist and harden oneself against it. One cannot choose where one will serve one's country; but one can always choose to fortify in and around oneself the French reason, which is also the homeland."<sup>68</sup>

Louis Pasteur (1822-1895), French chemist and opponent of the theory of spontaneous generation that Michelet and the Pouchet family supported, was one of few scientists who evaluated Michelet's nature books, and expressed a similar concern to Bersot's. At a conference at Sorbonne on April 7, 1864, Pasteur gave a speech against the theory of spontaneous generation, which had been following the footsteps of other hypotheses that were ultimately proven false. Besides, the theory allowed room for poetry—Michelet's *The Sea* was an example of the alarming effect of poetry on scientific debates. After quoting a long passage of *The Sea*, Pasteur exclaimed: "In such subject, enough of poetry as this, enough of fantasy and instinctive solutions; it's time that science, the true method take up again its rights and exercise them."<sup>69</sup> While Pasteur's criticism was not new—after all, Goethe had heard similar accusations, and Michelet even more—Pasteur noted the dualistic nature of Michelet's writing, which Bersot also noticed. Switching his tone accordingly, Pasteur praised how Michelet recognized the necessity of treating Pouchet's *experience* as his guide when writing *The Sea*.<sup>70</sup> Michelet's commitment to experiences, placed in a "book of imagination without scientific pretense, with no other purpose than to move us with the spectacle of the fecundity of life within the seas," was the most beautiful homage to the power of experimental method. Pasteur optimistically concluded: "From the days when such a great figure as Buffon said 'Let us find a hypothesis to establish a system,'

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<sup>68</sup> Bersot, "La Mer, par J. Michelet," *Journal des débats politiques et littéraires* (Feb. 6, 1861): 4.

<sup>69</sup> Louis Pasteur, "Conférence de M. Pasteur: des générations spontanées," *Revue des cours scientifiques de la France et de l'Étranger* (Apr. 23, 1864): 259.

<sup>70</sup> *Ibid.*, 260. Italics are Pasteur's.

we have progressed far to arrive here today, where a novelist says ‘Experience is my guide.’”<sup>71</sup> One thing, though—did Michelet’s nature books have no other purpose than portraying nature’s wonders for readers’ pleasure, as Pasteur assumed? What purpose did mixing temporalities, disciplinary boundaries, commitments to experience and imagination serve for Michelet?

Methodologically, Michelet’s and Goethe’s approaches to the human past and nature’s past can be characterized with an active use of “mind’s eyes.” Isidore, writing from a scientist’s perspective, warmly discussed Michelet’s method, in which he saw his father’s own approach:

Your historical works, I dare to say in the honor of the scientific school of which I am a modest disciple, seem to me to have a great analogy to the works of this school—you have always seemed to be to other historians what my father [Geoffroy Saint-Hilaire], Oken, Garat are to other naturalists. What essentially characterizes the works of others, in relation to those of *ordinary naturalists*, according to the epigrammatic expression of Cuvier that was directed against the naturalists whom an implicit but necessary antithesis qualifies as *extraordinary*, is that they attach themselves to the knowledge of facts alone, hence the exclusive use of observation; when other wish, after having considered facts by observation, and sometimes even like Oken (and thus they are often misled) before having considered facts, to amount to the notion of their *meaning*; hence the use of reason at the same time as observation—there are also historians, and a lot of them, who don’t have any goal higher than the exact narration of facts: for you, like Vico, you raise yourself higher: you pretend and also succeed, according to the expression of Germans, at penetrating the *meaning* of facts; and thereby you make the complete history.<sup>72</sup>

Although Isidore did not explicitly mention Goethe’s name, Goethe could have been easily included among the naturalists who utilized both observations and reason—the eyes of the body and of the mind—to get to the meaning behind a series of facts. For Goethe, a purely empirical method such as microscopic investigation was excellent, but the collaboration between the “eyes of the body” and the “eyes of the mind” was wanting, without which “one runs the risk of seeing

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<sup>71</sup> Ibid., 260.

<sup>72</sup> Isidore’s letter to Michelet on February 9, 1839. Michelet, *Correspondance générale* t.III, 25.

but looking past.”<sup>73</sup> Michelet, too, put to use his mind’s eyes in addition to his historical evidence and his own observations, as Isidore described above. But Michelet might have gone further. One of the most common words that appeared in the reviews of his books was “heart” or “passion.” Just to give few examples, Dollfus commented that Michelet’s history, or “resurrection” as Michelet himself called it, could not be achieved by intelligence alone but needed insights that rendered the past “perceptible to the heart.”<sup>74</sup> Michelet achieved this task when painting a portrayal of nature, as Chassin commented that Michelet’s nature books “came from heart and directly reached readers’ heart,” serving as a “model of a new literature that commentated on science with heart” in an attractive form. “One does not discuss them, but one loves them.”<sup>75</sup> In short, what set Michelet apart from his contemporary historians or writers on nature, for better or worse, was his use of the trifecta of the eyes of the body, mind, and heart, which allowed him to communicate with both his study subject and his readers. With these tools then, borrowing Isidore’s words, what *meaning* behind the facts was Michelet trying to communicate to his readers?

## 2. Turning science into faith, and the present into the future

For Goethe, nature had no moral or teleological ends. Nature simply went on creating in its diverse ways the individual phenomena, each of which—and the relation among which—was a reflection of the whole nature. The aim of his writings on nature was to recognize, through the small hints that nature revealed to us, the part-whole relations of nature. “We must not come to a

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<sup>73</sup> Goethe, *Sämtliche Werke. Briefe, Tagebücher und Gespräche: Schriften zur Morphologie* v.24, ed. Dorothea Kuhn (Frankfurt: Deutscher Klassiker Verlag, 1987), 432. Geoffroy Saint-Hilaire and Candolle used similar terms, when discussing the organic analogies and the organic type of plants, respectively, in their scientific works. See: Geoffroy Saint-Hilaire, *Principes de philosophie zoologique* (Paris: Pichon et Didier, 1830), 17. Candolle, *Organographie végétale* t.2 (Paris: Déterville, 1827), 241.

<sup>74</sup> Dollfus, “Essai sur le XIX<sup>e</sup> siècle,” *Revue germanique et française* t.28 (1864): 7.

<sup>75</sup> Chassin, “Naturalisme sentimental: J. Michelet,” 343, 344.

standstill when confronted by individual phenomena in nature ... we must not dwell on them, cling to them, or view them as existing in isolation. Instead, we should look about in the whole of nature to find where there is something similar, something related. For only when related elements are drawn together will a whole gradually emerge which speaks for itself and requires no further explanation.”<sup>76</sup> Michelet was well aware of Goethe, especially his morphological work, it seems. Michelet applied the key conceptions of Goethe’s morphology, such as the universal primitive type and its organic metamorphosis, to his nature books in his own ways. Michelet’s application led many of his contemporary reviewers to criticize the puzzling manner in which poetry and imagination intruded into the realm of natural science. It leads us to question whether it was as unintentional as the reviewers had assumed, and whether he was an accidental victim of his own talent, as they assumed. If it was instead a well thought-out play of possible temporalities of a morphological concept, and a play of science, history, and imagination, what purpose and meaning might Michelet have had as France’s beloved national historian? Building on historian Edward Kaplan’s argument that Michelet borrowed the concept of evolution—especially in the Lamarckian sense—from natural science and applied it to the psychological history of humanity,<sup>77</sup> I focus on Michelet’s modification of the Goethean concept of type, and application of that concept to human and especially national history. At the same time, by examining why Michelet would have chosen to combine history and natural science in this manner, I also modify the usual view that Michelet’s work became increasingly outdated and dismissed with the growing positivist trend.<sup>78</sup> Michelet created his own type of history and

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<sup>76</sup> Goethe, *Scientific Studies*, ed. Douglas Miller (New York: Suhrkamp, 1988), 203.

