Science and Technology beyond the Barricades

Robert Fox, *The Savant and The State*

John Tresch, *The Romantic Machine*

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The history of nineteenth-century French science after Napoleon has long labored under a cloud of decline. For too long, the question “What went wrong?” has crowded out other inquiry, and the standard answer—an overcautious positivism that refused to speak of anything other than observable facts—has made the period look sterile and uninteresting. But France at the time was one of the most vibrant and high-stakes battlegrounds of the forces of modernity, and science was at the center of the fight. “The capital of the nineteenth century” was Walter Benjamin’s phrase for Paris, and two recent books have recovered that sense of drama and importance to the science being done there. Robert Fox’s *The Savant and The State: Science and Cultural Politics in Nineteenth-Century France* (Baltimore: Johns Hopkins University Press, 2012. Pp. 408. $60) and John Tresch’s *The Romantic Machine: Utopian Science and Technology after Napoleon* (Chicago: University of Chicago Press, 2012. Pp. 472. $40), while entirely different in tone and purpose, both establish beyond doubt the centrality of science and technology to the pressing issues of the French public during the tumultuous years following Napoleon’s fall.

Fox has published widely on the history of science and technology in France, and his work has already done much to establish our current understanding of the important role of patronage, institutions, and state support for science and industry. This is his first monograph devoted to the subject, and its great strengths are the sweep and coherence of the narrative, which stretches from 1814 to 1914. Its central object of inquiry is what he calls the “public face of science” (p. 1) or the role science played in the

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major political, economic, and military debates of the day. Although Fox modestly denies that the coverage is exhaustive, for historians of nineteenth-century French science, it is as close as we could hope for.

He offers several themes to guide us through a troubled and complex history: over the course of the century, science grew in prominence; it became more closely integrated with the bureaucracy of the state; it was increasingly recognized for its role in the national interest and drawn on for ideological positions. But his true interest is in what he calls the “fine structure of science” (p. 2), where he shows that none of these developments happened easily. All were the products of substantial political conflict, negotiation, and reversal. Every public lecture, ministerial appointment, and academy election was an opportunity for a culture clash, and Fox lays out in full detail the stakes in each contest.

Much of the focus is on state institutions. The educational system is foremost among these, and we learn much about the successive regimes at the Ministry of Public Instruction, although the Observatoire, Muséum d’histoire naturelle, and other sites are covered as well. Although Fox rarely completely overturns the reigning stereotype (for instance, that the Second Empire privileged Catholic interests over science instruction, while the Third Republic drafted science into an ideology of secularism), his detailed accounts provide nuance, texture, and some surprises. Fox details, for example, both the failure of the minister of Public Instruction’s efforts to tailor science education to industry in the Second Empire and the proliferation of vocational instruction under other auspices, such as the Ministry of Commerce. Overarching historical trends like centralization are given depth and focus by Fox’s attention to such figures as Arcisse de Caumont, who devoted his life to supporting provisional science journals and congresses. Although tension between Paris and the provinces runs throughout French history, Caumont’s particular story reveals the important role of his legitimist politics and Catholic faith in his efforts to build a scientific culture geared toward consensus, one that avoided the rancorous debates of Paris.

With his focus on the public arena, Fox is not primarily interested in moments of scientific discovery or the development of particular theories. But he does not ignore the content of science, especially when it enters into public debates. One interesting section involves the ideology of materialism, its introduction from Germany and political appropriation in France. Fox revisits the Pasteur/Pouchet debate over spontaneous generation, usefully drawing out the ways in which the debate became part of a broader discussion over secularization, despite the participants’ attempts to restrict it to a scientific issue. By the end of the century, science (or more properly, “scientism”) was not only a cultural issue, but in some ways the cultural issue. Fox ends with a scene of rioting at a meeting of the French Association for the Advancement of Science by anti-Dreyfusards unhappy with the closing speaker. The Dreyfus affair, which laid bare the fault lines between
secular and traditional France, may seem to have little bearing on a chem-
ist’s speech to fellow scientists, but, as Fox makes clear, science had be-
come the vehicle for both sides to project their hopes and fears. As a result, even
scientific congresses could be politically explosive.

Tresch also sees science and technology as central to the ferment of the
day. Rather than tracing the sweep of the century, he focuses on a particu-
lar moment, the Romantic era, re-creating for us a rich world in which the
boundaries among art, science, technology, and culture were diffuse and
permeable. So forgotten are these connections that the categories we usu-
ally use to describe the period lead us to confusion: How could Romantic
art, with its emphasis on emotion and organicism, be paired with the brute
machinery of the new industrial age? The problem, Tresch assures us, is il-
lusory, and he introduces the term “mechanical romanticism” (p. xi) to re-
cover the mindset, ultimately thwarted, that viewed machines as liberating
and transformative, as ideal models for the dynamic interactions of the or-
ganic world. Sandwiched between the Enlightenment ideals of the revolu-
 tionary era and the scientism of the Third Republic, the 1830s and ’40s
were, for Tresch, a near-hallucinatory phantasmagoria of transformative
possibilities where the lines between machine and organism blurred.

