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Charles Coulston Gillispie, *Science and Polity in France: The Revolutionary and Napoleonic Years*. Princeton and Oxford: Princeton University Press, 2004. ix + 751 pp. Figures, notes, bibliography and index. \$80.00 / £51.95 (cl.) ISBN 0-691-11541-9.

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This is a book which no French historian or historian of science can afford to ignore. It represents the lasting achievement of a life devoted to history of science, exemplified in the monumental study *Science and Polity in France*, of which this book is the second part, and in the editorship of the indispensable reference work *Dictionary of Scientific Biography*.^[1] It is a curious hybrid: part intellectual biography; part institutional history; part an account of the applications of the sciences within public life. Gillispie's choice of the term "polity" in his title is apposite, for this is not, as his introduction makes clear, a history of science and politics. It is rather an account of the involvement of scientific practitioners in policymaking and all aspects of civic government. The previous volume, concerning the eighteenth century, appeared nearly a generation ago.^[2] This successor follows in its footsteps, but examines the scientific practitioners and organisations of the French Revolution and First Empire, well-known and obscure. An indispensable reference tool for anyone working on the sciences in this period, it provides a backdrop against which to position more narrowly focused accounts. As in the previous volume, Gillispie deftly handles an impressive range of subject areas, from medicine and natural history to engineering, astronomy, chemistry, and mathematics, drawing copiously upon published secondary studies.

Gillispie's concern is not to present a radical new thesis concerning the sciences in this period; accordingly, he only touches on, rather than evaluating, earlier syntheses.^[3] The book is also perhaps most profitably read in a natural historical manner, dipping into the narrative flow at various points to observe the many different inhabitants, rather than as a sustained argument. As in the first volume of *Science and Polity*, the reader will find many colourful characterisations of individual scientific practitioners, such as Gilbert Romme, inventor of the Republican calendar and tutor to the young Count Stroganov, "Popo" to his intimates, who reared his charge to become a radical egalitarian who dined with the servants; or Choderlos de Laclos, better-known as the author of *Les Liaisons dangereuses*, protégé of the duc d'Orléans, Republican administrator of Mauritius and inventor of incendiary devices. These enjoyable portraits are by no means pure intellectual history, but are still closer to psychobiography than to, say, the social history of David Sturdy's study of members of the Académie Royale des Sciences.^[4] There are also engaging tales, as when the Old Regime standard for the unit of length replaced by the metre was distorted after a watchful workman hammered it back into the wall, noticing that it was sagging. Gillispie's characteristically lively but clear prose ensures, as in volume one, that the reader's interest need never flag through its nearly 700 pages of dense print. There are nonetheless some areas where the arrangement, balanced between chronology and institutional history, leaves something to be desired, as when the abolition of the Académie Royale des Sciences in 1793 is discussed some pages *before* Lavoisier's reform proposal to save it, or when the process of surveying the meridian in order to determine the standard for the metre has to be described twice to accommodate the book's chronological structure. In this very long book, too, one feels the absence of some sort of brief biographical table, such as those offered by Roger Hahn or Yves Laissus, more acutely than in the previous volume.^[5]

The book's scope is forward-looking in the sense that it addresses a whole range of concerns which would preoccupy nineteenth-century reformers: hygiene and clinical medicine, political economy, reforms in medical and scientific education, military technology, and scientific institutions. But Gillispie locates the critical juncture for such concerns, insofar as they involved scientific and medical practitioners, in the Revolutionary and First Imperial years in France. During these decades, the isolated recruitment of scientific experts as government advisors and committee members, a practice typical of European governments before 1789, became formalised into a policy of treating scientific post-holders in national institutions as official salaried advisors on natural knowledge and its management. Transformations in the definitions of scientific expertise translated into changes in the public status of scientific experts; a closer tie between science and state was possible in France than anywhere else at this time, and new forms of accreditation, training and qualification were developed.

In his account of Gaspard Monge, Minister of the Navy in the early Republic, Gillispie claims that his is the last case of direct involvement in executive government by a scientific practitioner. His conclusion raises a double question: which came first, political or scientific activity? For Gillispie, the two roles are clearly separable. However, the savant and the politician were personae constructed during these critical decades, and one cannot be presumed to be either preeminent over, or fully distinct from, the other. Ministers were not omnipotent, and further attention to savant involvement in local and governmental committees deserves our fullest attention, for it often brought the ability to intervene in many spheres, from publishing privileges and pensions to military reform and tactics. Individuals like Hébert Carnot or Claude-Antoine Prieur-Duvernois, a.k.a. Prieur de la Côte d'Or, were part of Robespierre's executive. Jean Antoine Chaptal, Antoine de Fourcroy, and Jean Hassenfratz, together with manufacturing chemists such as Jean-Pierre-Joseph Darcet, Nicolas Louis Vauquelin, and Joseph Pelletier, participated in the production of armaments. Chaptal and Laplace both became Ministers of the Interior under Napoleon. Taken together, Gillispie's examples suggest that while scientific practitioners penetrated all levels of governance, they featured most successfully in organisations for the exploitation of national resources and the execution of centralising national policies. When Revolutionary legislators wanted a more efficient supply of saltpetre, they did not farm it out to private entrepreneurs, but established a nationwide organisation within which scientific practitioners and artisans could cooperate, innovating, managing, reforming, and administering. It was an exercise in the relations of power and science unimaginable in the old regime, and the lasting legacy of Revolutionary reforms was to ally scientific practitioners closely with the beginnings of industrialisation, and to ensure them an ongoing presence or representation within government. Many entrepreneurs went on to become prominent in government or industry in the post-Revolutionary period, like Nicolas-Jacques Conté, an artist who studied under Jean-Baptiste Greuze and who, twenty years later, having invented a pencil based on a graphite substitute, was a highly successful factory owner. In this sense Gillispie tells us as much about the beginnings of French industrialism as about the flowering of scientific activity, and reminds us of the wide range of establishments that converted the utilitarian goals of the sciences into technological and industrial innovation.

