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CELEBRITY CULTURE IN PARISIAN CHEMISTRY

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“Hard as he tried, [Nobelist] Murray Gell-Mann could never make himself into a legend like his rakish colleague and collaborator, Richard Feynman—even if he was the greater physicist.” Thus begins an article in the July 2000 issue of the *Atlantic Monthly*. The author notes that (1):

..there are other factors [besides top honors] that count in the manufacture of fame. Gell-Mann knew how to package ideas, and he had a knack for giving whimsical and unforgettable names to the most abstract concepts in science. Feynman had a more vital gift: he knew how to package himself.

Celebrityhood in science is, of course, nothing new. The earliest obituarist of the French chemist Jules Pelouze (1807-1867) began his article by praising those who successfully raise themselves from modest backgrounds (2):

Even if some allow themselves to be defeated through lack of perseverance, there are others, and more than one would think, who attain prosperity, fortune, and, what is perhaps even preferable to these, celebrity. ... This is the case with the man whom we have just lost, and whom I make bold to call my pupil; for, issu-

ing from my apothecary laboratory, he grew, found fame, and became a celebrity.



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The irony in this particular instance is that in spite of an extremely successful and influential working life, and in spite of this putative celebrityhood in his own day, Pelouze has been almost completely ignored by posterity. Other than five obituaries published at the time of his death, there is virtually no secondary literature on Pelouze. To make matters worse, the nineteenth-century obituaries contradict each other in some of the important dates, and collectively omit some others. Little wonder that the poor writer of the Pelouze article in the *Dictionary of Scientific Biography* ended up by being vague and was sometimes in error (3).

I want to explore here what it meant to be a “celebrity” in nineteenth-century French chemistry, how this status can be correlated with historical significance as measured by posthumous historiography, and what this all meant (and means) in a broader perspective. Confirming the earlier work of Robert Fox and others, we will see that in Orleanist and Second Empire France there developed a distinct culture—or even *cult*—of savant-celebrities, which tended to replace the institution of so-called “no-

tables” of the First Empire and Restoration. This celebrity culture may have played a significant role in shaping nineteenth-century French science, and not always for the best. To instantiate the discussion, I use two pairs of French chemists. The first pair is Pelouze and a slightly older and much better known contemporary, Jean-Baptiste Dumas (1800-1884); the second part will focus on Adolphe Wurtz (1817-1884) and Marcellin Berthelot (1827-1907).

Pelouze and Dumas

Born in the provinces, Pelouze arrived in Paris in 1825 to take his apprenticeship in pharmacy (4). He was desperately poor, living in a garret and surviving at times on bread and water. About 1827 a chance encounter determined his future. Caught in a driving rain walking from Charenton toward Paris, Pelouze flagged down a passing cab, not realizing that it already held a passenger who had hired the driver to take him back to Paris. The driver was reluctant to stop until the passenger, the eminent J. L. Gay-Lussac, insisted on taking the young man in. The two chemists found common interests during the trip, and Gay-Lussac immediately offered Pelouze a place in his laboratory in the Paris Arsenal (5). This was only the second time that Gay-Lussac had taken a private student; the first had been the young Justus Liebig, in 1824. Pelouze and Liebig first met when Liebig returned to Paris for a few weeks in 1828 and visited his mentor’s laboratory. Liebig and Pelouze became fast friends.

In 1831 Gay-Lussac hired Pelouze as his *répétiteur* at the École Polytechnique. Here Pelouze found himself in daily contact with Dumas, who had been *répétiteur* for Gay-Lussac’s colleague L. J. Thenard since 1824. For the next five years, Dumas and Pelouze occupied neighboring laboratory benches at the École Polytechnique. Both also corresponded regularly with Liebig. In the summer of 1836 Pelouze traveled to Giessen to work with Liebig and in subsequent years acted essentially as Liebig’s agent in Paris. In their correspondence with Liebig, Pelouze and Dumas both offered high praise of the rising German chemical com-

munity, often using virtually the same language; they regularly disparaged Parisian academic chemistry.

They also lamented their lack of facilities. Liebig not only had a fine laboratory and a growing group of *Praktikanten*, but his residence was conveniently upstairs from the laboratory, and there were no urban distractions in the tiny town of Giessen. He could virtually live in his laboratory, devoting himself heart and soul to his research and his students. By contrast, life in Paris was immensely complicated. Unlike Liebig, Pelouze and Dumas had no laboratories in their residences, and each had two workplaces (aside from the École Polytechnique, Dumas was also professor at the École Centrale des Arts et Manufactures; and from 1834 Pelouze also worked as an assayer at the Paris Mint). Although this practice of multiple positions (called “cumul”) prevented scholars from starving, it created logistical havoc with their daily lives. Moreover, chemical laboratories in Parisian academic institutions were sadly deficient, and most were scandalously bad.