<sup>77</sup> See: Edward Kaplan, “Michelet évolutionniste,” *Romantisme* n.10 (1975): 111-128. Kaplan focused on the concept of evolution as a process in which internal desires could become a second nature. Michelet applied it to the history of human’s inner world, whose impulses and instincts had been transforming into moral sentiments and reason—which was also a history of the liberation of human mind.

<sup>78</sup> See Hooper, “Changing Perceptions of Jules Michelet as Historian.”

natural history writing, as many of his contemporaries noticed—this new genre did not, however, aim to make history scientific, but to incorporate scientific tools into history in service of France’s future.

In both historical works and nature books, Michelet actively used the Goethean concept of the primitive type, as discussed above. While the concept of the type as Goethe had defined it—the blueprint of all possible plant forms—provided a broad framework for how Michelet made sense of the seeming fluctuations, crises, and differences as part of the unified history and nature, he tended to emphasize the “primitive” aspect of the concept and its unfolding history in his nature books. This emphasis on the past, in turn, allowed him to use it towards the anticipation of a different kind of type, fixed in the future. Émile Chasles (1827-1908), French historian and writer, noted in his review of *The Bird* and *The Insect* that Michelet was more than a historian; he was a time traveler, no longer dominated by the past but by a “new life.”<sup>79</sup> Indeed, Michelet’s historical works and nature books both seem to be bookended by two different kinds of the type. For example, Michelet implied that birds as a whole might have emerged from marine life, which in turn originated from a primitive monad in the deep past; he also perceived the existing various bird species as a *single* bird. And yet, Michelet also viewed birds—or the bird—as “the agent of the grand universal transition, and of purification.”<sup>80</sup> But transition to what? As discussed above, Michelet argued that birds were ranked higher than man because man (and other animals) lacked wings, which granted and symbolized liberation from the land, from the material. Although he did not mean that man was to literally evolve into a winged being in a distant future, Michelet did claim that man longed to become an “angel,” a metaphorical and abstract concept representing purity that completely transcended history and nature. Camille

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<sup>79</sup> Émile Chasles, “Les confidences de M. Michelet,” *Revue contemporaine* v.37 (1858): 38.

<sup>80</sup> Michelet, *The Bird*, 149.

Ferdinand-Dreyfus (1849-1915), French politician and historian, had a similar interpretation when he wrote that Michelet's single bird *freed* itself from the sky.<sup>81</sup>

A parallel could be made in the field of history, with Michelet himself serving as a type. Readers of his history books recognized that Michelet was a “true Proteus who put on successively the diverse physiognomies,” embodying and transforming through different French characters such as a soldier, a monk, an artist, a philosopher, a diplomat, etc. as he was writing about them.<sup>82</sup> At the same time, by resurrecting history before readers' eyes, Michelet also took up the role of a “Promethean titan who initiates a rebirth of civilizations.”<sup>83</sup> A historian could be viewed as a type-member of a nation whose role went beyond revealing the relations of individuals to one another and to the nation's history, but included—unlike Goethe's type—consciously and willfully creating a new moral history for the future. This creation would force a historian to step out of the guises of any of the characters he has worn, even that of a historian, just as the type-bird was to shed all its definitions and become an angel. The birth of the complete liberty and purity which Michelet placed at the end of the world's timeline was at once a creation and an obliteration. To reach this future state, or the ultimate “type,” the Goethean type was needed to begin and push the process forward, but it was not a sufficient end, in Michelet's vision.

Kaplan succinctly proposes that Michelet's historical recreation was an “essentially prophetic task,”<sup>84</sup> where Michelet traced the past in the present to create a vision of an ideal future based on it. In this sense, Michelet fully embodied the Romantic self, as defined by American philosopher and sociologist George H. Mead (1863-1931)—a self that could not help

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<sup>81</sup> Camille Ferdinand-Dreyfus, “Étude sur Michelet,” *Revue politique et parlementaire* t.16 (1898): 572.

<sup>82</sup> *Ibid.*, 564.

<sup>83</sup> Michelet, *On History*, 137. In Kaplan's introduction to the “Preface to the *History of France* (1869).”

<sup>84</sup> *Ibid.*, 136.

but revisit the past with new eyes, as much as it longed for the familiar past, and was conscious of its new perspective.<sup>85</sup> The future Michelet envisioned, or the “type” he planted in the future, rather than in the present, was a creation that was not entirely new and a conscious obliteration. Dollfus echoed this view when writing on the spirit of modernity: “It is not a completely new society we are trying to create from void, but the past we are trying to bring into the present to connect it to the forms of future.”<sup>86</sup>

This new society of the future took a more definite shape as a type in Michelet’s discussions of France, which he thought of as a gigantic person. In the *Introduction to World History*, Michelet compared the center of France to other provinces in the nation. Unlike provinces, each of which exhibited its unique originality, the center participated in all others’ characters while remaining neutral. “It is the character of the center of France ... to form the connection, the intermediary among all, to the point where each provincial quality can readily recognize in the intermediary its kinship with the rest.”<sup>87</sup> This neutrality, seemingly insignificant and indifferent, Michelet called a “universal aptitude, capacity, and receptivity”: “This intimate fusion of races is the very identity of our nation, its personality.”<sup>88</sup> In other words, the center functioned as the type—which existed in the present and also in physical reality—for the rest of

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<sup>85</sup> “What the Romantic period revealed, then, was not simply a past, but a past as the point of view from which to come back at the self. ... it is this self-conscious setting-up of the past again that constitutes the romanticism of this period. It made the past a different past.” George H. Mead, *Movements of Thought in the Nineteenth Century* (Chicago: University of Chicago Press, 1936), 59-64.

<sup>86</sup> Dollfus, “Essai sur le XIX<sup>e</sup> siècle,” 35.

<sup>87</sup> Michelet, *On History*, 50. In “Introduction to World History (1831).”

<sup>88</sup> *Ibid.*, 50. Michelet developed the same idea in his letter to a German correspondent (Spitzmüller, first name unknown,) where he highlighted France’s organic unity that prevented the nation from ever becoming fragmented. “France is not dismemberable. ... France is less dismemberable than any other country in the world because it possesses organic unity to the highest degrees. I am surprised to see that Germans, so strong in natural history, hadn’t at all reflected on this. They know well that there is among beings an ascendant ladder by which they come close to *unity*, the indissoluble unity. For France in general, this unity has formed for centuries, less by the coactive force of the law than by the insensible, powerful work of *jurisprudence*. ... One thing extremely old and unique to this country is the perfection with which the *fusion of races* is achieved ... This is not a custom, it is France’s powerful attraction, like an organized star in nebulous surroundings ...” Letter on February 23, 1872. Michelet, *Correspondance générale 1871-1874 t.XII*, 265-266.

