

Jean-Antoine Chaptal and the establishment of French industrial society in the 19th century

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Abstract. *This paper will acquaint readers with the most significant reforms in France at the turn of the 18th and 19th centuries, that is with the stint of chemist Jean-Antoine Chaptal (5 June 1756, Nojaret – 30 June 1832, Paris), count of Château de Chanteloup since 1808 and French peer since 1819, as Minister of the Interior: with the application of science into the school curriculums, the implementation of practical teaching, the mutual cooperation of scientists, entrepreneurs, experts and students in favour of economy and with the newly founded institutions which were meant to function as catalysts of the nascent French industrialization. The paper will deal with the reform of the educational system during Napoleon's Consulate and with the causes of these changes. It will also analyse thought impulses from Chaptal's youth that were influential in his later decisions as the Minister of the Interior. His stint in the state service was very beneficial for France – he adopted many measures for economic enhancement, implemented extensive investments in the health care and educational system, founded the central Statistical office, decreed the foundation of a national museum at Louvre and was also the founder and the first chairman of the Society for Encouraging National Industry (1801).*

Key words

History of Science, History of Technology, France, turn of the 18th and 19th centuries, Jean-Antoine Chaptal, Chemistry, Industrial Revolution, Educational System, French Consulate (1799 – 1804), Science, Schools and Universities

1. Introduction

The period from the French Revolution to the reign of Napoleon Bonaparte is still the interest of many historians. Although they have examined this quarter-century from many perspectives, especially from a political one, there are still some areas that could complement and be an important part of the overview of "general" history. This is the case of Jean-Antoine Chaptal as Minister of the Interior.

Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in
the 19th century

J.-A. Chaptal, a qualified chemist and a convinced physiocrat and vitalist, was trying to transform the society in favour of all citizens and the state itself. At the beginning of the 19th century he started reforming a significant component of the state apparatus, the educational system. The newly formed system had created profiled groups of citizens (farmers, engineers and technicians, bureaucrats, entrepreneurs, soldiers and industrialists) that supported both internal and external policies of the French state.

The aim of the paper is to describe Chaptal's methods by which he had reformed an ossified educational system and founded a whole range of specialized schools. His procedure could not be complete without application of science, technique and practice into the curriculums and without backing of this system by specialized Societies that spread technical innovations among society.

Important sources of this paper include the monograph¹ and the article² by Jeff Horn which aptly and briefly present the French industrialization from the *ancien régime* until the July Revolution in 1830. Very broad in scientific, social and political fields is Charles Gillispie's³ work which is somewhat inconsistent and presents information about the events, personalities and discoveries of the pre-revolutionary and Napoleonic period. The paper draws on information from the field of History of science, technology and education and qualitatively examines the application of reformist efforts of the Minister of the Interior Chaptal into practice.

The future significant chemist and statesman was born in 1756 in Nojaret, southeast France to a well-to-do family with medical background. Because of studies in Montpellier⁴ and Paris, he had become acquainted with ideas of physiocrats, vitalism and Masonry. The combination of these three movements was fully manifested while controlling the Ministry of the Interior: as a physiocrat, Chaptal considered the agricultural land and its products as indicators of the state's wealth; as a vitalist, he regarded the society as one functional machine

¹ HORN, Jeff. *The Path Not Taken: French Industrialization in the Age of Revolution, 1750–1830*. London: The MIT Press, 2006. ISBN 978-0-262-08352-2.

² HORN, Jeff and Margaret C. JACOB. Jean-Antoine Chaptal and the Cultural Roots of French Industrialization. *Technology and Culture*. 1998, vol. 39, no. 4, pp. 671–698.

³ GILLISPIE, Charles Coulston. *Science and Polity in France: The Revolutionary and Napoleonic Years*. Princeton: Princeton University Press, 2004. ISBN 0-691-11541-9.

⁴ The university was founded in 1289, reformed in 1793 and set up again in 2015 (*Établissement public à caractère scientifique, culturel et professionnel*).

Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in
the 19th century

in which all components work together; and as a Freemason, he felt the urge, along with other scientists, to transform the society and to raise a new type of citizen – a technician.⁵

Thanks to his contact with the James Watt family,⁶ he applied British technical knowledge in France that scientists shared and were enriched by in a narrow circle of scholars. He applied this knowledge in his business, specializing in dyeing fabrics, vinification and producing saltpetre for the production of gunpowder.⁷ After the Coup of 18 Brumaire, Chaptal had become a state councillor, on 7 November 1800 he was named an acting Minister of the Interior instead of Lucien Bonaparte and from 21 January 1801 until 7 August 1804 he was appointed Minister.⁸ In his remit he had "*public order and health, welfare, communications, agriculture, education, commerce, industry and the arts and sciences,*"⁹ thus becoming an initiator of social and economic changes in society.

First of all, it was necessary to revise the state of finances during the Consulate and the tax collection to make any reform. After the coup d'état in November 1799, the regime struggled with an embezzled and almost empty treasury. It contained only 167,000 francs (about 945 thousand EUR) and a debt in excess of 474 million francs (about 2.6 billion EUR).¹⁰ The new Ministry of Finance created a group of 840 officials (eight from each département) who were charged with collecting taxes. Every year the government was able to get 660 million francs (about 3.7 billion EUR) thanks to the gradual increase in indirect taxes.¹¹

⁵ Vitalism is characterized by "*the emphasis on an organic concept of man and society*" where people were seen as machines „*and on the need for the state to intervene to protect society from illness and dysfunction.*" HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 672 and 677–681.

⁶ *Ibid*, pp. 682–683.

⁷ GILLISPIE, *Science and Polity in France*, p. 388, 401, 403 and 623–625, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 685, HORN, *The Path Not Taken*, p. 196 and LE ROUX, Thomas. *Between Industry and the Environment: Chemical Governance in France, 1770–1830*. In: ROBERTS, Lissa L. *Compound Histories: Materials, Governance and Production, 1760–1840*. Leiden: Brill, 2018, pp. 184–204. ISBN 978-9004325562. P. 195.

⁸ GILLISPIE, *Science and Polity in France*, p. 491 and 613, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 687, HORN, *The Path Not Taken*, p. 194 and LE ROUX, *Between Industry and the Environment*, p. 196.

⁹ For all shortcomings in the country see GILLISPIE, *Science and Polity in France*, pp. 614–615.

¹⁰ The reason was not only the inefficiency of the Directorate members, but also the growing state debt, budget deficits or inflation. CRONIN, Vincent. *Napoleón Bonaparte*. London: Harper Collins Publishers, 1971. ISBN 978-0007329588. P. 206 and DWYER, Philip G. *Napoleon and Europe*. New York: Taylor & Francis, 2001. ISBN 978-0-5823-1837-3. Pp. 170–171.

¹¹ Indirect taxes applied, for example, to wine, salt, playing cards or tobacco which became a state monopoly. CRONIN, *Napoleón Bonaparte*, pp. 206–207, DWYER, *Napoleon and Europe*, pp. 172–174 and GRAB, Alexander. *Napoleon and the Transformation of Europe*. New York: Palgrave Macmillan, 2003. ISBN 0-333-71694-9. Pp. 53–54.