Jules Pelouze, Oesper Collection

In 1836 Dumas was promoted to professor at the Polytechnique, and simultaneously, with Thenard’s help, he became professeur adjoint at the Sorbonne. Two years later, a vacancy at the Faculté de Médecine was announced. Dumas wrote Liebig to tell him that he had no wish to apply for this position, since he already held professorships at three different institutions. But the Sorbonne had no laboratories at all, and his ill-heated Polytechnique laboratory had become virtually uninhabitable during the Paris cold wave of January 1838. Dumas was desperately unhappy. He formed a new plan (as he subsequently explained it to Liebig): to win the medical professorship, resign the Polytechnique, and then use the resulting higher income to run a private laboratory, which he could also use for his personal scientific research. Connected with this plan, Dumas’s wealthy father-in-law, Alexandre Brongniart, generously built him a house for the laboratory on the Rue Cuvier (6). Dumas wrote Liebig (7):

Since I came to Paris, I have been seeking a way to create a laboratory broadly constituted under my di-

rection. I think I have finally succeeded in this, and that gives me some consolation. In two or three months I will be able to put ten selected students to work in my house, and I will be able to devote four or five thousand francs per year to their experiments. Only then will I be in a position to resume my experiments in competition with yours. At the moment I can't keep pace with you.

The Rue Cuvier laboratory operated for a total of ten years, financed entirely from his own pocket, before Dumas was forced to close it in the chaotic conditions of the Revolution of 1848. However, in this decade the Dumas laboratory played a major role in the history of 19th-century French chemistry.

Many years later, in his *éloge* for Pelouze, Dumas commented that their destinies had been closely linked for forty years, and there is much truth to the statement (8). Dumas had been Thenard's *répétiteur* at the École Polytechnique, while Pelouze was performing the same function for Gay-Lussac. Just as Gay-Lussac and Thenard, once close friends, had fallen out, so also their respective protégés became unfriendly rivals. Both men also taught at the École Centrale and both also provided substitute lectures for Thenard at the Collège de France. Both were elected to the Académie des Sciences at an early age (Dumas at 32, Pelouze at 30). In their parallel early letters to Liebig, both professed abhorrence of the politics of *cumul*, and pledged not to engage in such behavior (9). Of course, both later did just that. When Dumas took the professorship at the Faculté de Médecine, Pelouze succeeded Dumas as professor at the École Polytechnique. Just as Dumas used his new professorship to enable him to open his private laboratory in the Rue Cuvier near his residence, Pelouze simultaneously used his new professorship at the Polytechnique to enable him to construct a private teaching and research laboratory adjacent to his official residence in the Rue Guénégaud at the Mint (10). Pelouze's and Dumas's letters to Liebig leave no doubt that they were both consciously following the model of Liebig's Giessen laboratory.

Many fine chemists were trained in Pelouze's Rue Guénégaud laboratory, or pursued their own original research there, including Claude Bernard and Charles Gerhardt. Seven years after opening this laboratory, Pelouze closed it in order to create a much larger private laboratory school in the Rue Dauphine, near the Mint (and the Seine). This expanded enterprise, lasting twelve years, was highly successful. He had enrollments of around thirty at a time, consisting mostly of young

men from the provinces and from abroad, preparing for future roles in their families' chemical businesses. Pelouze's enterprise could only have benefited when Dumas was forced to close his own laboratory in the spring of 1848, and Gay-Lussac, his patron, was induced to retire (11). In mid-career, Pelouze became successively professor at the Collège de France (1846), president of the Commission of the Mints of France (1848), and chief consultant of the great state-chartered Saint-Gobain chemical works (1850). With these positions, together with his private chemical laboratory school, which operated in two successive locations for nearly twenty years without much competition (12), Pelouze had more wealth and influence than he could have dreamed (13).

Nevertheless, Dumas far exceeded Pelouze in career success. Like Pelouze, as a young man from the provinces Dumas had arrived in Paris without means; and like Pelouze he had also risen quickly. As already mentioned, in 1838 Dumas traded his professorship at the École Polytechnique for the Faculté de Médecine. Upon Thenard's move to the vice-presidency of the Conseil Royal de l'Instruction Publique in 1841, Dumas was promoted from *professeur adjoint* to *professeur* at the Sorbonne; and the following year he succeeded Thenard as dean of the Faculté des Sciences. Thenard,

raised to the baronage in 1825, became the *de facto* academic czar of France in the 1840s and relied heavily thereafter on his protégé's recommendations for chairs and promotions. In this way Dumas became the most powerful academic scientist in Orleanist



Jean-Baptiste Dumas

France. Parisian chemical students began to refer to Dumas jocularly at this time as "l'être suprême (14)." His private laboratory became the French analogue to Liebig's.

Politically, Dumas was a center-right conservative, and he had a few queasy moments during the brief Second Republic. However, during the Second Empire he became even more powerful than he had been in the July Republic. For a few years he was Napoleon III's Minister of Agriculture, then was appointed Senator, and also was Inspector General of Higher Education—all while retaining his two professorships. After Pelouze died, he gave up the Inspector General position and his Sorbonne professorship in order to become Pelouze's successor as head of the Mint (a time-consuming but very lucrative post). Finally, in 1867 Dumas was named *Secrétaire Perpétuel* of the Académie des Sciences, the most exalted honor in the French scientific community.

