

Introduction

Biographies are shaped as much by the interests and competence of biographers as by their subjects. I find Ampère intriguing in his rare synthesis of scientific brilliance, philosophical reflection, and spiritual sensitivity. While my perspective may be appropriate for a scientific biography, quite different books will be written about Ampère in the future. The few that presently exist do not attempt to convey the burden of Ampère's science. For example, although Louis de Launay (1925) did appreciate the complexity of Ampère's intellectual and emotional life, he provided no detailed analysis of scientific achievements. On the other hand, Valson (1886) and Lewandowski (1936) went to great lengths to herald Ampère as an example of a scientist who ultimately assigned as much, if not more, importance to his religious faith as he did to the pursuit of scientific knowledge. Unfortunately, this portrayal elucidates neither Ampère's science nor the fascination it held for him. It is true that Ampère's scientific career evolved in conjunction with philosophical and religious concerns about the limitations of scientific knowledge. But in this respect his spirituality both haunted and inspired him. With due respect for the complexity of Ampère's character, the present biography places his scientific work at center stage.

As these comments suggest, Ampère was prone to introspective brooding. His letters to friends and relatives are predominantly recitals of his own suffering, boredom, or enthusiasm, together with appeals for support in his daily struggles. This is not surprising in light

INTRODUCTION

of the tragic events that punctuated his personal life. His character took on a permanently melancholic cast following the execution of his father by guillotine during the Reign of Terror and the early death of his beloved first wife. Perhaps neither Balzac nor Dickens more forcefully depicted the dismal consequences of misplaced emotion as does the tale of Ampère's disastrous second marriage. On the other hand, Ampère could be exuberant and even boisterous in conversation; he could captivate audiences with the sheer energy of his discourse. This was particularly the case in the company of close personal friends, a context in which he felt encouraged to cross disciplinary boundaries in a manner not tolerated by his professional colleagues. It was also a milieu in which he usually held the center of the stage and did not have to acknowledge alternative viewpoints.

Ampère is by no stretch of the imagination representative of his era. He was idiosyncratic in ways that made him unique. Nor was he a figure who had significant personal impact on the society in which he survived as a gifted but essentially exotic presence. In this respect he stands in contrast to Einstein, Newton, or Darwin who in such large measure helped define the centuries in which they worked. Instead, Ampère's life was a series of intersections, a commingling of the intellectual and social currents he explored. With no formal education, his protective family circle encouraged him to adopt both the optimistic scientific outlook of the Enlightenment and a devotion to the Catholic faith. This combination of intellectual expectations and emotional spirituality produced a tension that became his most definitive characteristic. As a scientist, he made original contributions to mathematics and chemistry as well as electrodynamics, the discipline he virtually created. As a member of the prestigious Académie des Sciences and a professor at the École Polytechnique, he was one of the elite few who fully participated in the highly centralized French scientific community. On the other hand, he made valiant philosophical efforts to locate scientific knowledge within a broader intellectual context; he was an active member of a philosophical circle that drew much of its agenda from Maine de Biran and the study of Kant. While Ampère is generally acknowledged as the man who created the science of electrodynamics, relatively little attention has been devoted to the relationship of this achievement to his broader philosophical interests, a central concern of this biography.

Were we to search for a foil to serve as a contrast to Ampère's multifaceted personality, several men immediately come to mind. Among his contemporaries, Biot, Poisson, and Gay-Lussac all participated in the Parisian scientific environment in ways that bring Ampère's character

INTRODUCTION

into sharp relief. These were rigorously trained career men who knew how to be appropriately aggressive in the pursuit of their own interests, particularly in formal institutional settings. Ampère preferred the more relaxed context of casual conversation where exploratory speculations were encouraged. Furthermore, unlike Fresnel or Berthollet, Ampère did not contribute significantly to “applied science.” His invention of the galvanometer was an exception to his predominantly theoretical and highly mathematical approach to physics.

With provincial roots in Lyon, Ampère never lost touch with the eclectic circle of friends he established there prior to his departure for Paris in 1804. Of a predominantly spiritual and literary bent, this group included Bredin, Ballanche, and Degérando. But Ampère was atypical in this context as well. Although he participated in the romantic Catholic revival of the Restoration, he was far better informed about contemporary science than the majority of romantic thinkers. For example, while romantics were apt to denounce atomic theory as an expression of materialist philosophy, Ampère’s own atomic theory was thoroughly embedded in an anti-materialistic metaphysics. Ampère’s intellectual life ultimately came full circle. As a child he studied the quintessential expression of the scientific mentality of the Enlightenment, the *Encyclopédie* edited by Diderot and d’Alembert; his last years were devoted to his own attempt to construct a “natural” classification scheme for all disciplines of human knowledge.