France, and represented the whole nation. One can understand the significance of the concept of the Center in Michelet's public correspondence with Dollfus. On August 13, 1869, the journal *Le Temps* published Dollfus's article that denounced the discourse of the new minister of public instruction, which equated the University and the State. Dollfus wrote against the centralization of education, opting instead for liberal system of schools and decentralization in general.<sup>89</sup> Michelet felt his "brain stirred while reading Dollfus's article," in which he believed he was seeing "the unity of France in peril," and wrote a "very moving response and read it to [Dollfus]."<sup>90</sup> In his response, which was published on the front page of *Le Temps* on August 23, 1869, Michelet argued that what Dollfus perceived as France's centralizing system was in fact a "crushing machine," a corrupted form of centralization. But in its original form—and *especially in nature*—"centralization" was not synonymous with "tyranny":<sup>91</sup>

... in man, mammals, birds, etc., centralization is organic, a sympathetic work of all parts working in perfect unanimity. ... *Centralization of a great life (such as a nation) can never be mechanical* or imposed by hard, metallic, artificial forces. ... What we have had until now is a cruel chain of events, not centralization. Italy in its demise lived off individuals; it had the Pergolesi, the Vico, the Leopardi. Germany, in its dispersion and nullity of its national life, lived off its stars, the Goethe and the Schiller, the Mozart and the Beethoven. Here, all will be lost when the common soul is lost. Without France, no more French.<sup>92</sup>

Michelet then concluded his letter: "Liberty for us is a right, a duty. ... Another time will arrive, and the University will be less necessary in the future. But today, in full combat, and in front of our enemy, let us not sacrifice anything that forms intellectual unity. Let us decentralize administration. But let's come together morally, and centralize us in spirit."<sup>93</sup> This centralized

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<sup>89</sup> Dollfus, [an article for decentralization,] *Le Temps* (Aug. 13, 1869): 1-2.

<sup>90</sup> Journal entry for August 17, 1869. Michelet, *Journal* t.IV, 151-152.

<sup>91</sup> Michelet, [an article for centralization,] *Le Temps* (Aug. 23, 1869): 1.

<sup>92</sup> *Ibid.*, 1. Italics are Michelet's.

<sup>93</sup> *Ibid.*, 2.

collective—organically centralized at the geographical center and intellectually united at the educational institutions—was a type and soul of France, necessary for the time Michelet lived in, but its form could change to accommodate the needs of a different historical time. Liberty and unity through assimilation were, however, the unchanging end and goal.

France itself was to become a type for the rest of Europe. Through its alternating organic motions—the repetition of expansion in influencing France’s neighbors and then contraction in absorbing others’ influences—France was moving towards the “universal assimilation” of minds.<sup>94</sup> The assimilation Michelet had in mind, however, was not the same as levelling or obliterating diverse originalities. In a chapter titled “Our Country. Are Nationalities about to Disappear?” in one of his most well-known work, *The People* (1846), Michelet firmly answered in negative. In the “natural progress of life,” an individual was to develop and become conscious of one’s originality as one matured, which allowed one to relate oneself to others better and participate in the collective life. The same for nations: “The most powerful means of God for creating and developing the distinctive originality is to maintain the world harmoniously divided in these great and wonderful systems that are called nations.”<sup>95</sup> In fact, Michelet seems to have feared the possible obliteration of originalities and diversities, as can be seen in *The Mountain* where Michelet quoted Candolle as he observed with sadness the Arollas (Swiss pines) being slowly suffocated by mosses and lichens: “The commonplace will prevail.”<sup>96</sup> Michelet also lamented how shepherds were mindlessly chopping down the Alpine pines and carving them to

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<sup>94</sup> Michelet, *On History*, 51.

<sup>95</sup> Michelet, *Le Peuple* (Paris: Hachette & Paulin, 1846), 306-316.

<sup>96</sup> Michelet, *The Mountain*, 284. Candolle wrote this phrase in his essay “Botanical Geography” (1820). Michelet was contemplating how the languages, populations, and cultures of the mountainous populations have disappeared, and whether Candolle’s pessimistic view would apply to humanity, not just to plants. Émile Montégut (1825-1895), Michelet’s friend, was concerned with Michelet’s sadness when quoting Candolle (it is possible that Montégut was reading Candolle’s phrase in political and social senses, beyond the original botanical context): “That is not a possibility, but a certainty. Why is Michelet surprised and saddened by this? Take your side, and happily reap the fodder you have sown.” Émile Montégut, *Mélanges critiques* (Paris: Hachette, 1887), 330-331.

sell as toys; Pouchet, echoing Michelet's alarm, denounced this commercial practice as "selling the nation itself" without realizing it.<sup>97</sup> Instead, Michelet meant a preservative assimilation that consciously strengthened originalities, through which France was to guard its purity better than any other nation: "Our particular virtue is not innocence, is not ignorance of evil, childhood's state of grace, virtue without morality; it is experience, it is knowledge, the earnest mother of liberty. Good derived thus from experience is strong and durable."<sup>98</sup> Virgile Rossel (1858-1933), a Swiss politician and writer, likewise exhorted that France should integrate the foreign without limitlessly imitating it—France's role has historically been that of universalizing and interpreting for others what was national, but France needed to renew its own genius through continuous contact with others.<sup>99</sup> Although Michelet assigned these traits to France's national type, at the same time, he anticipated the full maturity of purity and liberty in the future. In other words, Michelet used different temporal contexts for the concept of type, which was both a tool and an end.

Organic liberty, purity, and unity—these were the principles of nature, for Goethe, based on which the concept of the type was perceived, through which the past and present organic forms were understood. For Michelet, these concepts functioned as a future type towards which the natural and political forms were striving—and the study of natural and human histories brought these efforts into our consciousness, to help align our actions, be it forest preservation or supporting centralized education, with these goals. If Goethe's concept of the type merged thinking and perceiving, Michelet's concept of the type was born out of thinking, perceiving, and

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<sup>97</sup> Pouchet, "La Montagne, par M. J. Michelet," 3.

<sup>98</sup> Michelet, *On History*, 58.

<sup>99</sup> Virgile Rossel, *Histoire des relations littéraires entre la France et l'Allemagne* (Paris: Fischbacher, 1897), 275-276.

believing. Indeed, when convincing his audience to view the crises throughout history as the necessary and periodic passages towards progress, Michelet was asking for a bit of faith:

Whatever doubts and uncertainties we may have in times of transition, let us have faith in progress, in science, in liberty. ... We are still—you must believe this—in the embrace of Providence and, as has been noted in the case of the solar system, Providence has placed in this world a curative and reparative power that compensates for seeming irregularities. What we often take to be a breakdown is in reality a necessary passage, a periodic crisis that is not without precedents and that returns in due course.<sup>100</sup>

Michelet affectionately described the ascension and progress of the common people as the “invasion of the *Barbarians* ... full of a new, living, regenerating sap,” whose collective was making a continuous march towards “Rome of the future” despite individual deaths.<sup>101</sup> Similarly, individuals slowly disengaged themselves from the materiality of their native villages, related themselves more and more to the abstract idea of homeland, to eventually arrive at the idea of the universal home country, the “city of the Providence.”<sup>102</sup> In the nature books, too, birds, insects, sea creatures, and mountains were often depicted as “dreaming” of the future. A bird “loves the future and unknown ... she will suffer unto death for her dream and her faith,” while the shells at the bottom of the sea dreamed of mobile functions that their more evolved neighbors exercised.<sup>103</sup>

The component of faith in Michelet’s view of history and nature emerged from his belief in the continuity through death and reincarnation. The study of history for Michelet had an ongoing and future aim of revealing and constructing a path of progressive triumph of liberty, a task that was possible because history was fundamentally a resurrection of the past.<sup>104</sup> Humanity

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<sup>100</sup> Michelet, *On History*, 130. In the “Opening Address at the Faculty of Letters (1834).”