Hence, despite all the parallels between these two men, and contrary to the obituarist's claims with which I began this paper, Pelouze was no savant-celebrity, and Dumas most certainly was. What did it mean to be a celebrity? Scholarly renown was the first criterion, and it is true that Dumas's scientific work, especially in his early career, far outshone Pelouze's. However, wealth, social connections, and (what is more important) the habitual exercise of influence were certainly a part of the mix. The mature Pelouze was modest and retiring, just as he had been in his youth, while the mature Dumas was proud, confident, expansive, and powerful. Pelouze had reputation and position, but Dumas was both world famous and locally powerful in a way that Pelouze never became. Aside from his very real merit as one of the finest scientists of his generation, Dumas had always been careful to cultivate celebrityhood. Pelouze never did.

Wurtz and Berthelot

Let us now move forward a half-generation and take up the case of Adolphe Wurtz and the slightly younger Marcellin Berthelot. Wurtz's background was middle-class and provincial (Alsatian), and he studied under both Liebig and Dumas. Dumas's support was important in gaining Wurtz his principal professorial chair, that of organic chemistry in the Faculté de Médecine in Paris (1853). Later he added a second position, at the Sorbonne.

Unlike all my other protagonists, Berthelot grew up in Paris, the son of a physician. He was successively Pelouze's *préparateur* in his private laboratory school, then Antoine Balard's *préparateur* at the Collège de France; and he gained both men's patronage. In 1859 he was awarded a new chair of organic chemistry at the

École de Pharmacie. Then, a group of influential intriguers succeeded in engineering the creation of a new chair of organic chemistry at the Collège de France; and in 1865 they managed to have Berthelot installed in it. Thus, it can be said that both Wurtz and Berthelot were cumulards, but to a much lesser extent than Dumas and Pelouze had been.

Wurtz and Berthelot had an uneven personal relationship right from the beginning. Part of the conflict was religious and cultural, for Berthelot was an atheist and materialist whereas Wurtz was an idealist and a devout Lutheran. Mostly, however, they clashed over chemical theory. Berthelot was powerfully influenced by Pelouze's anti-theoretical attitudes, which Pelouze had imbibed from his own mentor, Gay-Lussac. Wurtz, on the other hand, adopted Dumas's and Liebig's strong orientation toward theory. In 1854 Wurtz embraced the atomic-molecular reforms in chemistry that had been advocated by such chemists as Auguste Laurent, Charles Gerhardt, Alexander Williamson, and August Kekulé. For the remaining thirty years of his life, Wurtz was the principal French advocate of atomistic chemistry, but those who regarded themselves as anti-atomists—led by Berthelot in the first instance—were successful in opposing him. The Gerhardt-Laurent reforms, rapidly adopted in other European countries, especially in Germany and after 1860, failed to win acceptance in France until near the end of the century.

As already mentioned, between 1853 and 1865 three new professorships dedicated to organic chemistry were established in Paris. However, none was used to promote the Gerhardt-Laurent reforms or the emergent theory of chemical structure. The chairs at the École de Pharmacie and Faculté de Médecine, held by Berthelot and Wurtz respectively, had practice-oriented pedagogical restrictions that excluded any systematic teaching—or even extended discussion—of chemical theory. The Collège de France, on the other hand, was explicitly devoted to pure scientific research, including advanced theory; but molecular theory was the last thing either Berthelot or Balard wanted to consider. Wurtz naturally found this situation frustrating, particularly since the chemical reforms did not seem to be making much headway in France. His chair at the Faculté de Médecine gave him a secure professional position and his teaching/research laboratory was popular and successful; but what he dearly desired was a rhetorical platform from which he could make the case for the new chemistry to a wider circle. His efforts met with mixed results, at best.

By any measure, Wurtz was one of the greatest French scientists of the nineteenth century; his research spanned the entire science of chemistry and was notable for its volume, significance, and influence. Nonetheless, Wurtz's election to the Académie des Sciences was delayed, largely because the number of members was fixed, and there happened to be a dearth of deaths in the Académie after the Dumas/Pelouze generation. The first election in the Académie's Chemistry Section after Wurtz's arrival in Paris was in 1857, after Baron Thenard died. Wurtz was deeply disappointed that Edmond Frémy (professor at the *Muséum d'Histoire Naturelle*) was chosen in preference to himself. There were reasons for this unrelated to intrinsic merit: not only was Frémy senior to Wurtz, but there can also be little doubt that Frémy's mentor and patron Pelouze had pulled some strings.