2. The Reform of the Educational System

The next task was, according to Chaptal, to reform the educational system in France which meant the application of science into the theoretical teaching, students meeting with experts and the implementation of practical activities at schools.¹² The practise was realized by setting up three large workshops specialized in wood working, in iron and steel making and in making precision instruments, in which experienced manufacturers and entrepreneurs taught novices how to handle each machine with a practical demonstration. Students in free spinning schools were introduced to the machines in the same way.¹³

Hand in hand with the practice went the theory, which also underwent changes. As for the new century, there were municipal schools for primary education, communal schools for secondary education, newly founded *lycées* and special schools for professional education. The primary education, intended only for men, consisted of reading, writing and arithmetic; the girls learned spinning, knitting and sewing. The secondary education was composed of Natural History, Geography, dead and live languages, planning, mechanics, mathematics and physics. Special education that has been made available to those who have already graduated on lyceum, included only professional training in legal, medical, chemical and technical schools.¹⁴

Chaptal also promoted the establishment of other specialized schools: in addition to the new mining schools, the *Vocational School of Agriculture and Rural Economy* and the *Vocational School of Mechanical and Chemical Crafts* were linked to educational institutions from the *ancien régime*.¹⁵ The *School of Arts and Crafts* in Compiègne reopened, the *Conservatory of Arts and Crafts*, the *School of Bridges and Roads*, the *Mining* and

¹² The ideal was by Chaptal "to learn theory and connect it with existing practice". HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, pp. 687–689 a 691 and LÉON, Antoine. Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France, de 1800 à 1815. *Revue d'histoire moderne et contemporaine*. 1970, vol. 17, no. 3, pp. 846–859. P. 849.

¹³ HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 689 a 692 and HORN, *The Path Not Taken*, p. 200.

¹⁴ The new curriculum with an emphasis on practice was applied in schools focusing on metal processing, fabric dyeing, pottery, glass and applied chemistry. GILLISPIE, *Science and Polity in France*, pp. 617–622, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 692, HORN, *The Path Not Taken*, p. 199–200 and LÉON, *Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France*, pp. 851–852 and 856–857.

¹⁵ As early as 1780, Duke de La Rouchefoucauld-Liancourt founded an experimental school aimed at linking theory and practice. HORN, *The Path Not Taken*, p. 201 a LEON, *Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France*, p. 855.

Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in
the 19th century

Polytechnic School expanded, and the *National Institute* with the *Imperial University* were established to bring together teachers from all over the country and give them degrees.¹⁶

Important for Chaptal was communication between scientists, businessmen and officials throughout the Republic, respectively the Empire. The dissemination of industrial methods and innovations between 1801 and 1803 was facilitated by the communal *Chambers of Commerce*, the municipal *Advisory Chambers of Manufactories, Factories, Arts and Crafts* and the departmental *Councils of Agriculture, Arts and Commerce*, all of them being superior to the *Superior Council of Commerce* responsible for promoting industrial awareness and collecting statistical data from departments.¹⁷

He also continued the tradition of his predecessor, François de Neufchâteau,¹⁸ to organize industrial exhibitions to show the finest French products and inventions. The first European industrial exhibition was held from 19 September to 3 October 1798. Several hundred exhibitors competed with each other during each exhibition and the winners then received a significant sum of money from the state, a medal for the benefit of French industry, contacts with other manufacturers or orders for their wares.¹⁹

Jean-Antoine Chaptal was also the initiator of the most important institution for the dissemination of industrial ideas, the *Société d'encouragement pour l'industrie nationale* (Society for Encouraging National Industry), which brings together bankers, landlords, scientists, industrialists and senior officials. Chaptal held the position of chairman of the institution until his death in 1832, in his absence he was represented by two vice-chairmen. For the operation of the Company, each of the three hundred members paid an annual

¹⁶ The prestige and the title of engineer were also ensured by the Polytechnic school. GILLISPIE, *Science and Polity in France*, p. 446, 621–622 and 635, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 690 and 693, HORN, *The Path Not Taken*, p. 175 and 202 and LÉON, *Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France*, p. 852, 855 and 857.

¹⁷ GILLISPIE, *Science and Polity in France*, pp. 622–623, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 694 and HORN, *The Path Not Taken*, p. 202.

¹⁸ François de Neufchâteau (17 April 1750 – 10 January 1828) was a French Member of the Revolutionary Legislative Assembly and Convention, one of the Directors (September 1797 – May 1798) and Minister of the Interior (July – September 1797 and June 1798 – June 1799). He devoted himself primarily to agriculture and was the first to organize an industrial exhibition in Europe in the autumn of 1798.