The link between art and science was robust and bidirectional. Tresch
traces the transformations in French science after Napoleon back to the
aesthetic theories of Kant and Schiller, who built theories of beauty on the
oppositional tension between formal generalities and a direct attachment
to the senses. Alexander von Humboldt, the German naturalist who lived
in Paris and was central to the French scientific community, drew heavily
from these sources, establishing a model for observational practices that
would unify the objective and subjective, transforming instruments from
lifeless machinery to tools of an engaged polity. His close friend François
Arago echoed both his politics and aesthetics, overturning Laplace’s celes-
tial empire with a republic of active observers. Tresch presents the da-
guerreotype, revealed publicly by Arago in 1839, as particularly emblematic
of the Romantic machine: being both art and science, the astonishing alter-
atations of its surface as it transformed the fleeting into the fixed rendered it,
to the public, as “a technology of rationalized magic” (p. 119).

Tresch places technology at the heart of the period’s scientific transfor-
mations, with machines as the emblem of the dynamic, productive nature of
the cosmos. Romantic art forms like Berlioz’s symphonies and Meyer-
beer’s operas, which were praised for their “magic” and “enchantment”
(p. 153), drew heavily on modern technology for their effects and, even
more importantly for Tresch, depended on a burgeoning promise of trans-
formation awakened by the Industrial Revolution.

Romanticism has often been thought, à la Thomas Carlyle, a reaction
against industrialization and a longing for a more organic past. But Tresch
shows that this opposition dissolves in France, particularly among the
Saint-Simonians, who conceived of their technocratic system as operating equally on nature and human hearts. Society was, for them, an organized machine, but one that surpassed the materialist mechanism and embraced instead a vision of pantheism, where every aspect of nature was imbued with spirit and every machine could be thought of as a temple. Tresch dwells with particular care on one such device: the pianotype of noted Romantic publisher Pierre Leroux, which allowed its user to line up the letters to be printed as if playing a piano. A one-time Saint-Simonian, Leroux continued to develop a utopian vision in which machines mediated what he saw as the divine progress of humanity. Feted at a radical banquet for his efforts to “proclaim THE TYPOGRAPHICAL REPUBLIC” (p. 250), Leroux’s pianotype was one such effort to use the productive force of engines to remake social relations.

Tresch’s focus on specific material objects is immensely rewarding; through them, he is able to uncover an entire world that rejected the binary of living/mechanical that we have come to see as inevitable. But the approach is also, by its nature, episodic, and it is hard to know how universal the sentiment was. Romanticism is an evocative though messy category, and it can be difficult to determine its boundaries with precision. Arago, for example, typically cast himself as an heir to the Enlightenment and revolution, and often spoke of technology in a more utilitarian manner. (His son Emmanuel was perhaps a more clearly Romantic figure, as part of the inner circle surrounding George Sand, who nicknamed François “père Bignat” and occasionally mocked his seriousness.)

Both authors address the issue of positivism, which looms large over the entire century and has its origins in the 1830s in the work of French astronomer Auguste Comte, whose fevered writings are hard to reconcile with the doctrine’s reputation for rigid dispassion. Tresch embraces Comte as a mechanical Romantic. Although positivism has rarely been thought of as either Romantic or particularly technological, he makes his case by focusing on the paper technology of the Positivist Calendar, which harnessed and organized the flow of time. Comte defined life as the interaction between an organism and its environment, and his famous progression of humanity (in which man passed from the theological to the metaphysical to the positive stages) hinged upon this interaction of man and environment. The human was thus a fundamentally technological animal, deploying machines to adapt to the “social organism” (p. 273) of the external world. Fox, meanwhile, situates Comte’s work in his frustrated attempts to navigate the elite scientific institutions of Paris, and shows that positivism’s true entrance into mainstream public debate came in the 1860s at the hands of Émile Littré, who revived it as a companion to the politics of liberalism and modernity and stripped it of its more extravagant and radical elements.
Both authors raise the specter of decline, while showing that the complaint itself was the product of certain historical forces. Fox, whose work goes much later into the century than Tresch’s, points to its political uses after France’s defeat by Prussia in 1871. Although he details many instances of genuine stagnation and resistance to new ideas, such as, notably, natural selection, Fox counts himself increasingly persuaded of a “revisionist consensus” (p. 279) questioning the standard line (put forward by Joseph Ben-David in 1970) that French science declined inexorably after Napoleon’s defeat. But neither book focuses on this debate, which indeed seems beside the point when confronted with such rich and detailed expositions of the role of science and technology in the wider culture.