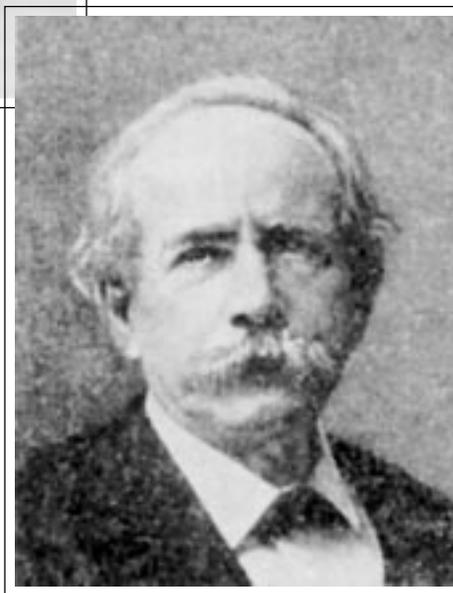
Adolphe Wurtz

The next vacancy in the Section occurred ten years later, when Pelouze died. Wurtz easily won the election, by a vote of 46 to 3 over Berthelot. The same year, an anonymous ministerial report addressed to the emperor assessing candidates for Dumas's vacated office of *Inspecteur Général de l'Enseignement Supérieur* was frankly critical of Berthelot. The most eminent chemists in France, the writer declared, were clearly Pasteur, Deville, and Wurtz, and Balard was senior to all of them (Balard was chosen) (15). In the following year another vacancy was created in the Académie's Chemistry Section, upon Dumas's elevation to *Secrétaire Perpétuel*. For a third time Berthelot was a candidate, and for a third time he lost, this time to Auguste Cahours (Pasteur and Deville were already members of the academy). Berthelot finally won election to the Académie in the

Physics Section, when a vacancy occurred in 1873. Even then he was third on the Section's nomination list, tied with nine others; nonetheless, he prevailed in the general election (16).

All this suggests that Wurtz's research standing exceeded Berthelot's, but Wurtz's contemporary renown did not translate to posterity. There are no Wurtz memorials in Paris, and until the last eight years there was only a little more Wurtz historiography than that devoted to Pelouze. Marcellin Berthelot, by contrast, lived and died larger than life. The fiftieth anniversary of his first publication (1901) was celebrated by 3,000 invited guests in the Great Hall of the new Sorbonne. His state funeral six years later was marked by speeches by the President and Prime Minister of the Republic and the presence of hundreds of other dignitaries. Interment, for both Berthelot and his wife, was in no less elevated a place than the Panthéon—an unprecedented honor made possible only by a special legislative act. His

statue was erected prominently in the Rue des Écoles, in the square opposite the Collège de France, a square that bears his name today. The centenary of his birth in 1927 was the occasion of elaborate celebra-



Marcellin Berthelot

tions, including the preparation of a sumptuous commemorative volume. No fewer than fifty schools in France are now named in his honor (17).

Wurtz was not a star in the French scientific firmament. Berthelot was. So was Pasteur, for whom an eponymous research institute was created long before

his death. So was Claude Bernard, in whose honor the French government conducted the first state funeral for any scientist (1878). In an earlier generation, so were Thenard, Gay-Lussac, Dumas, Arago, and Cuvier. What made a scientist into a celebrity? It was not just contemporary research renown, for Wurtz had that; and conversely Thenard fell far short of the research productivity of Gay-Lussac, Dumas, or Wurtz. Rather, what one needed in addition was a collection of certain other human qualities, including the ability successfully to promote oneself.

Three qualifications are in order. I do not wish to imply that Berthelot's scientific work was weak, or that he was undeserving of his fame. Partington wrote, accurately, that (18):

Berthelot's work is astonishing in its volume, originality, and importance. ... There must be few chemists of my generation, whatever their interests, who have not more than once turned up Berthelot's publications.

What I do want to affirm, however, is the judgment that the great advantage Berthelot enjoyed over Wurtz, both in reputation among the literate lay public in his own day (though not in specialist collegial circles!), and in posthumous recognition, was not in proper proportion to their respective scientific merits. I believe, on the contrary, that Wurtz's lifetime scientific accomplishments must be judged as significantly greater than his rival's; moreover, I believe that the majority of *expert* authorities contemporary with Wurtz and Berthelot agreed with this judgment. Jean Jacques's recent demythologizing biography of Berthelot (16) is generally on the mark, in my view.

My second qualification is the following. In partially ascribing this unjust disproportion to what I am calling a "celebrity culture," I do not mean to imply that scientific prowess was unimportant to contemporary Parisian opinion, or that other countries refused to engage in hero worship. The "research ethic" was not a German monopoly; the route to success in 19th-century French science was always through research. In particular, Berthelot could not have gained the heights without a superb research record. Moreover, in my first case study, that of Dumas and Pelouze, I hope that I have made my opinion clear that Dumas fully deserved his fame, and also that he deserved to be more celebrated than Pelouze. One might certainly argue that the other savant-celebrities of nineteenth-century Parisian culture, such as Gay-Lussac, Thenard, Cuvier, Claude Bernard, and Pasteur, were also deserving of their "star" status,

on substantive grounds. In fact, the argument I want to make does not concern so much the fate of individuals, but rather the fate of the national community.