¹⁹ During the Napoleonic era, exhibitions took place in 1801, 1802 and 1806. For more information about Industrial Exhibitions see HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 690 and 694, HORN, *The Path Not Taken*, pp. 187–193, 205–207 and 212–216 and LÉON, *Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France*, p. 850.

Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in the 19th century

subscription of 36 francs (roughly 203 EUR) with the remainder of the funds being supplied by the Ministry of the Interior.²⁰

The constitutional meeting of 18 November 1801 set out goals which included "*sending out models, designs and descriptions of new inventions and demonstrating their functions, distributing rewards and prizes to experts*" and, last but not least, "*publishing a Bulletin*".²¹ Industry-specific bulletins and magazines were "*technical magazines*" and were used to spread new discoveries. The Society published up to twelve issues a year, and this thirty-page bulletin at the end of the year summarized all the discoveries for the year which it then made available not only to its subscribers but also to citizens visiting libraries.²²

After leaving politics, Chaptal has held the position of chief industrial expert in the newly established *Supreme Council of Manufactories and Trade* since 1810, and during the Hundred Days Empire he also headed the Ministry of Agriculture, Trade and Industry. In 1819 he published his treatise on the nascent industry in France.²³ He continued his business and, due to a continental blockade, laid the foundations for beet sugar cultivation to make up for cane sugar outages.²⁴

3. Conclusion

Thanks to his beliefs, Jean-Antoine Chaptal was able to unite students, experts and entrepreneurs to get them to work together and to establish contacts with other regions through communal *Chambers of Commerce*. There was not only an exchange of technical knowledge but also the application of practical experience, the establishment of specialized schools, the transformation of curricula and the creation of a centralized state which, through special institutions, in particular the *Société d'encouragement pour l'industrie nationale*, had

²⁰ GILLISPIE, *Science and Polity in France*, p. 450, 492 and 628–635, HORN, *The Path Not Taken*, p. 203, LÉON, *Promesses et ambiguïtés de l'oeuvre d'enseignement technique en France*, p. 849, LE ROUX, *Between Industry and the Environment*, p. 196 and PARKER, Harold T. Two Administrative Bureaus under the Directory and Napoleon. *French Historical Studies*. 1965, vol. 4, no. 2, pp. 150–169. P. 167.

²¹ Chaptal could have been modeled by the Industrial Support Office of 1787. GILLISPIE, *Science and Polity in France*, p. 631 and HORN, *The Path Not Taken*, pp. 202–203.

²² Important magazines included the *Bulletin of the Society for the Encouragement of National Industry*, as well as, for example, the *History of Crafts and Manufactories or Technological Memories of Modern Discoveries in the Crafts, Manufactury, Agriculture and Trade*. GILLISPIE, *Science and Polity in France*, p. 490, 632–634, HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, p. 694 and HORN, *The Path Not Taken*, p. 207.

²³ CHAPTAL, Jean-Antoine. *De l'industrie française*. Paris: Antoine-Augustin Renouard, 1819.

²⁴ HORN, J.-A. *Chaptal and the Cultural Roots of French Industrialization*, pp. 696–697, HORN, *The Path Not Taken*, p. 196 and 198, LE ROUX, *Between Industry and the Environment*, p. 696 and PARKER, *Two Administrative Bureaus under the Directory and Napoleon*, p. 167.

Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in
the 19th century

helped to spread industrial awareness across the Republic and, as a result, has brought up a generation of technicians who have fully unleashed the industrial revolution in France in a few years.

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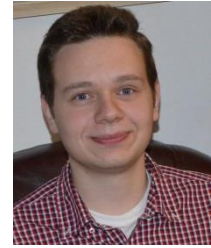
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Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in
the 19th century

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Michael Dudzik, Jean-Antoine Chaptal and the establishment of French industrial society in the 19th century



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