Part I

*Coming of Age
(1775–1804)*

1

Idyllic Youth

Family Roots

In the earliest extensive biographical study of Ampère, Louis de Launay traced Ampère's paternal lineage back five generations to the middle of the seventeenth century. By that point the family had established itself in Lyon. Ampère's great-grandfather, Jean-Joseph Ampère, originally followed his father's trade as a stonemason, but eventually made a transition to the merchant class. These bourgeois roots were strengthened as Ampère's grandfather plied the flourishing silk trade in Lyon and married Anne Berthois, daughter of an *avocat au Parlement*. Their four sons all entered business in Lyon and it was there that the fourth son, Jean-Jacques Ampère, married Jeanne-Antoinette Desutières-Sarcey on 16 July, 1771. At the time of her marriage, Jeanne Sarcey was a 22-year-old orphaned daughter from another Lyon silk-merchant family. Her father had been Claude-Joseph Desutierres-Sarcey of J. Sarcey and Company. Following his death, Jeanne lived in Lyon with his only other child, her sister Antoinette. One of Jeanne Sarcey's uncles provided her with an endowment of 25,000 livres shortly after her marriage. Both sides of Ampère's family tree thus enjoyed a moderate prosperity prior to the upheavals of the Revolution.

Before his marriage at age 28, Jean-Jacques Ampère resided on rue Merciere, centrally located in the heart of the old commercial center of Lyon between the Saône and Rhône rivers. Michelet described this area as a "teeming ant heap nestled among rocks and rivers, crowded

COMING OF AGE

into dark streets that slope downward in the rain and the eternal fog."¹ It was common for prosperous bourgeois families to maintain country homes and spend the summer months outside the city. Three weeks prior to his marriage, Jean-Jacques Ampère's financial status allowed him to purchase a country estate at a price of 20,000 livres. Located adjacent to the village of Poleymieux, about ten kilometers northwest of Lyon, the new property provided a summer retreat during the initial years of marriage; the Ampère household would take up permanent residence there following Jean-Jacques' early retirement in 1782.

Lyon and Poleymieux

It was in the midst of the bustling commercial activity of Lyon, however, that the Ampères' first two children were born: a daughter, Antoinette, in 1772 and a son, André-Marie, on 20 January, 1775. Both were baptized in the nearby parish church of Saint-Nizier. Little direct information has survived concerning Ampère's early years in Lyon, the capital of the department of Rhône in southwestern France. The cliffs and valley created by the confluence of the Saône and Rhône rivers provided a serenely beautiful setting. With a relatively low population of only 149,000 as late as 1821,² the city was a commercial and cultural center for the primarily rural populations of the surrounding departments. The silk trade's dependance on far-flung markets gave the city a broader perspective than might be expected of a provincial town. Its proximity to Geneva ensured an international aspect intellectually as well. Noted for both an aggressive business climate and a mystically inclined religious intensity, the city later made an eclectic setting for Ampère's early and permanent friendships.

During the first seven years of Ampère's life, Lyon provided his initial encounter with concentrated urban life. During the summers of that same period, however, he also experienced exhilarating rural life at Poleymieux. The combination of Lyon and Poleymieux was to leave an impression which later would haunt Ampère with a longing for a return to the happy scenes of his youth. Separated from Lyon by the short distance of only ten kilometers, Poleymieux is reached by following the Saône valley north and then veering to the west by one of several possible routes so as to reach a small enchanting valley within the Mont d'Or mountain range. Dotted by small hamlets, the valley comes to a head in the west where it is dominated by the peaks of Mount Verdun to the north and Mount Thou to the south, both over

IDYLIC YOUTH

600 meters in altitude. The Ruisseau du Thou has its source midway between them and follows a major fault line northeastward until, after a quick descent of 350 meters, it flows into the Saône at Neuville. The approach to Poleymieux from Neuville thus requires an invigorating climb as the valley gradually widens into an amphitheater where the village clings to the steep northern slope. Sun, rich soil, and ample rain support the foliage of a lush and complex forest that directly borders the cleared acreage. In Ampère's time local roads were primitive, particularly in rainy weather. The terrain is somewhat rugged but manageable; from the heights, the views of the distant Saône valley are inspiring, but the overall impression is that of an oasis rather than a citadel. Perhaps the mood Poleymieux inspired in Ampère is best captured by this passage from Chateaubriand's *René*.³

In our endless agitation we Europeans are obliged to erect lonely retreats for ourselves. The greater the turmoil and din in our hearts, the more we are drawn to calmness and silence. These shelters in my country are always open to the sad and the weak. Often they are hidden in little valleys, which seem to harbor in their bosom a vague feeling of sorrow and a hope for a future refuge. Sometimes, too, they are found in high places where the religious soul, like some mountain plant, seems to rise toward heaven, offering up its perfumes.

During Ampère's lifetime, the permanent population of Poleymieux ranged between 400 and 500. In 1788, for example, 406 inhabitants were recorded, a population that was hard pressed financially under the obligations of the Old Regime.⁴ The village center was located about a kilometer further up the slope from Jean-Jacques' house; it clustered near the old church and the ancient *château*, a fortified remnant of the Roman Empire. There was no school until 1833, long after Ampère's departure. For centuries the peasant population had coexisted with a small contingent of Lyon bourgeoisie who found the valley an ideal setting for summer estates or permanent retirement. During Ampère's childhood there were five of these families in residence.