Finally, one might legitimately suggest that the ability to create excitement about one's scientific contributions and to persuade others of their importance is an essential element of what it means to practice science successfully. In writing of the "private science" of Louis Pasteur, Gerald Geison (19) rightly notes that "past scientists are great insofar as they persuaded their peers to adopt their ideas and techniques.." However, he adds the important qualification that it is also necessary that "those ideas and techniques [be] fertile in the investigation and resolution of important research problems." Geison affirms that Pasteur's work fully meets both criteria, and therefore "he deserves his reputation as one of the greatest scientists who ever lived." The work of the celebrities Richard Feynman and Jean-Baptiste Dumas met Geison's second criterion by universal agreement. Such agreement is less unanimous in certain other cases—Thenard, Balard, and Berthelot, for example.

Context and Consequences of Celebrity Culture

In many respects, 19th-century Parisian science worked well. In chemistry, there was a galaxy of talent in the middle decades of the century. After the retirements of Gay-Lussac and Thenard, students could attend the lectures of Regnault, Cahours, or Frémy at the École Polytechnique, or those of Dumas and Balard at the Sorbonne. The latter men were succeeded by Pasteur and Deville, and then Wurtz was added, as well. The École Normale also boasted Pasteur and Deville; and at the Collège de France were Pelouze, Balard, Regnault, and Berthelot. Frémy and Chevreul held the two chemical chairs at the Muséum d'Histoire Naturelle, and Dumas and then Wurtz were professors at the Faculté de Médecine. Even this is not a full list of the chemical talent available in Paris, for private laboratory schools were run at various times by Gerhardt, Laurent, Wurtz, and Pelouze; and the private École Centrale des Arts et Manufactures had considerable importance.

Furthermore, in many respects opportunity for advancement ran on admirably egalitarian principles, a legacy of Napoleonic reforms. Admission to the *grandes écoles* was by competitive examination, and the university system was essentially free and open. During the July Monarchy, professorships in the French university system were awarded as the result of complex—and

more-or-less impartial—competitions. The most powerful scientific institution of all was the Académie des Sciences, which has been accused, from the 1830s on, of operating as an oligarchic clique to control access to careers and political power in the scientific community. There is truth to this criticism, but Maurice Crosland has also rightly emphasized the essentially meritocratic nature of admission to the Académie, and its emphasis on research renown (20).

The system worked, in its own fashion, and much evidence points to its health. The fact that success was possible for poor youths such as Dumas and Pelouze, and for others from lower middle-class backgrounds such as Berthelot, Wurtz, and Pasteur, is an obvious positive indicator. Politics was ever-present, of course, but the ardent republicans Pelouze, Arago, and Berthelot, for instance, succeeded in relatively conservative times. Those who exercised the greatest influence, such as Gay-Lussac, Thenard, and Dumas, usually were able to discern talent and excellence in the next generation, and in most cases acted appropriately to promote careers. (The unfortunate cases of Gerhardt and Laurent, ostracized by the powerful in the 1840s and early 1850s, are striking, but fortunately somewhat anomalous.) The quality of research produced by the French chemical community in the middle years of the century was excellent.

Nonetheless, there were pathologies in the system, and some of these had unfortunate consequences. One of these is the characteristic upon which I focus here, a culture of celebrity. Early in the century, influence in France was exercised predominantly by a small privileged elite denominated by the word “*notables* (21).” These men used old aristocratic connections, social position, and wealth to exercise political power; they included a number of scientists—such as Berthollet, Laplace, and Cuvier. In the middle decades of the century, this structure yielded in the broadest terms to the growing power of the bourgeoisie and, in science, to a movement toward increasing professionalization. In the late 19th century, power was no longer wielded by *notables* distinguished largely by their social standing, but rather, in the scholarly world, by top university researchers, academicians, and high-level bureaucrats. This change has been well studied, at least in its broad outlines. What I want to suggest, however, is that certain cultural attitudes survived this socio-economic shift. In the following generation, celebrities now played some of the cultural functions that *notables* had earlier. The notability of the beginning of the century had been con-

ferred principally by social position and wealth; by the middle of the century the first criterion was fame.

This issue is closely related to what Robert Fox has referred to as a “radical change” in French cultural life in the decade or two after Napoleon’s fall (22). Fox observes that a new “declamatory” style of higher education, where oratorical and dramatic effects were emphasized often at the expense of serious treatment of difficult issues, became fashionable in Restoration French culture. This new style was particularly visible at the Sorbonne and the Collège de France, where huge audiences consisting mostly of interested laypeople were attracted to lectures in all fields of scholarship. This situation developed partly because there was no attendance requirement for registered students, and contrariwise there was much interest in elevated subject matter among the educated public. Education became a variety of theater; one had to come early to get a seat, spectators expected to be entertained, and professors hoped for applause. These practices were already noticeable (and commented upon as novel) in the 1820s; by the 1830s a few worried voices were raised, and by the 1860s many reformers viewed them as deleterious to the future of French science. The very public meetings of the Académie des Sciences had gone in a similar theatrical direction, which critics regarded as damaging to the institution’s *raison d’être*—pure science and serious research.

