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## Chemistry Courses, the Parisian Chemical Community and the Chemical Revolution, 1770-1790

*John Perkins\**

During the latter part of the 18<sup>th</sup> century chemistry enjoyed growing popularity in Europe, in France, and, in particular, in Paris. This popularity was both reflected in, and stimulated by the growth of chemistry courses. In Paris, in 1784 for example, there were 7 courses in public institutions, the majority of them open to the public and free, most with audiences of several hundred. There were another seven courses given by private individuals, fee-paying, with smaller audiences ranging from 10 to 40. In addition there were 10 or so chemists offering courses to private individuals or groups of friends. Alongside these there were 6 courses solely on the subject of gases or elastic fluids, a subject central to chemistry in general and to Lavoisier's anti-phlogiston chemistry in particular, as well as 23 experimental physics courses which included not only gases and their chemistry, but also, in a number of cases, quite substantial amounts of general chemistry.

Some of these are well-known, but their full extent, their growth, their roles in the development of the chemical community in Paris, in the developing infrastructure of chemical research, and in the Chemical Revolution, have not been fully appreciated. This paper aims to address these issues.

### Patterns of development

The development of these courses is summarised in two charts.

1. Chemistry Courses – Professors
2. Chemistry Courses – Number

These charts reveal some significant patterns. The first and most striking is a clear transformation around 1775/76. On the one hand the number of courses in public institutions increased sharply. On the other, there was a relative, if not absolute, decline in the number of private courses. The long process of the institutionalisation of chemical education in France changes at this point, and it did

\* Centre for the History of Medicine, Oxford Brookes University, Oxford, UK. [jperkins@brookes.ac.uk](mailto:jperkins@brookes.ac.uk)

so well before the creations and reforms of higher education during the Revolution and Empire Periods.

Second, a number of long-running private courses, the majority taught by apothecaries, came to an end at about the same time, and a new generation of chemical practitioners entered the market. But few of this new generation were apothecaries. The end of the dominance by apothecaries of the market for courses suggests a significant change in their position within the Parisian chemical world. And again, it is one that pre-dated the chemical and political revolutions.

Third, before the mid 1770's the majority of those teaching chemistry, in institutions and privately, continued to be medical practitioners, either as apothecaries or physicians. But after the mid seventies, the majority of those giving courses were more loosely attached to any form of medical practice and its institutions.

Fourth, the general audience for chemistry was growing rapidly and becoming more diverse, in its interest in the subject, its expectations from courses, and in their prior knowledge. This expanding audience changed the nature of the cultural market in which those offering courses had to operate. It had always been competitive, it became much more so. Those offering courses used a variety of ways to make their courses more attractive: a more forceful use of advertising; competitive pricing; a stress on the novelty of their content; an emphasis on the broader utility and economic importance of chemical knowledge and practice.

Fifth, it does seem that in the 1780s more individuals were chancing their hand at chemical teaching, albeit often for a short time, reflecting increased demand, opportunity and competition, as well as the changing structure and dynamics of the chemical community.

The timing of these changes is important. They were not driven by the Chemical Revolution. On the contrary they provide a very important element, indeed it is suggested, the major element, of the context in which the Chemical Revolution took place.

### **The courses and the Parisian chemical world**

The chemical world of Paris in the 1770s and 1780s was large and growing. These courses were the most important structural feature of that world and the community of chemical practitioners at its core. Starting a successful course was for many the route into pursuing a career in chemistry. They were the places where reputations were made and could be exploited. They were also where the public

image of chemistry, and of the chemist, were constructed and disseminated. The courses, and the laboratories attached to them, particularly the smaller and more intimate spaces of private courses, were the site for the development of important networks of friendships, connections and patronage, not least between chemical practitioners and *personnes de distinction*, including the grandest of *les grands*. They were places where a less hierarchical scientific sociability could emerge. They were also where many of those who set up courses in provincial cities received their chemical instruction, learnt the tricks of the lecturing trade, returned for refresher courses and made the social and political connections that were essential to their future provincial success. In addition, several courses, notably those given by Sage and Darcet, played an important role in fostering the deployment of chemical expertise in industry.

Three other important roles they played, in chemical training, in research, and in the Chemical Revolution need emphasis.

### **Courses and chemical training**

One small part of the audience for these courses was made up of those who wished to go on to practice chemistry. Doing so required a number of things: time; money; practical as well as theoretical instruction over an extended period; access to a laboratory and to practical experience in doing chemical operations under the tutelage of an experienced chemist; discussion and debate; guidance in defining research problems; access to a chemical library; access to networks of connection and patronage; and to the public arenas where reputations were made. These requirements were by no means easy to come by. The letters of the Genevan Henri Gosse<sup>1</sup> who came to Paris in January 1779 to continue his training as an apothecary and to pursue his chemical interests show how one person, with not inconsiderable financial support, negotiated to obtain these resources. Over a period of 2½ years he took 7 public and 4 private chemistry courses. He also spent six months in the laboratory of the apothecary Antoine Quinquet and six months in Fourcroy's private laboratory, both for no fee, in return assisting Quinquet in his pharmaceutical preparations and acting as unpaid preparateur for Fourcroy's private courses and as an assistant in his research. Gosse's correspondence provides the most complete contemporary account of chemical training, but a range of other sources show that his was becoming the normal route into chemical research.