Jean-Jacques Ampère's house was itself something of a model representation of bourgeois taste. Of solid stone construction, it was cut into the northern slope of the valley. It had three main rooms, including a reception area, on the ground floor and five rooms upstairs. Southern windows gave splendid views into the valley, as did the southern terrace, shaded by lindens. About 70 acres of land made up the surrounding estate, part of which was rented to local farmers. An assemblage of farm animals completed the scene. The nearest neighboring

COMING OF AGE

structure was the *maison de la dîme*, a small storage shed where the peasants delivered the sporadic but burdensome tithe of the Old Regime. The property remained in the possession of the Ampère family until 1818, when André-Marie's financial requirements in Paris forced him gradually to sell parcels of land and eventually the house itself in 1819. The house survived the subsequent century and in 1928 it was purchased by two Americans, the brothers Hernand and Sosthènes Behn. They were directed to the purchase by Paul Janet of the Académie des Sciences, and they donated the home to the Société française des Electriciens. The Société des Amis d'André-Marie Ampère was initiated in 1930, and during the following year it assumed the preservation of the Ampère property as a museum.

In 1782 Jean-Jacques Ampère moved his family to Poleymieux; thereafter he allotted only short periods of time during the winters for business in Lyon. About to turn 50 years of age, he placed more importance on the education and nurturing of his children than on the advancement of a business career. In 1785 a second daughter was born and christened Joséphine. Ten years younger than André-Marie, she became a close companion and eventually would be his housekeeper in Paris. In 1786 Marie-Aimé Guillin Dumontet took up residence in the *château* as the new *seigneur* of Poleymieux. A retired Governor of Senegal with a distinguished military record, he soon established a reputation in Poleymieux for highhandedness and intransigence. Nevertheless, Jean-Jacques Ampère was willing to take an administrative and judicial position as Dumontet's *procureur fiscal*.

What little is known about André-Marie's experiences during these years is due primarily to an autobiographical summary he composed many years later. The following passage contains his memories of his early education. Ampère refers to himself in the third person.⁵

His father, who had never ceased to cultivate Latin and French literature, as well as several branches of science, raised him himself in the country near the city where he was born. He never required him to study anything, but he knew how to inspire in him a desire to know. Before being able to read, the young Ampère's greatest pleasure was to listen to passages from Buffon's natural history. He constantly requested to have read to him the history of animals and birds, the names of which he had long since learned while amusing himself by looking at the pictures. The liberty he was allowed to study only when it pleased him to do so was the cause of the fact that, although he had known how to spell for a long time, he did not yet read, and it was only by making an effort on his own to understand the history of birds that he finally learned how to read fluently. Soon the reading of history books and

IDYLIC YOUTH

theater pieces that he found in his father's library attracted him as much as Buffon. He became enthusiastic about the Athenians and the Carthaginians and scorned the Lacedaemonians and the Romans when he saw them subjugate or destroy peoples he was fond of. He took a singular pleasure in learning entire scenes from the tragedies of Racine and Voltaire and in reciting them while walking alone. The feelings that this reading developed in him were amplified by the fact that he heard recounted events from the war that England and France were engaged in on the subject of the independence of the United States.

This intriguing summary is open to a variety of interpretations. Although Jean-Jacques Ampère was guided to some extent by Rousseau's educational philosophy, he left no direct evidence about how he put it into practice. Clearly he was selective. We can only speculate as to whether his move to Poleymieux was partially motivated by Rousseau's insistence on the advantages of a rural setting. Surely André-Marie was given ample opportunity to explore the terrain of Poleymieux and to practice Rousseau's admonition both to "learn from things" and to do so according to spontaneous interest. Nor was the boy constrained by the structure of a formal institutional education. On the other hand, contrary to Rousseau's warnings, André-Marie was given early access to his father's library. Nor was he in any manner discouraged from exploring and applying the power of words at an early age, practices strongly discouraged by Rousseau. As Ampère mentioned in his autobiographical sketch, he delighted in memorizing entire passages, particularly dramatic ones. Years later, separated from his own four-year-old son following the death of his wife, Ampère advised his sister Joséphine concerning the reading habits he wished the boy to adopt, habits that he recalled from his own childhood.⁶

Kiss him well for me and try to inspire in him, if not a taste for reading, at least one for listening to reading. I am sending you some books for this and I beg you to try to make him understand what you read to him by explaining it to him while showing him the corresponding engravings. One must try to make him connect the written ideas with the engraved ideas, either with respect to animals or little stories.

In addition to unrestricted early reading, Jean-Jacques also ignored Rousseau's advice to teach his pupil music and the physical practice of a manual trade. André-Marie would grow up to be rather maladroit physically; an early accident was later said to be responsible for his childlike but very legible handwriting. Similarly, in the religious sphere the young Ampère was not restricted to the precepts of the "natural

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COMING OF AGE



1 Portrait of Ampère, probably commissioned from an unknown artist near the time of his marriage in August, 1799, when he was 24. In the mid-1930s it was given to the *Musée Ampère* in the subject's old home at Poleymieux, where it remains. (Photograph by Studio Basset, 159 rue Pasteur, 69300 Caluire.)