In 1864, the philologist Ernest Renan published a biting essay on the French system of higher education, comparing it unfavorably to that of Germany (23). A German visiting courses in Paris, he wrote, is “very surprised.” The lack of dignity and respect, the coming and going of the students during the lecture, the inattention of the auditors, the theatrical style of the professor, and above all, the applause at the conclusion, strike the German student as curious. “An attentive listener has no time to clap. This bizarre custom shows him once more that the purpose of the exercise is not to instruct, but to shine.” The intellectual danger that France was running, stated Renan, was of becoming “a nation of orators and editors, without concern for essential matters and for the real progress of knowledge.”

The Minister of Public Instruction at this time, Victor Duruy, agreed with Renan. Duruy complained of the predilection among French academic historians of his day for “the depiction of personalities and passions, the analysis of the human heart, [and a] brilliant style of light reading (24),” and he was well aware that the sci-

ences shared the same histrionic style as the humanities. Duruy played the leading role in the creation of a new teaching institution in Paris, the *École Pratique des Hautes Études*. This was to provide a means for the pursuit of careful scholarship, not “brilliance,” and for the creation of new knowledge instead of the recounting of moving stories.

Renan and Duruy were not alone in these opinions. A generation earlier, Liebig expressed a number of similar thoughts, pronounced in his characteristic hard-edged fashion. His 1832 paper, published in his own proprietary journal, charged most French scientists with arrogance, chauvinism, rhetorical bombast, and thievery. The harshness of these judgments was only slightly ameliorated by his suggestion that much of the behavior he described was an inevitable product of certain *structural* characteristics. In particular, he thought that the monopolistic power of the *Académie des Sciences*, “the source of all remunerative positions,” led almost inevitably to an unseemly scramble for success. This was why French scientific papers seemed so arrogant and self-promoting, Liebig thought (25). (Liebig, of course, was not immune to the very faults he imputed to his foreign rivals. No one was more skilled at cultivating celebrityhood than he!—and many accused him, with some justice, of the very same list of crimes: arrogance, chauvinism, rhetorical bombast, and thievery.)

The *Académie* was, indeed, a powerful organization, not *de jure* but rather *de facto*. Given the centralization of French science in Paris, combined with the highly cumulated structure of professional positions, it was almost inevitable that power in the community would be concentrated in a few hands; and the geographic/institutional locus of that clique was the *Académie*. To nearly everyone outside of that clique, and even to some on the inside, this was an unhealthy structure. This accurate perception was the source of the attacks on *cumul*, which we have cited in the early letters of Dumas and Pelouze; of course, both ceased attacking the system after they were brought into the elite. *Cumul* continued to be criticized throughout the century, without, however, being dismantled.

Cumul was made almost inevitable by the resistance of the governing authorities to raise academic salaries to a decent level and to provide chairholders with appropriate facilities for their work. The understandable response of a scientist offered a professorship at the Sorbonne that included no laboratory and a deficient salary was to seek a second professorship.

When teaching duties became overwhelming because of the multiplicity of posts, the less desirable or more exhausting positions could be farmed out to youthful *suppléants*, with whom the chairholder shared half the salary in exchange for all of the real work. The same underlying cause, namely the refusal of the government for proper support of higher education and research, meant that scholars were diverted in their middle and later years into lucrative state consulting posts or politics, rather than continuing their teaching or research. All of this also fed into the celebrity culture that I have described.

Of course, none of this was healthy for the Parisian scientific community. The structure of that community became even less salutary during the Second Empire, when Napoleon III abolished the meritocratic system of competitions for major academic positions. It was a developing sense of imminent crisis in the 1860s that led such leading figures as Wurtz, Renan, Pasteur, and Duruy to sound the alarms. Unfortunately, on the brink of success the Franco-Prussians dealt a temporary defeat to all of those efforts. Only in the new environment of the early Third Republic could effective measures finally be taken for thorough going reform.

Conclusions

I want to caution that my account of French “celebrity culture” is intended at this stage merely as suggestive. Even stipulating the existence of this phenomenon, neither its etiology nor its consequences are clear. Comparisons across national boundaries, which I have not even attempted, are vital to judge whether this really was a “pathology” that damaged the development of French science relative to rival nations. This, of course, requires much more investigation. Contemporary historians of 19th-century French science have done extraordinary service in elucidating the historical developments dealt with here, and my work would have been inconceivable without that foundation. However, this field is still relatively young and undeveloped, compared to others even within the history of science. I would like to point to a few topics I think are worthy of further investigation, under three headings: personalities, institutions, and practices.

Other than Lavoisier, Claude Bernard, and a small number of other examples, French chemists have not been well investigated by historians. Speaking only of my cast of characters, I have already noted that Pelouze has been almost completely neglected, and the same was

true of Wurtz until a decade ago. Dumas has been studied, at times with care, but I think it is fair to say that the Dumas literature is still quite meager, compared to his importance. Even Berthelot, about whom much good work has been written, is still imperfectly understood. As for others contemporary with these personalities, there is almost nothing in the modern historical literature on Thenard, Balard, Frémy, Chevreul, Cahours, or Deville. This is the case, despite the existence of masses of archival materials at the Archives Nationales and the Archives de l'Académie des Sciences.