## Courses and chemical research

With the exception of Lavoisier, we know little about the laboratory and its social environment as the site of chemical research at the time of the chemical revolution. In Paris in the 1770s and 1780s there was a wide range of laboratories where chemical research was practised. In several of these, especially in the laboratories that supported courses one can see the emergence of the same sort of organisation for research that Lavoisier developed at the Arsenal: the established figure surrounded by a small number of younger collaborators, some there for sustained periods of time, who later were to go on to their own research careers; a mobile population of colleagues, friends and visitors; and the supporting cast of *préparateurs* and assistants. In this respect Lavoisier was not the unique figure that some historians have suggested, the harbinger of a more 'professional' organisation of research.

## Courses and the Chemical Revolution

Both a lot and surprisingly little is known about the Chemical Revolution in Paris. Historians have focussed almost exclusively on the Académie and on the campaign carried out by Lavoisier and his group at the Arsenal. The dominant interpretation of the reception of Lavoisier's chemistry is still that elaborated by Carleton Perrin in 1981<sup>2</sup>—a process of active transmission of the new ideas from the small central group via the *Nomenclature*<sup>3</sup> and then the *Annales de Chimie*, and, apart from resistance by a group around De La Métherie and some in the Académie, their passive reception by the rest of the French chemical community, the majority of whom watched the campaign in silence, and were unenthusiastically converted, indifferent or reluctant to publicly express opposition as the juggernaut rolled on.

However, the number and popularity of chemistry courses indicate a larger Parisian chemical community than the standard model suggests. In addition, it was not passive towards the new chemistry, on the contrary many of its members were actively and critically engaged with it. The courses provide important evidence for this. Between 1780 and 1790 Lavoisier's views were given widespread and increasingly supportive dissemination through most of the chemistry courses, in particular those given not only by Fourcroy, but by Antoine Louis Brongniart, Gengembre, Deyeux, Deleymerie, Deparcieux, Ribaucourt, Prudhomme, Alexandre Brongniart, Reynard, Vauquelin and Alyon, as well as through many of the experimental physics courses given Sigaud de la Fond,

Brisson, Rouland, Charles and Lefèvre-Gineau. The large-scale water synthesis experiment carried out at the Collège de France by Lefèvre-Gineau which had such a powerful public impact was repeated on a number of occasions in other courses.

Few lecture notes have survived from this period. But we do have an incomplete set of notes taken by the physician Antoine Hardy when he attended Fourcroy's short course of 12 lectures on gases in April 1786. Hardy was from Rouen where he had given a chemistry course in 1781 and 82. He was thinking of restarting it and was taking Fourcroy's course to learn about the latest developments. Hardy's notes<sup>4</sup> show that Fourcroy's presentation of pneumatic chemistry gave preference to Lavoisier's views—as one would expect—but they also record Hardy's own thoughtful engagement with both their strengths and weaknesses. It is suggested that this position, rather than the outright rejection or passive indifference that figure in the standard account of the reception of Lavoisier's chemistry, was more typical of those who were part of the Parisian chemical world in which the courses given by Fourcroy and many others played such a prominent role.

## Conclusion

Studying these courses reveals a larger and more dynamic Parisian chemical community than historians have recognised up till now. It was a community undergoing major changes prior to both the chemical and the political revolutions, changes which provide the context for a broader understanding of both the chemical revolution and the contested history of chemistry during the Revolution and Empire. And they indicate that in order to do so it is necessary to look beyond the limited confines of Lavoisier and the Académie des Sciences.

## Notes

<sup>1</sup> Geneva, Bibliothèque Publique et Universitaire, Ms fr 2615, 2617, 2628, 2633, 2643.

<sup>2</sup> "The triumph of the Antiphlogistans," in H. Woolf, ed., *The Analytic Spirit: essays in the history of science in honor of Henri Guerlac* (Ithaca, N.Y.: Cornell University Press, 1981), pp. 40-63.

<sup>3</sup> Guyton de Morveau, L.B., Lavoisier, A.L., Berthollet, C.L., and Fourcroy, A.F. de, *Méthode de Nomenclature Chimique*, Paris, Cuchet, 1787.

<sup>4</sup> Archives Départementales de la Seine-Maritime, 5E108.