

# Chemistry at the King's Garden

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## Abstract:

From the 17<sup>th</sup> to the 19<sup>th</sup> centuries, lectures and demonstrations in chemistry which were given at Le Jardin du Roi, in Paris, influenced the development of the science throughout Europe. Many of France's greatest chemists were taught there. Early textbooks, written by the teachers, covered the period of transition from alchemy and iatrochemistry to the dawn of modern chemistry. A reprint of one of them *The Compleat Chymist* (London 1677) by Christopher Glaser is available. It is a good example of a 17<sup>th</sup> century textbook of chemistry.

**Keywords:** Jardin du Roi, Beguin, Glaser, Rouelle, Macquer Lavoisier Chevreul

During the 17<sup>th</sup> and 18<sup>th</sup> centuries, lectures and demonstrations in chemistry, which were given at Le Jardin du Roi, in Paris, had a far reaching influence on the development of the science not only in France but throughout Europe<sup>1</sup>.



FIG. 2.—La leçon de chimie au Jardin royal  
From a vignette by Sébastien Leclerc, 1676

A herb garden, on the left bank of the Seine, existed in 1572. It was used by the apothecaries of Paris and later the École de Pharmacie was built on the site. Nearby lay the garden of Guy de la Brosse, the king's mathematician, to which was attached a modest chemical laboratory. In 1626, it became Le Jardin du Roi founded after Guy de la Brosse, grandson of the above, had written letters to Richelieu and the young king Louis XIII. Additional land was purchased and the garden, lecture theatres and laboratories formally opened in 1640 although lectures were probably held there some years earlier.

The first public lectures on chemistry given in Paris (c. 1604) were in a school of pharmacy which was founded by Jean Beguin with the help of Jean Ribit, physician to Henry IV, king of France. Beguin gave practical demonstrations in his shop. He moved forward from the mysticism of alchemy toward the precision of chemistry. His book, *Tyrocinium Chymicum*<sup>2,3</sup>, which borrowed some material from Libavius<sup>4</sup>, has been regarded as the first popular textbook of chemistry. About 50 editions, in Latin or French appeared between 1610 and 1690. The only English edition was published in London in 1669. Although primarily a teacher, Beguin did isolate some new substances. Thus he prepared “burning spirit of Saturn” (acetone) by the dry distillation of “salt of Saturn” (lead acetate)<sup>5</sup>. The classes were supported by some Paracelsians, mostly Protestant physicians who had trained in Germany, Switzerland, or at Montpellier, but were opposed by the misochymical doctors of the University of Paris. Twice Beguin’s shop was broken into, many valuable preparations were destroyed, and Beguin, himself, was beaten up.

Estienne de Clave taught at Le Jardin du Roi. He wrote a textbook *Cours de Chimie* (1646) and also a theoretical work (See<sup>5</sup> Annotations) in which he gave a definition of an element twenty years before Boyle.

William Davidson (his name has been spelt in many ways) was born in Aberdeenshire about 1593. After graduation he went to Paris about 1618. He may have studied medicine at Montpellier. Doubtless because he was a physician to the king, he was able to teach chemistry in spite of the opposition of the physicians of the University of Paris. According to Read<sup>6</sup> he became “The First British Professor of Chemistry” when he was appointed to a chair at Le Jardin du Roi where he entered his official duties on the 23rd July 1648. However, it is probable that he had held classes there for some years. His textbook, *Philosophia Pyrotechnica sev Curriculum Chymiatricus* (“Pyrotechnic Philosophy, or a course in Spagyric Chemistry”) (1633 - 1635), was translated into French as *Les Elemens de la Philosophie de l’Art du Feu ou Chemie* (1651 & 1657). Although Davidson was an alchemist, in theory, with religious and metaphysical conceptions, the practical parts of his book, describing many preparations made from vegetable, animal and mineral sources and their medicinal applications show that, in practice, he was a chemist. Although his interest in solid geometry led him to some strange theoretical speculation, it also resulted in an interest in crystallography and his book includes a plate of illustrations of some crystals. However, the book was never translated into any other language than French and, perhaps because it was overburdened with theoretical speculations, was never as popular as the books by Beguin, le Febure, Glaser, or Lemery. Davidson was obsessed with salt. In

*Oblatio Salis sive Gallia lege Salis condita Tractatus* [“The Oblation of Salt, or France preserved by the Law of Salt”](1641) he refers to a “covenant of salt” quoting references from the Old Testament<sup>7</sup>. He attached great importance to the Salic Law, which only allowed for male succession. However, although Davidson had a son, Charles, he had no grandsons, only grand-daughters. In 1651, because of growing religious intolerance in France, Davidson was forced to resign and he went to Warsaw as physician to the King of Poland.