<sup>101</sup> Michelet, *Le Peuple*, 35-36.

<sup>102</sup> Michelet, *Histoire de France* t.2 (Paris: Librairie classique de L. Hachette, 1833), 192.

<sup>103</sup> Michelet, *The Bird*, 66; Michelet, *The Sea*, 290.

<sup>104</sup> Michelet, *Le Peuple*, 37.

as a whole moved forward towards their angelic type because individuals served as tightly arranged stepping stones, each carrying the memories of the past and the present throughout one's lifetime before passing them to the next generation. In this continuity of the past into the future, Michelet saw individual deaths as reincarnations.

People and houses, we all bear the imprint of ages past. As young men, we carry within us countless ideas and ancient feelings of whose presence we are unaware. These traces of times long past are jumbled inside us, indistinct, often disturbing. We turn out to know things we never learned, to have memories of things we never witnessed and we feel the reverberations of the emotions of people we never knew. ... It is because history is in us, we feel the weight of centuries, we are the bearers of the world.<sup>105</sup>

The renewal and continuity of generations in history was mirrored in the metamorphoses of organic forms in nature. Invoking Jean-Baptiste Lamarck (1744-1829) and Geoffroy Saint-Hilaire, whom he called "the genius of metamorphoses," Michelet wrote: "Nothing will perish utterly. What has once lived may slumber and preserve a latent vitality, a capacity of restoration. Who is dead in fact and in truth? No one. ... Death has taken to flight before the inquiring gaze of Science."<sup>106</sup> Whether discussing vultures and crows as the "wholesome accelerator of the interchange of substances," the multiple deaths and births that insects go through during their lifespan, or his own experience of a strange exchange of death and renewal during his therapeutic hot mud bath in Italy, the topic of death and reincarnation was at the forefront of Michelet's mind throughout his nature books. Some reviewers like Louis Ulbach (1822-1889), who collaborated with and directed *Revue de Paris*, took these topics well in his review of *The Insect*. Ulbach understood the concept of immortality and infinity to be the reason for progress, and thus

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<sup>105</sup> Michelet, *On History*, 122. In the "Opening Address at the Faculty of Letters (January 9, 1834)."

<sup>106</sup> Michelet, *The Sea*, 118, 120.

scientifically, historically, and socially relevant.<sup>107</sup> Other reviewers like Anatole Ferdinand Claveau (1835-1914), French journalist and essayist, found that Michelet's emphasis on soul in birds, plants, insects, and mollusks was too much, and the abundance of the ideal was drowning: "it is a true bath of metempsychosis; but one does not come out wiser."<sup>108</sup>

Michelet's obsession with death has been well documented.<sup>109</sup> Looking back at his gloomy days of youth when he lived near a cemetery and a sepulcher, Michelet wrote: "I loved death."<sup>110</sup> Starting with his mother's death at a young age, Michelet witnessed a series of deaths of loved ones, including his first wife in 1839, Madame Françoise-Adèle Dumesnil (who was Michelet's muse, the "White Angel," and the mother of Alfred Dumesnil) in 1842, and his infant son in 1850. In spring of 1842, around the time of Madame Dumesnil's illness and death, Michelet showed a particular interest in the topic of metempsychosis, or reincarnation.<sup>111</sup> His journal entries show that he was reading books on metempsychosis by Pierre Leroux (1797-1871) and Jean Reynaud (1806-1863), the co-founders of the *New Encyclopedia* (1834-1847) and socialist philosophers. Paul Janet (1823-1899) and Gabriel Séailles (1852-1922) summarized in their *History of Philosophy: the Problems and the Schools* (1887) how the preoccupation with the problem of the future life had manifested in different forms and schools, including the Platonian school, Christianity, the philosophies of Leibniz, Spinoza, and Kant. Humanitarian

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<sup>107</sup> Louis Ulbach, "L'Insecte par M. J. Michelet," *La Revue de Paris* (Jan. 1, 1858): 86, 91. Michelet appreciated Ulbach's review of his work, which he thought was eloquent, delicate, and respectful. Michelet, *Journal* t.II, 391.

<sup>108</sup> Anatole Claveau, "La Montagne, de M. Michelet," *Revue contemporaine* t.61 (1868): 558. Claveau also questioned how confident readers could be about the facts and theories that Michelet advanced. He even likened Michelet's passion for nature to one's love for a mistress—the connection being that nature, like a mistress, could lead one astray. Despite these comments, Michelet considered this review "favorable," especially for a comment that Claveau preferred Michelet to Victor Hugo (1802-1885), the well-known French Romantic novelist.

<sup>109</sup> See, for example, Kaplan, *Mother Death* (Amherst: University of Massachusetts Press, 1984). This edited and translated work includes a selection of Michelet's journal entries that contained his contemplations on death.

<sup>110</sup> Michelet, *On History*, 147. In the "Preface to the History of France (1869)."

<sup>111</sup> Kaplan, *Mother Death*, 131. Also see Michelet's journal entry for March 28, 1842, where he discussed and criticized Leroux's *On Humanity* (1840). Michelet, believer of the immortality of the soul, particularly disagreed with Leroux's hypothesis that, while the whole humanity continued its moral progress, individuals lost every memory of their prior lives and every experience and lesson they suffered. Michelet, *Journal* t.I, 386.

school was the nineteenth-century development of the same preoccupation, led by Leroux and Reynaud,<sup>112</sup> with whom Michelet shared the vision of social equality and harmony as Romantic socialists. Michelet's interest in the topic of metamorphosis and metempsychosis reflected the general French interest of his time, not just the traumas of his personal experiences. From these speculations about future, death, and reincarnation, one gets a sense of uncertainty, anxiety, and even despair that may have reigned in the nineteenth century, not just with Michelet.