We also need to know a great deal more about the institutions of science in the nineteenth century. Maurice Crosland has done us a great service with the publication of his important monograph on the Académie des Sciences (26), and we also have fine recent studies by John Weiss, Craig Zwerling, and Terry Shinn, among others, of the École Centrale, École Polytechnique, and the École Normale; but this is only a beginning (27). One obvious desideratum is a study of science instruction at the Sorbonne (28). A second is the Collège de France, the details of which are far too little understood (29). A third is a proper study of laboratories and facilities for research, both official and private. And very much to be desired is a broad study of the politics of science funding in the crucial middle decades of the century, where so little attention has been directed—the generation before the rise of what Harry Paul calls the “science empire” in France (30).

Finally, we would benefit greatly from a study of practices and customs in 19th-century French science. One such example is the system of *cumul*; it would be nice to know more about how it actually operated, from both sides of the lectern. There are all sorts of details that we know little about, including remuneration, actual duties, procedures of selection of—and attitudes of students toward—the *suppléants*, for example. A statistical analysis of how the *degré* of cumulation of Parisian (or French) science changed over time would also be very revealing.

A second area of interest under the rubric of practices is the doctrinal control of pedagogy. I have recently finished a study for which this topic was an important element, but I was frustrated by the limits to what I was able to learn. The usual complaint, then and now, is that French “anti-atomists” threw up roadblocks that effectively prevented the teaching of atomistic chemistry from the 1830s until the 1890s. In general I have found this impression to be reasonably accurate, but many puzzles remain unresolved; and it would be very

helpful to know more about both the effectiveness and the tools by which this influence was exerted (31).

This story must, of course, be embedded within a larger account of the science politics of the day. We know that both Wurtz and Pasteur cried foul in 1863 when Berthelot was awarded a new chair created expressly for him at the Collège de France. They quite reasonably suspected that there had been some behind-the-scenes influence, but it would be gratifying to see the actual details revealed in this and many other similar episodes. It is, of course, possible that the real action happened in face-to-face encounters, or by a written trail that has vanished or is otherwise unrecoverable. This exemplifies one of the difficulties for the historian in dealing with Parisian science of the past. German scientists, spatially separated as they were in the decentralized German states, wrote thousands of letters to each other and to their governments, many of which still exist; Parisian scientists, by contrast, could do much business orally, leaving fewer tools by which the historian can reconstruct the action. Celebrities in particular, the focus of this paper, often do their best promotional work in person.

The situation may not be quite as desperate as I appear to be suggesting. Anyone who has sampled the richness of yet unexploited resources at the Archives Nationales and the Archives de l'Académie des Sciences knows that the historical study of 19th-century French science is still young. These are, of course, only two of a great network of archives, and much still exists also in private hands. Exciting work lies ahead.

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2. A. Chevallier, “Théophile-Jules Pelouze,” *Journal de chimie médicale*, **1867**, [5] 3, 444-48 (444).
3. The five obituaries are Chevallier (Ref. 2); C. von Martius, *Neues Reporatorium für die Pharmacie*, **1868**, 17, 506-10; A. Cahours, *Moniteur scientifique*, **1868**, 16, 502-8; W. De la Rue, *J. Chem. Soc.*, **1868**, 21, xxv-xxix; and J. B. Dumas, in *Discours et éloges académiques*, Gauthier-Villars, Paris, 1885, Vol.1, 125-98. Pelouze also enters substantively in F. L. Holmes' biography of Justus Liebig in the *Dictionary of Scientific Biography*, and in his *Claude Bernard and Animal Chemistry*, Harvard University Press, Cambridge, MA, 1974. Alex Berman's three-paragraph Pelouze article in the *Dictionary of Scientific Biography* (1974) is excellent consid-