After Davidson’s departure, Nicasiaus le Febure (or Le Fèvre) was appointed demonstrator in chemistry at Le Jardin du Roi. Among those attending his classes were some English Royalist émigrés; and following the restoration of Charles II, in 1660, Le Fèvre was invited to England as Royal Professor in Chemistry and apothecary to the king’s household, with a laboratory in St James’s Palace. He was admitted to the Royal Society. He died in London in 1669<sup>8</sup>. His *Traicté de la Chymie* (Paris 1660) ran to at least five editions. It was translated into German and also into English. The English editions which were entitled *A Compleat Body of Chymistry* appeared in 1664 & 1670.

A short time after Le Fèvre resigned his post at Le Jardin du Roi, Vallot, physician to the king of France, chose an able experienced physician and apothecary, Christopher Glaser<sup>9</sup>, a native of Basel as his demonstrator. Glaser published one book, for the convenience of those who attended his lectures at Le Jardin Du Roi, an excellent short treatise of laboratory preparations, one of the best practical chemistry books of the 17<sup>th</sup> century. Ferguson<sup>10</sup> lists eight French editions (Paris 1663, 1667, 1673, 1678, Lyons 1670, 1676, 1679, and Brussels 1676), three German editions (1677, 1684, and 1710), and the English edition entitled *The Compleat Chymist* (London 1677). It has recently been republished, ISBN 1-56459-354-1, by Kessinger Publishing Company, Montana, U.S.A.

In Book I, Glaser writes about the usefulness and subject matter of chemistry, and, following Paracelsus, mentions the three active principles, mercury, sulphur, and salt. He then describes chemical operations, and the variety of vessels used for chemical procedures, before discussing types of furnaces.

Book II is divided into three sections, Of Minerals, Of Vegetables, and Of Animals. The first section describes purification of the, then known, metals and some of their compounds and, in some cases, uses of the preparations as medicines. Although some of the medicines may have been useful, many patients must have been poisoned by preparations of lead, mercury, antimony, or arsenic. Alum, vitriols, sulphur, and nitre are described. The preparation of *Sal Polycrestes* (potassium sulphate) by heating a mixture of *Salt-peter*

(potassium nitrate) and sulphur is of interest. The naturally occurring mixed sulphate of sodium and potassium ( $3\text{K}_2\text{SO}_4:\text{Na}_2\text{SO}_4$ ) has been named glaserite. The second section describes vegetable products such as jallop, guiacum, opium, cinnamon, and others. Of interest to chemists are *Flowers of Benjamin* (benzoic acid), alcohol, vinegar, and tartar.

The third section describes distillation of skulls, viper's flesh, blood, and urine. Some foul mixtures must have been obtained. It finishes with Chapters on manna, honey and wax.

A paper<sup>11</sup> entitled "Christophle Glaser and the *Traité de la Chimie*, 1663" includes a fuller account of the preparations giving modern chemical names and formulae.

In 1672 Glaser was implicated in a poisoning case and he was sent to the Bastille. The Marquise de Brinvilliers, with Saint-Croix, her lover, poisoned her father and two brothers with white arsenic which had been supplied by Glaser. However, Glaser was released as there was no real evidence against him. As arsenic was often used as a rat poison, he may not have known that it would be used for a criminal purpose.

Nicolas Lemery, was a pupil of Glaser and his best known book, *Cours de Chimie* (1675 and many later editions up to 1758) was modelled on Glaser's work. It was translated into Latin, German, English and Spanish. The English editions, entitled *Course of Chemistry* are still quite readable. When Lemery encountered religious intolerance, he solved the problem by becoming a Catholic. He died in 1715.

Although Beguin, Davidson, Glaser, and Lemery added little new knowledge to chemistry, by their lectures and demonstrations, and through their books, they aroused a new and growing interest in the everyday applications of chemistry.

One of the greatest teachers of chemistry in France in the mid-18<sup>th</sup> century was Guillaume-François Rouelle<sup>12</sup> (1703-1770) who was appointed demonstrator at the *Jardin du Roi*, in 1742. From 1742 till 1768 Rouelle popularised chemistry which he taught with enthusiasm to scientists, writers, gentlemen of the court, ladies of fashion, and students. He would stride to and fro as he lectured, sometimes he would take off his hat and hang it on a retort, and continue lecturing while he went to fetch some apparatus from the back of the laboratory. Nevertheless, he taught almost all the French chemists of the second half of the 18<sup>th</sup> century, including Macquer, Cadet, Leblanc, Proust, and Lavoisier.

Diderot recommended that Rouelle's lecture notebooks, which had been revised by Rouelle's brother (the chemist who first isolated urea), should be used for the teaching of chemistry in France. However, the *phlogiston* theory of Becher and Stahl was already beginning to be superseded by the new chemistry of Lavoisier.

Pierre-Joseph Macquer<sup>13</sup> (1718-1784) has been said to have sprung from a Scottish Catholic family (MacKay?) which had moved to France on account of its religion<sup>14</sup> but McKie<sup>15</sup> believes him to have been of Irish extraction, descended from the Maguire family of Enniskillen who came to France with James II in 1689. Macquer's researches were numerous, varied, and original. They included studies of alumina, arsenates and Prussian blue, the combustion of hydrogen (with Baumé), and of diamond (with Lavoisier). His competence in applied chemistry led to his appointment as director of the royal porcelain factory at Sèvres. He worked with Lavoisier on improvements in the production of saltpetre for the manufacture of gunpowder. He wrote several books on pharmacy and chemistry but he is remembered for his *Dictionnaire de chymie* (1766 and later editions). This was the first dictionary of chemistry and it was translated into German, English, and Italian.