It is not surprising that Goethe, as a naturalist who considered in depth the concepts of metamorphosis and type, had also commented on the topic of death and eternity—although not in his scientific writings. Goethe said to his friend Johann Peter Eckermann (1792-1854) that “this thought [of death] never gives me the least uneasiness,—I am so fully convinced that the soul is indestructible, and that its activity will continue through eternity.”<sup>113</sup> Similarly, Goethe noted: “I pity those who make much ado about the transitory nature of all things and are lost in the contemplation of earthly vanity: are we not here to make the transitory permanent? This we can do only if we know how to value both.”<sup>114</sup> These words reveal that Goethe's understanding of the role of individual life in the collective history was very close to Michelet's. And yet, there were differences in tones and aims. Just as the concepts of unity and harmony—as the very principles, not goals, of nature—allowed Goethe to derive the concept of the organic type through which to understand the empirical world, he could derive the certainty of the immortality of life from the laws of nature that did not assign moral values. The future was no more and no

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<sup>112</sup> Paul Janet and Gabriel Séailles, *Histoire de la philosophie: les problèmes et les écoles* (Paris: Delagrave, 1899), 908-909. According to the authors, the humanitarian school had differences within. Leroux argued for the “impersonal” metempsychosis of the humanity itself, where an individual, reincarnating in another individual body, lost its memory and personality. Reynaud opposed this immortality without conscience and memory, however. Michelet seems to have sided with Reynaud. See the previous footnote.

<sup>113</sup> Goethe, *Conversations with Goethe in the Last Years of His Life*, trans. S. M. Fuller (Boston: Hilliard, Gray, and Co., 1889), 108.

<sup>114</sup> Goethe, *The Maxims and Reflections of Goethe*, trans. Thomas Bailey Saunders (London: Macmillan, 1908), 84.

less than the continuation of the current life in different forms and conditions. Dollfus, who argued that “Goethe always considered things in whole because he himself was a marvelous whole,”<sup>115</sup> noted how Goethe’s view of immortality as continuous metamorphoses of a general type in all corners of nature helped him see in himself an individual character that directly participated in the essence common to things—Goethe was thus “endowed with the faculty of particularizing himself without ever losing his universality.”<sup>116</sup> For Goethe, there was no particular direction of metamorphosis that he considered morally “progressive”<sup>117</sup>—according to Dollfus, Goethe recognized the boundaries among different domains such as science, faith, and poetry, and successfully united them without mixing them<sup>118</sup>—but he knew there unquestionably existed an essence behind the metamorphoses that held everything together, and likewise, found certainty and immortality of his own self.

Michelet’s understanding of metamorphosis was a bit different in that Michelet attributed a moral aspect to it; he meant the concept of continuity to be a progress, rather than a progression. His reincarnation was a renewal for the better. Insects shed their cocoons to be born again in better, more splendid forms; birds, mollusks, insects, and men were all ranked by their “superiorities”; nations, too, were ranked among themselves and different periods were ranked within each nation’s history; Michelet himself was reborn with healthier mind and body after his energetic exchange with the earth during his full-body mud bath. Michelet did utilize the Goethean concept of type for beings and nations, based on his observations in nature and his research on historical facts. However, as discussed above, he also used another kind of type,

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<sup>115</sup> Dollfus, “Étude sur Goethe,” *Revue germanique* t.10 (1860): 169. Michelet enjoyed this article and agreed that Goethe was a remarkably well-balanced personality.

<sup>116</sup> *Ibid.*, 194, 201.

<sup>117</sup> In the *Metamorphosis of Plants*, Goethe argued that the transformations of the leaf should be understood “both forward and backward.” Goethe, *The Metamorphosis of Plants*, ed. Gordon L. Miller (Cambridge: MIT Press, 2009), 102.

<sup>118</sup> Dollfus, “Étude sur Goethe,” 188.

which he placed in the future and treated as ideal goals. The former type was subject to the laws of nature, while the latter type could not be entirely defined by such laws—the future was in large part up to people’s current thoughts and actions, over which neither nature nor Michelet had a full control. Michelet could not course-correct the fickle changes of regimes and uprisings that permanently affected Michelet’s psyche and material life, as well as the Franco-Prussian War in his later life, but the people could. As much as Michelet loved nature and his nation, he had to be equally nervous about the future of both.

Compared to Michelet’s passionate, nervous, and worried language,<sup>119</sup> Goethe appeared almost too calm. Ralph Waldo Emerson (1803-1882) once said that Goethe was “artistic, but not artist, spiritual but not spiritualist.”<sup>120</sup> Emmanuel des Essarts (1839-1909), a French poet and writer, gave a following evaluation of Goethe:

Goethe seems to us as a judge who is never misled, endowed with an instinctive faculty of seeing justly and thinking healthily. This faculty, we call it the certainty. To what does he owe this power of judgment, even more astonishing than his inventive power and which served him as much for his masterpieces? Maybe to his perfectly balanced nature, where he had established the ancient *ataraxie* [imperturbability], definitely to the excellent habits his mind contracted. The most fertile of these habits had been to let the imagination free and vigorous only under the protection of reason. One day, he told Eckermann, “The great art consists of limiting itself.” All his life he put this word to action.<sup>121</sup>

Another reviewer, a Christian writing for the journal *The Crusader*, criticized Goethe’s pantheism, but admitted that Goethe had “an air of freedom which is seductive. . . . Goethe is dominated by his own only; he is his own master.”<sup>122</sup> The contrast between Goethe’s

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<sup>119</sup> Almost all reviewers praised or criticized Michelet for the unmistakable passion that came through his nature books. Bersot went a bit further, by describing Michelet’s voice as a “nervous, worried language with a dangerous charm.” Bersot, “La Montagne, par J. Michelet,” 3.

<sup>120</sup> Emerson was quoted in a review of Goethe’s biography: Unknown author, “Goethe, ses mémoires et sa vie, par H. Richelot,” *Revue critique des livres nouveaux* (Jan. 1, 1863): 423.

<sup>121</sup> Emmanuel des Essarts, *Les Voyages de l’esprit* (Paris: Maillet, 1869), 87.

<sup>122</sup> Georges Seigneur, “Étude sur Goethe,” *Le Croisé* (Jan. 11, 1868): 13, 14.

imperturbability and Michelet's passion seems to have a lot to do with, among other factors, the difference of their aims in the first place. Edmond Schérer (1815-1889), a French theologian and critic, was one of the reviewers who put his finger on this point. Schérer, criticizing other reviewers who mocked the growing eccentricity in Michelet's writings, offered a more precise critique of his nature books. After noting how Michelet struggled with reconciling two types of evolution—the material evolution of marine organisms and the metaphysical evolution towards liberty—Schérer pointed out the leap Michelet made between hypothesis and aspiration: “He recognizes that the idea of a chain of beings, constituted by metamorphoses by need and effort, is only a supposition. But he goes ahead and adopts this supposition and treats it as the solution of all problems. ... He is a scholar and critic, but in the end the artist alone persists. He is less concerned with knowing than with creating in his turn, and for his sake.”<sup>123</sup> Jules Simon (1814-1896), a French statesman and secretary at the Academy of Moral and Political Sciences, made a very similar remark. “Michelet has aspirations rather than doctrines. ... His books are more than resurrection; they are creation with his passion and imagination; he is the first of magicians and painters, if not the first of historians; as he qualifies himself, the artist.”<sup>124</sup> If Goethe drew the line at knowing, Michelet wanted to inspire himself—and above all others, unlike Schérer commented—to consciously create something better in the future.

Michelet's vision of progress, of France as the “city of Providence” that united Europe in harmony, stemmed from his belief in progress and his impulse to create it in reality. His nature books and history books alike relied on the multiple uses of the Goethean concept of the type that had been gaining traction. This concept offered points of scientific relevance to modern readers, and more importantly, provided the certainty of the building blocks for the ascension

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<sup>123</sup> Edmond Schérer, “M. Michelet,” *Le Temps* (Jul. 18, 1861): 3.