The period Gillispie covers is as noteworthy for the remarkable range of fundamental reforms in the organisation of the sciences, as for the opportunities the Revolution afforded for the creation of new outlets for scientific research and communication. Among other things, the Revolutionary decade spans the introduction of the metric system and of modern chemical nomenclature, the beginnings of the beet sugar industry and the reform of the calendar, the foundation of a new system of public instruction, and the complete institutional reorganisation of medicine and the sciences. The scope of change is breathtaking, the extent to which these utopian schemes were implemented continues to attract the envy of scientists today. Gillispie's central thesis is that there was a shift in the nature of learning between 1789 and 1815 from an encyclopedic approach (collecting, classifying, and ordering) to a positivist approach, revolving around the dual representation of phenomena, on the one hand in mathematical terms, on the other by means of experimentally obtained inscriptions. He ties this to the

rise of positivism, exemplified in the political philosophy of Auguste Comte, but also in scientific reforms across the board which rendered French scientific practitioners the most famous in the world by the 1820s: André Marie Ampère, François Arago, Jean-Baptiste Biot, François Fourier, Georges Cuvier, François Magendie, the list reads like a *Who's Who* for the history of science.

The celebrated theoretical transformations in physics, chemistry, physiology, comparative anatomy, and other disciplines, however, play second fiddle to Gillispie's elucidation of "work-a-day changes" (p. 653) in the disciplinary content and professional organisation of science which have persisted since that time. Again, this transformation tends to be presented in a teleological manner. With the fall of Robespierre, science could fulfil its true destiny: "Now at last, reason and moderation, talent and knowledge, had their chance to create the order to which the century had been pointing" (p. 445). Given the current state of the discipline of history of science, it is reasonable to ask how the term "science" is being used in a work concerning this time period. For Gillispie, "science" equates with the natural sciences (the Class of Moral and Political Science at the Institut merits the dubious appellation "quasi-scientific" [p. 447]), and the central issue for the historian of science must be the possibilities that the Revolution opened up for the creation of modern forms of practice, argument, and verification, as well as for recognisable relations between scientific practice and liberal government. This seems to reflect the liberal agenda of American scientists of Gillispie's own generation, the image they have of the role that science can play in rationalising government and society. Perhaps it encourages a certain inattention to aspects of the sciences circa 1795 which do not fit within this model. Certain reforms seem such inevitable parts of this bigger transformation that they are not presented as the problematic and contested events that they were. Woe betide, moreover, any individual who dared stand in the way of the inevitable scientific juggernaut: Jean-Claude Delamétherie, editor of the *Journal de Physique*, is accused of converting it into a journal of "crank science" because he continued to oppose Lavoisieran chemistry (p. 450).

Gillispie is not much inclined to comment either on continuity or on rupture. His failure to make extended comparisons between different periods and institutions is frustrating in a synthetic study devoted to the sciences in a period of enormous social and political upheaval. At the same time, he barely comments on the wider significance of the sweeping transformations of scientific practice that accompanied the reforms of the Revolutionary and Napoleonic decades. In one sense, Revolutionary reforms incorporated many within the institutional world of the sciences who had previously worked as private tutors, physicians, merchants, mines inspectors, tax farmers, and so on. The reforms created opportunities for scientific practitioners not just to participate in public life but to propose legislation in their own right. But a good proportion of reforming activity seems to have served primarily to create a privileged and exclusive scientific elite. Indeed, the success of this reinvention of the savant was such that many perfectly respectable pre-Revolutionary scientific practitioners, who happen to have been privately wealthy, or female, or members of corporations, or clergymen, are still today largely excluded from the history of science. Issues of social class and gender, questions about the consequences of the exercise of political power by scientific practitioners are thus largely absent from Gillispie's discussion.