The English edition, by Keir, (London, 1777, 3 vols.) is still useful when reading 17<sup>th</sup> or 18<sup>th</sup> century chemistry books. Macquer succeeded to the chair at Le Jardin du Roi in 1777.

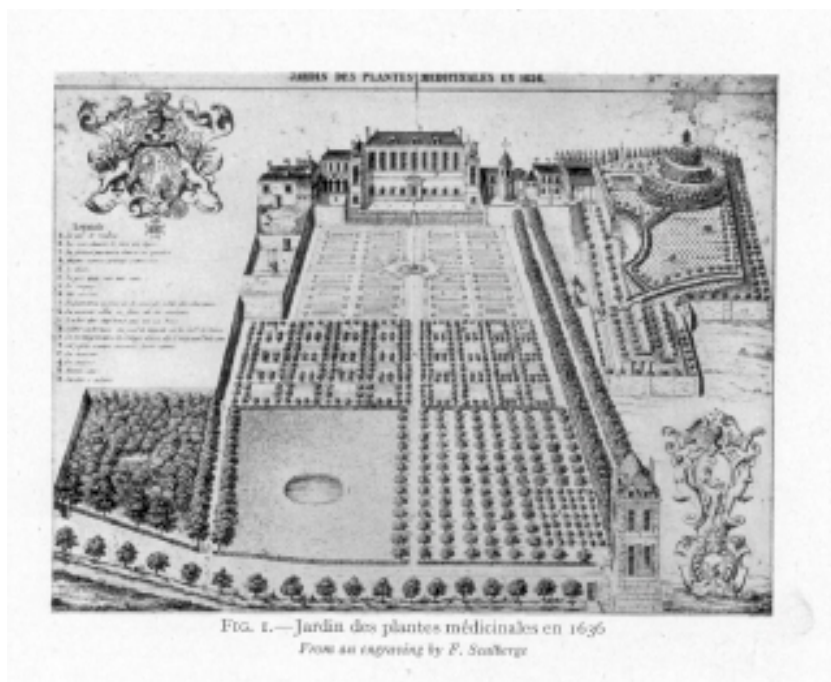
The textbooks, described above, cover the period of transition from alchemy, and iatrochemistry, to the dawn of modern chemistry. They emphasised the practical and utilitarian nature of chemistry rather than the theoretical. Present day students would do well to remember that, for centuries, the alchemists tried to fit the facts into their theories and there was very little progress in chemistry but after the iatrochemists at Le Jardin du Roi paid more attention to practical chemistry, and passed on their views to their students, the ground had been prepared for the birth of the modern science.

Chemistry was carried on at Le Jardin du Roi well into the 19<sup>th</sup> century. Fourcroy (1755-1809) who was one of the earliest converts to the views of Lavoisier was more of a teacher than a research worker. However, he made Nicolas-Louis Vauquelin (1763-1829) his laboratory assistant. In 1809 Vauquelin succeeded Fourcroy as chemistry professor. He discovered chromium, prepared some beryllium compounds from beryl, and discovered quinic acid, asparagine (the first amino-acid to be isolated), and other naturally occurring compounds. Michel-Eugene Chevreul (1786-1889) was an assistant from 1810, professor of organic chemistry from 1830, and director from 1864. Chevreul must be regarded as one of the founders of organic chemistry. He studied saponification and used melting points to characterise the fatty acids which he isolated. With Gay-Lussac (1778-1850), he patented improved methods for manufacturing candles. He also studied natural dyestuffs. He was still scientifically active when he was over 100 years old and, a pioneer in gerontology, he investigated the psychological effects of aging.

A statue of Chevreul, in le Jardin, has recently been restored through the generosity of Astra-Zeneca.

As a result of the researches of Vauquelin, Gay-Lussac and Chevreul, Paris became famous as a centre of work in the new science of organic chemistry. Liebig came to study there in 1822 and, by the second half of the 19<sup>th</sup> century, the Germans were making the leading advances in organic chemistry.

Later Moissan (1852-1907) did some work which later resulted in his isolation of fluorine and, in 1896, Henri Becquerel, who had succeeded to his father's chair in physics, discovered the radioactivity of uranium which led others to make discoveries which enabled 20<sup>th</sup> century scientists to come to knowledge of the structure of the atom.



*Le Jardin du Roi*, which after 1792 became known as *Le Jardin des Plantes*, and is now *Le Muséum National d'Histoire Naturelle*, houses collections of preserved animals and plants, and was associated with some famous biologists including Buffon, Cuvier, and Lamarck.

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(Neville is, however, in error when he states [p.39] that destructive distillation of lead acetate affords acetic acid. The main product is acetone. See references2) and 3) to Beguin's work)
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