<sup>124</sup> Jules Simon, “Notice sur Michelet,” *Le Temps* (Dec. 5, 1886): 2.

towards a progressive future, a belief that Michelet wished to promote in his readers. This belief in progress itself could have been further buttressed by Michelet's friend Marcellin Berthelot (1827-1907), a French chemist and historian of science.<sup>125</sup> Ernest Renan (1823-1892), a French philosopher and scholar of religion, had written to Berthelot that, based on the history of physical and moral revolutions that have happened on the earth, "the need to march on and to progress must be the permanent tendency of a being" and that this progress towards the universal conscience, which continuously pushed the possible to come into existence, was the "most general law of the world."<sup>126</sup> Berthelot responded by defining the relationship between ideal science and positive science, and the role of history in it. Although the centuries-long metaphysical questions, such as origins and destinies of individuals, humanity, and universe, escaped positive science, one could tackle them through real existences, such as historical observations, and by applying a method borrowed from positive science. However, history involved the element of liberty, which changed the course of natural destinies; ideal science was by nature an uncertain provenance. One thing certain has come out of this science, however: "it is the fact of incessant progress of human societies, progress in science, progress in the conditions of material existence, progress in morality, all three correlated. The sum of good will always increase, and the sum of bad will diminish, as the sum of truth increases and as ignorance diminishes in humanity. Thus, the notion of progress emerges, as an *a posteriori* result of historical studies."<sup>127</sup> Individual liberties and choices in the human world made history a less

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<sup>125</sup> Friend of both Michelet and Athénaïs Michelet, Berthelot's name appeared in *The Sea*, on p.311. Himself very much interested in entomology, Berthelot was asked to write a preface for a new edition of *The Insect* after passing of both Michelet and his widow. Michelet, *L'Insecte: étude par M. Berthelot* (Paris: Calmann-Lévy, 1903), 1-39.

<sup>126</sup> Ernest Renan, *Dialogues et fragments philosophiques* (Paris: Michel Lévy Frères, 1885), 177-178, 181. Renan also expressed that the secret of the formation of species was in morphology. He validated the legacy of zoological morphology by Geoffroy Saint-Hilaire and Goethe, and supported Darwin's hypotheses which were "on the way to the grand explication of the world and of the true philosophy." See 160-161 and 163-164.

<sup>127</sup> *Ibid.*, 235.

certain knowledge than positive science, but they were also the key to bringing the general results of history closer to future progress. As Berthelot concluded: “next to positive and universal science, which establishes itself by its own certainty since it affirms only the observable realities, one can raise the ideal science, also necessary as positive science, but whose solutions, instead of being imposing and dogmatic as in the past, have henceforth for its principal basis the individual opinions and liberty.”<sup>128</sup>

### Conclusion

As Dollfus noted, nineteenth-century French writers and readers increasingly looked back at their century and talked about the philosophy of history, which signified that “man increasingly recognizes himself and judges himself; that he has become aware of a thing that connects generations, peoples, ages, individuals, and which is the human kind.”<sup>129</sup> Nineteenth century was a “vast field of experimentation,” a “transition,” and a “crisis of the future.”<sup>130</sup> Other reviewers like Montégut were pessimistic, fearing how everything—humanity, civilizations, religions, philosophies—might all disappear, like a mere dream or a soap bubble.<sup>131</sup> Michelet himself could not help but explicitly wonder, “Will our era succeed in regenerating itself?” a question he asked in the final chapter of *The Mountain*; he also expressed his anxieties about the health of the future generation in the final chapter of *The Sea*, “The vita nuova, or new life, of nations.” Dollfus wrote, “We are tired of doubting and denying; uncertainty upsets us, but it doesn’t discourage us, as we carry with us the beginning of the rejuvenated world ... man never

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<sup>128</sup> Ibid., 240-241.

<sup>129</sup> Dollfus, “Essai sur le XIX<sup>e</sup> siècle,” 30.

<sup>130</sup> Ibid., 25-26.

<sup>131</sup> Montégut, *Mélanges critiques*, 299.

felt this much need to believe in himself.”<sup>132</sup> Michelet’s four books on nature sympathized with all these doubting, wondering, and worrying, and at the same time, attempted to serve as a remedy. It might not have provided a full positivist certainty, but it was a remedy that united faith, science, and history. One reviewer wrote that Michelet’s work was a cordial salutary in the time of breakdown, for those who were fighting, doubting, and suffering.<sup>133</sup> Chasles added an optimistic note when he defined the nineteenth century as the artist-dreamer, and Michelet’s books as a reflection of its dream, which was the “most complete symbol of the new religion.”<sup>134</sup> In this sense, Michelet’s books on nature and history were far from being obsolete in the era of positivism, but very much fitting and necessary in the time of unrest, a period that nervously walked between the liberal and republican regimes, between anxiety and hope, and between science and faith. Michelet once described the natural world a “perpetual *alibi*”<sup>135</sup> from the human world. The term “alibi” meant for Michelet something different from what it means today—it meant a physical and psychological place where one retreated from other places and influences.<sup>136</sup> This place was enigmatic and almost fantastical, but it was also what kept one safe and hopeful. As Michelet explicitly wrote, nature was his alibi: “we have sought an *alibi* from the human world, from the profound solitude and desolation of ancient days.”<sup>137</sup> But the ultimate alibi, for Michelet and for his contemporaries, was the future. The final pages of *The Bird*, where

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<sup>132</sup> Dollfus, “Essai sur le XIX<sup>e</sup> siècle,” 26.

<sup>133</sup> Anatole de la Forge, “La Montagne, par Michelet,” *Le Siècle* (Feb. 29, 1868), 3.

<sup>134</sup> Chasles, “Les Confidences de M. Michelet,” 54, 58.

<sup>135</sup> Michelet, *The Insect*, 20.

<sup>136</sup> Michelet used the term “alibi” in his historical work as well. In the *History of France*, he characterized Margaret of Angoulême (1492-1549), the sister of the King of France Francis I and patron of reformers, humanists, and artists, as holding two loves—the love of sciences and the faith in her brother—which created against all others a continuous *alibi*. Michelet, *Histoire de France* t.10 (Paris: Marpon et Flammarion, 1879), 154. Elsewhere, Michelet also wrote that mind always created an alibi from the furies and passions of the flesh. Michelet, *Histoire de France* t.17 (Paris: Marpon et Flammarion, 1879), 69. The term was used in a negative sense as well. Louis XVI was described as “more German than Germany, in a complete alibi, the perfect ignorance of the nation he reigned”; this alibi, in which the king lived, had to operate at all costs even during the wars. Michelet, *Histoire de France: dix-huitième siècle, Louis XV et Louis XVI* t.19 (Paris: Marpon et Flammarion, 1879), 10, 77.

<sup>137</sup> Michelet, *The Bird*, 17.