- ering the limitations under which he labored. There is little on Pelouze in Partington's *History of Chemistry*. Celia von Lindern (University of Regensburg) is currently preparing a full edition of the Liebig-Pelouze correspondence.
- The information on Pelouze in this paper is derived from the sources cited in the preceding note and the following: the government annual *Almanach royal [national, impérial]* (later editions of which add the words *Annuaire de la République Française*); the Pelouze correspondence in the Liebigiana Collection of the Bayerische Staatsbibliothek; and the Dossier Pelouze in the Archives de l'Académie des Sciences, Paris. Some of the material in this paper appears in slightly different form in A. Rocke, *Nationalizing Science: Adolphe Wurtz and the Battle for French Chemistry*, MIT Press, Cambridge, MA, 2001.
 - This story, related in the Chevallier and Dumas éloges, certainly derives directly from Pelouze, but the date is not certain. Gay-Lussac was a consultant at the large iron works in Charenton, and Pelouze's father lived and worked there. The vehicle specified in the story is a "coucou" (cuckoo), a two-wheeled carriage for hire that soon thereafter went out of fashion. I take it to be similar to the later English hansom cab.
 - Dumas to Liebig, n.d., postmarks December 19, 1837, January 21, February 25, May [?], and May 21, 1838, Liebigiana IIB.
 - Dumas to Liebig, n.d., postmarked April 21 and May [?], 1838, Liebigiana IIB. "Depuis que je suis à Paris, je cherche un moyen d'avoir un laboratoire largement constitué sous ma main. Je crois y être enfin parvenu et c'est là ce qui me fait quelque consolation. Je pourrai dans deux ou trois mois faire travailler dix élèves choisis chez moi et je pourrai consacrer à leurs expériences quatre ou cinq milles francs par an. Alors seulement, je serai en mesure de reprendre des expériences en concurrence avec les vôtres. Je ne puis pas aller votre pas dans ce moment."
 - J. B. Dumas, *Discours* (Ref. 3), pp 196-97.
 - Dumas wrote Liebig (n.d., late 1831, Liebigiana IIB), "Je suis parfaitement résolu à ne jamais plier le dos devant personne, pour obtenir une place meilleure. Il en résulte que je serai longtemps sans en avoir ... Jamais je n'ouvrirai la bouche contre ceux qui cumulent, jamais je ne consentirai à la création d'une place en faveur de mon chétif individu." Pelouze wrote Liebig (22 November 1836, Liebigiana IIB): "Vous êtes vraiment heureux d'être éloigné d'aussi viles passions que celles qui agitent la grande majorité des gens que l'on appelle savant. Le spectacle de tout cela me rend triste et m'engage plus que jamais à vivre éloigné de toute société. Pour mon compte au moins, je n'ai pas même sollicité la suppléance dont M. Thenard me charge [at the Collège de France]; c'est lui-même que me l'a proposé."
 - Pelouze had a small laboratory installed in (or attached to) his new lodgings soon after taking the position of assayer in 1834. In his letter to Liebig of August 22, 1835, he wrote, "On m'a donné deux chambres à côté de mon logement. J'en fais dans ce moment un laboratoire et j'espère bien travailler plus que par le passé et d'une manière d'ailleurs moins fatigante." Three years later (May 1, 1838), however, he announced to Liebig the completion that day of "un magnifique laboratoire de chimie qui va remplacer le petit trou qui j'occupais au bout de mon appartement" (Liebigiana IIB). Various witnesses rate the capacity of this laboratory (Rue Guénégaud) as being between six and twelve workers; it is apparently the laboratory that Laurent inherited in 1848. Many students and guest workers accommodated in Pelouze's laboratory can be documented prior to the opening of the better known laboratory treated in the following paragraph.
 - The best (and almost the only) source of information on Pelouze's laboratories is an untitled, undated 3,300-word anonymous document prepared (probably at Dumas's request) shortly after Pelouze's death (Dossier Pelouze, Académie des Sciences). It is precise, carefully researched, and seems authoritative. The most likely author candidate is Aimé Girard, who supervised the laboratory during the final five years of its existence.
 - As noted, Dumas's Rue Cuvier laboratory operated from 1838 until 1848. Wurtz ran a similar school from 1850 until 1853, and Gerhardt ran one from 1851 until 1855. Neither of the latter was a success, and the probable reason for that is competition from Pelouze's operation.
 - According to the information in M. P. Crosland, *Gay-Lussac, Scientist and Bourgeois*, Cambridge University Press, Cambridge, 1978, 230-31, Pelouze's positions at Saint-Gobain and the Mint alone must have brought in about 26,000 francs, at a time when most professorships in major academic institutions earned about 5,000.
 - A. Lieben, "Erinnerungen an meine Jugend- und Wanderjahre," in *Adolph Lieben Festschrift*, Winter, Leipzig, 1906), 5. Lieben was a student in Wurtz's laboratory in Paris in the years 1856-58 and 1862.
 - L. Velluz, *Vie de Berthelot* Plon, Paris, 1964, 119-20. The writer was probably Duruy himself.
 - J. Jacques, *Berthelot 1827-1907: Autopsie d'un Mythe*, Berlin, Paris, 1987, 105-11; A. Carneiro, The Research School of Chemistry of Adolphe Wurtz, Ph.D. Thesis, University of Kent/Canterbury, 1992, 69. Deville had been elected in the mineralogy section of the Académie as early as 1861; Pasteur was elected to the same section in the following year.
 - Jacques, *Autopsie* (Ref. 16), "Un test de la popularité de Berthelot: Son nom dans la géographie urbaine," and B. Javault, "Berthelot, héros de la IIIème République," both in J. Dhombres and B. Javault, Ed., *Marcelin Berthelot: Une vie, une époque, un mythe* SFHST, Paris, 1992, 121-31 and 113-19, respectively. Jacques has determined

that the only scientists who have had more French city streets named for them than Berthelot are Pasteur and the Curies.

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19. G. Geison, *The Private Science of Louis Pasteur*, Princeton University Press, Princeton, NJ, 1995, 10.
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25. J. Liebig, "Bemerkungen zu vorhergehenden Abhandlung [von Thenard]," *Ann. Chem. Pharm.*, 1832, 219-30.
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