However, the exclusionary process did not occur in the absence of dissent, and here Gillispie's approach, which hinges on close study of individual practitioners and institutions retrospectively identified as scientific, does fall short. Opposition to the formal acknowledgement by the State of a new scientific elite was vocal and widespread at certain key moments in the Revolution; in Gillispie's treatment opposition appears isolated, perhaps even misguided. One lacks a sense of the intense rivalry over state funding, prominent in the archival record, among unaffiliated savants threatened by the collapse of a well-to-do urban audience for the sciences. Some of the voices of dissent raised in the Assemblée and Convention Nationale in opposition to the reform plans put forward by prominent savants such as Condorcet or Lavoisier are recorded, but there is little sense of the precariousness of state funding of the sciences during, say, the Terror, at a time when hardly any scientific or medical institutions remained operative. In part this is owing to Gillispie's ascription of expertise; for example, he privileges the rationalism of a

Condorcet over the educational agenda of extreme Republicans, who belittled institutional qualifications and elite scientific hegemony, and viewed previous legislative or financial experience as marking the individual with the taint of despotic corruption. This asymmetry is an inevitable consequence of Gillispie's model of science. Yet it is arguable that to understand the natural sciences in the Revolutionary decade, we need to understand the opposition to them, and the various forms of self-presentation and self-organisation acceptable to different regimes.

Gillispie is thus right in one sense in representing the reform of the sciences and the close relationship that was built with government as an ongoing, wider development which transcended the vagaries of individual regimes, but wrong in the sense that he implies the process would inevitably take the course that it did. At least one serious alternative for the sciences, in which they were predominantly to be practised in popular societies, with state-funded institutions serving primarily moral and practical, rather than rationalist, educational purposes, seems to have held sway during the height of Republicanism in 1793-1794. In such a setting "pure" science meant that which was not generated by practitioners contaminated by degeneration, and through association with despots and the corrupt. The history of how such self-presentations were, in practice, attainable is a fascinating and largely unwritten one and explains why an Antoine Lavoisier could temporarily lose his status as a discoverer of truth during the middle 1790s. As some extreme and vocal Jacobins opined, state funding of science would be unnecessary in a properly regenerated populace, and even a national system of healthcare would become irrelevant once everyone was saved from physical softness and moral corruption.

Like much of the historiography of the sciences in the Revolutionary period, Gillispie's picture is thus teleologically inclined, reading the uncertainties of 1794 through the lens afforded by the securities of 1804. This obviates the need to discuss the constant refashioning of self, the tireless solicitations of wave after wave of new authorities, the retrospective political whitewashing and fly-by-night reformulation of social relations in which many savants engaged after 1790. In effect, it effaces from the historical record the labour required to relate science to polity, and in one sense thus denies the very aspect of the changes which was so remarkable. Still in 1804, still in 1824, savants were working to reconstruct their Revolutionary identities through biographical accounts of themselves and others, as well as disciplinary histories such as the two *Rapports sur le progrès des sciences depuis 1789*, and such materials have often been taken as transparent sources for writing the history of science in the French Revolutionary period.[6] Extensive archival research alone can reveal the extent of political ties that individuals were afterwards often at pains to conceal, and such research has only been carried out piecemeal. Not surprisingly, therefore, Gillispie's account is at its strongest when it, too, rests upon archival materials, as in his able characterisation of the administrative frustrations of running the Collège de France through the Terror. One of the great potential benefits of any synthetic study such as Gillispie's is the possibility it offers of making comparisons: between the treatment of the Académie Royale des Sciences, the Jardin du Roi and the Observatoire, for example. Yet in the absence of studies carried out at the same level of detail for all the scientific institutions, it remains unclear why, say, the Observatoire and Jardin fared so much better than the Académie, or why the Société Royale d'Agriculture collapsed despite being populated by prominent members of the committees of agriculture, salubrity, and public instruction.

NOTES

[1] Charles Coulston Gillispie, *Dictionary of Scientific Biography*. 16 vol. (New York: Charles Scribner, 1970-1980).

[2] Charles Coulston Gillispie, *Science and Polity in France at the End of the Old Regime* (Princeton: Princeton University Press, 1980).

[3] Jean Dhombres and Nicole Dhombres, *Naissance d'un nouveau pouvoir: sciences et savants en France* (Paris: Bibliothèque Historique Payot, 1989); Joseph Fayet, *La Révolution française et la science 1789-1795* (Paris: Marcel Rivière, 1960). He does not mention the more recent collection edited by Patrice Bret and Marcel Dorigny, *Sciences et techniques autour de la Révolution Française* (Paris: Société des études robespierristes, 2000).

[4] David J. Sturdy, *Science and Social Status: The Members of the Académie des Sciences, 1666-1750* (Woodbridge, Suffolk: Boydell, 1995).

[5] Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666-1803* (Berkeley, Los Angeles and London: University of California Press, 1971); Yves Laissus, "Le Jardin du Roi", in René Taton, ed., *Enseignement et diffusion des sciences en France au XVIIIe siècle*, reprint (Paris: Hermann, 1986), pp. 287-341.

[6] J.B. Delambre, *Rapport historique sur les progrès des sciences mathématiques depuis 1789, et sur leur état actuel* (Paris: Imprimerie Impériale, 1810); Georges Cuvier, *Rapport historique sur les progrès des sciences naturelles depuis 1789, et sur leur état actuel* (Paris: Imprimerie Impériale, 1810)

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