Michelet shared an anecdote of his encounter of a red warbler in dank and dark Paris, illustrating how saturated the term was meaning. The warbler, although confined to the inferior animal body and in captive state, kept singing: “she was lifted above by her wings, and by the winged soul which sang in that little body. An all-powerful *alibi* held her enthralled afar off, in her native grove, in the nest whence she had been stolen in her infancy, or in her future love-nest. She warbled five or six notes, and they kindled my very soul; I myself, for the moment armed with wings, accompanied her in her distant dream.”<sup>138</sup> The *alibi* here was a “distant dream” that was the bird’s past and the future and constituted the bird’s identity, regardless of its current situation. Moreover, this *alibi* momentarily became a reality, through the aesthetic effect of the warbler’s singing, where Michelet felt his wings and could identify himself with the bird—the future, according to Michelet, that man and all other beings longed for. The *alibi* could and did mean a sanctuary, a place antithetical to one’s current situation (ex. nature as a haven from human history and politics), but more broadly, Michelet also implied a teleological evolution, an eventual triumph in the future over the present situations. Michelet’s nature books carried his readers and his time to that seemingly uncertain future. Specifically, they aimed to convince readers that they held the key to equip the future with certainty.

At least three reviewers likened Michelet’s nature books to some sort of optical instruments, both as a praise and a criticism. For Bersot, Michelet’s eyes were like a magnifying instrument that amplified everything he observed;<sup>139</sup> another reviewer wrote that *The Bird* was like a “kaleidoscope with thousands of dazzling glares”;<sup>140</sup> Louis Énault (1824-1900), too,

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<sup>138</sup> *Ibid.*, 340.

<sup>139</sup> Bersot, “La Mer, par J. Michelet,” 3. Bersot was criticizing how Michelet immoderately amplified every single marine creature in the sea, which tended to create a single uniform dimension for all things and destroy the original proportions in nature.

<sup>140</sup> Roche, “L’Oiseau, par M. Michelet,” *Le Moniteur universel* (Mar. 4, 1856): 3. Roche was describing how this book was full of contrasts—the natural and the artificial, the touch of a superior male and the delicate sensibility of a female, the observation of a scholar and the fantasy of an artist, the true thought and hallucination. This review was

commented that *The Insect*, with so varied dimensions, was like a kaleidoscope—which was fitting for Michelet’s own motto of the book, “Insect, that is a living infinite!”<sup>141</sup> Michelet’s optical instrument was fundamentally equipped with the mechanics of optics, as it fully utilized the modern morphological concepts such as Goethe’s concept of the type. But it was also equipped with dazzles and warps to let viewers see the magic and believe it. The scientific mechanism was an essential component of this instrument, but it was not the point of it. The late nineteenth-century France needed to believe the certainty of the future history, and Michelet, using Goethe’s philosophy and science, responded to that need.

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one of the very first reviews of *The Bird* (the first of Michelet’s nature books) and Michelet was displeased with it. Journal entry for March 7, 1856. Michelet, *Journal* t.II, 299.

<sup>141</sup> Louis Énault, “L’Insecte, par M. Michelet,” *Le Pays* (Nov. 18, 1857): 3. Énault emphasized how this book felt short while there were so much material in it, thanks to its kaleidoscopic nature. He also quoted Goethe’s Werther in this review when describing the destructive power of nature, like a monster that devoured its offspring.

## Chapter 5 Conclusion

From the coinage of the term *Biologie* at the beginning of the nineteenth century by a German physiologist and naturalist Gottfried Reinhold Treviranus (1776-1837), the study of organic life rapidly expanded. This development involved consisted of proposals, exchanges, and debates on the topics of classifying existing organic beings, of the relationships among them, and of the relationships between the past and present beings. At the same time, the development in biological knowledge also fostered new ways to think of one's relationship with one's environment, notably one's nation. Sciences and nations have long been enmeshed together. In the immediate sense, nations vied for priority of important scientific discoveries and ideas, in a similar sense that nations would later participate in the nuclear arms race in the first half of the twentieth century. But in a more complex sense, and particularly during the nineteenth century, biological knowledge fueled the view of political and social groups like nations and social classes as organic beings. The life of these entities and the lives of individuals participating in it constantly formed and reformed each other.

This concept of a nation as an organic being had a different flavor from the earlier analogies between political and biological bodies employed by the political philosophers. In the nineteenth century, biological concepts, especially those influenced by Romantic thoughts, of the organic type and evolutionary growth created enough impact and reverberations that they could be appropriated outside of natural sciences. A nation became a creative organic being, capable of regenerating itself anew while still keeping steadfast to its national type that distinguished it from its neighbors. Each citizen, each scholar, and each idea was to bear the mark of the national type like a monad or a cell of a body.

In this fusion of modern biological and political concepts, a nation found motivation and inspiration to overcome the political distresses in which it was mired, by turning the idea of its “national destiny” into a reality, into an almost guaranteed stage of a natural process. This fusion made a nation and its people conscious not only of their own future, but also of their relationship to their environments, to other nations, and to the past and future histories of Europe. Employing a natural scientific thinking, the nineteenth-century’s self-reflection in the national context induced a perspective that was at once nationalistic and morally encompassing.

For the development of such reconciliatory perspective, there was no better model in natural science than the morphology of J. W. von Goethe (1749-1832), who walked a tightrope between purpose and chance, between laws and freedom, between the regulative ideal and the constitutive real, between art and science. Goethe’s morphology, which understood nature as a creative force that expressed itself historically in varying forms around an organic type, was a balanced delineation of the unconscious and nonmoral, yet still purposive and lawful nature. Goethe’s focus on the intuitive, unconscious aesthetics of phenomena across nature’s history provided space for the development of a moral teleology, even a self-conscious and self-willed one, of human history, especially for a nation like France which many perceived to have lost direction in a century of constant changes of regimes, revolutions, and decadence.

As many of nineteenth-century scholars remarked, especially during the second half of the century, the essence of Goethe’s morphology was a balanced freedom. This sense of balance—which some even interpreted disapprovingly as that of detachment—formed a contrast to the portrayals of other naturalists of his time. Jules Michelet (1798-1874) admiringly described Geoffroy Saint-Hilaire (1772-1844) as a “primitive barbarian” who “has invaded modern science, breaking down all our classifications as if they were useless threads.” A strong,

naïve, and “childlike man,” Saint-Hilaire seemed to possess “clumsy strength” which people mocked, but which could “grasp and play with your columns, smash your temple, and without being crushed.”<sup>1</sup> Michelet himself was perceived in a similar light. A French writer and critic Barbey d’Aurevilly (1808-1889) noted that Michelet was one of the greatest writers of the nineteenth century, whose gift of imagination was however often overstimulated and “fled with wings with crazy murmurs.” Referring to Michelet’s writings on nature, the critic portrayed Michelet as a “child that stirred up the bottom of the pure river with a stick.”<sup>2</sup> In Michelet’s books on nature, “science, which wants to appear with full force, does not balance imagination as it should.”<sup>3</sup> Although frequently criticized for the possible abuse of imagination, the childlike curiosity and passion were necessary traits for breaking into a new time and field, as Michelet’s description of Saint-Hilaire indicated. The practices fueled by these traits gained scientific support and even moral validation from the prior, more neutral models like Goethe’s morphology. For better or worse, Goethe’s unusually balanced and synthetic conceptions implied equally unusual flexibility and absorbency of other ideas and uses.

Goethe’s morphology was a scientific and philosophical model that interpreted nature through the Romantic conceptions of individual and collective growth, which historically played out in the forms of diverse phenomena, and of the aesthetic and lawful harmony uniting them together. Not only that, but Goethe’s morphology also served as a model which sent out reverberations in multiple forms. France’s scientific and intellectual communities displayed a range of reactions to Goethe’s morphology across the nineteenth century, which in turn reshaped the idea of “French character.” Because this dissertation centered on the reception of a German

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<sup>1</sup> Michelet, *Journal* t.I, ed. Paul Viallaneix (Paris: Gallimard, 1959), 406. Journal entry for May 30, 1842.

<sup>2</sup> Barbey d’Aurevilly, *XIX<sup>e</sup> siècle. Les Oeuvres et les hommes* t.17 (Paris: Alphonse Lemerre, 1899), 230.

<sup>3</sup> *Ibid.*, 247.

naturalist in France, it also showed the varying ways in which French nationalism was expressed. A comparative study (Chapter 2) of Goethe and A. P. de Candolle (1778-1841)—an active participant in the French scientific community during the early nineteenth century—demonstrated that French audience perceived Goethe’s morphology as a representative of German and Romantic science, and thus, as an antithesis of French Classical science, despite the equally strong influence of Romanticism in the leading naturalists’ thoughts in France. Chapter 3, a study of Goethe’s reception after the emergence of Charles Darwin’s *On the Origin of Species* (1859), suggested that Goethe’s morphology resurfaced in French scientific discussions as a useful link between modern biology and French intellectual history that went beyond the Lamarckian theory of evolution and traced back to the earlier French philosophical tradition such as Denis Diderot. Chapter 4 on the integration of Goethe’s morphology into Michelet’s natural and national history showed that, by the late decades of the nineteenth century, Goethe’s natural science became more than a bridge connecting French intellectual history and modern biology. Goethe’s concept of the type and its harmoniously diverse manifestations over time was essential for the establishment of Michelet’s vision in the evolutionary history of nature and of a nation, in a time when audiences expected more than a blind belief in the better future, the one grounded in scientific and historical perspectives.

These chapters not only sought to reveal the various gradations of Goethe’s reception and those of nationalistic expressions in French intellectual communities in the nineteenth century, but in doing so, also examined the place of Romantic natural science in history. Scholars have debated for decades whether Goethe’s morphology, and Romantic science as a whole, could be considered a precursor to Darwin’s evolutionism. Some have argued that Goethe stuck to the question of phenomena and refrained himself from addressing the question of descent (at least

not in his formal publications,)<sup>4</sup> or that Goethe's morphology fundamentally differed from Darwin's evolutionary view in that the former was guided by teleology and the latter was devoid of it.<sup>5</sup> Others have shed light on the evidence that demonstrates Goethe's explicit support for the notion of species transformation,<sup>6</sup> as well as indirect and direct influences that Goethe's concept of the archetype and his modification of Kantian teleology exercised on nineteenth-century biology, particularly on the idea of morality as humankind's purpose when Darwin was constructing his evolutionary theory.<sup>7</sup> The discussion on the lineage between Goethe's morphology and exactly which of the later evolutionary and transformist theories was not the central focus of this dissertation, which instead prioritized the opinions of the nineteenth-century naturalists and writers themselves on that topic. What seems evident is, however, that Goethe's morphological view grounded in Romantic principles was one form of numerous attempts to reconcile the ideal and the real throughout the intellectual history, which in turn pushed open its own cluster of ideas with similar yet varying terminologies and goals. Goethe's morphology at the very least contributed to familiarizing the audiences with the perspective that was necessary for understanding the evolutionary ideas that were in or near the cluster. Arguing that Goethe's idea was less than truly essential to the development of modern botany or to later evolutionary theories, thus, is futile.<sup>8</sup> As a flexible and creative form itself, the morphological idea rippled

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<sup>4</sup> Dorothea Kuhn, "Goethe's relationship to the theories of development of his time," in *Goethe and the Sciences: a Reappraisal*, ed. Frederick Amrine et al. (Dordrecht: D. Reidel Publishing Company, 1987), 14.

<sup>5</sup> Timothy Lenoir, "The Eternal Laws of Form," in *Goethe and the Sciences*, ed. Frederick Amrine et al. (Dordrecht: D. Reidel Publishing Company, 1987), 17, 26-27.

<sup>6</sup> Robert J. Richards, "Did Goethe and Schelling Endorse Species Evolution?" in *Marking Time*, ed. Joel Faflak (Toronto: University of Toronto Press, 2017), 232-235.

<sup>7</sup> Richards, "The Impact of German Romanticism on Biology in the Nineteenth Century," in *The Impact of Idealism: the Legacy in Philosophy and Science*, ed. Nicholas Boyle et al. (Cambridge: Cambridge University Press, 2013), 127-130. This argument is further developed in: Richards, *The Romantic Conception of Life* (Chicago: University of Chicago Press, 2002).

<sup>8</sup> F.-L. Hahn (1844-1921) quoted and argued against Emil du Bois-Reymond (1818-1896), a German physiologist who had stated that Goethe's contribution was not essential for the establishment of Darwin's evolutionary theory. F.-L. Hahn, "Goethe," in *Dictionnaire encyclopédique des sciences médicales ser.4 t.9*, ed. A. Dechambre (Paris: G. Masson, 1883), 744. Closer to our own time, Richard H. Eyde made a similar comment that Goethe's morphology

over and invited a historical (and teleological) perspective of a nation, through which people processed their current political environments. The concepts in Romantic biology interlocked well with the nineteenth-century national contexts, but as a form of dealing with the gap between ideas and reality, Romantic way of thinking may not be limited to a specific national and cultural border nor to a specific time period.

In researching and writing the chapters, I sought to experiment with various methodologies. In addition to a historical analysis of scientific publications and their reviews, I attempted a more literary analysis of a writer's work by going into Michelet's personal perspective and interpretation of Goethe's morphological concepts (Chapter 4). I also applied, with the support from the Visualization for Understanding and Exploration (VUE) at the University of Chicago, computer scientific and visualization method when analyzing Goethe's and Candolle's botanical texts (Chapter 2). The motivation behind the application of this method was to attempt to produce a more subtle argument on the difference between Goethe's morphology and the practices of natural science in France, to make this subtlety immediately visible to readers, and to diffuse the simplistic national divisions between Romantic and Classical sciences, as they were characterized in Goethe's time and even in our present day. On the other hand, this method also treated each sentence like a cell of a whole text that bore various traits of the text's identity. In addition to counting the number of sentences that constituted each trait, I attempted to analyze the texts in a less mechanistic way by examining the tendencies of different traits to interact with one another in each sentence, and thereby identifying more precise shape and nature of each text in question.

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was not necessary, as other naturalists, too, were developing similar ideas, and in a more rational context. Richard H. Eyde, "The Foliar Theory of the Flower," *American Scientist* 63.4 (Jul.-Aug. 1975): 435.

Lastly, the chapters in this dissertation are just a sampling of possible subtopics. Together, these chapters limit their focus to the receptions and uses of Goethe's morphology in the scientific and public intellectual communities in nineteenth-century France. They examined the relationship between Romantic biology and nationalism in natural scientific writing, but another set of case studies that examine such relationship in political texts would be a welcome complement to this dissertation.

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