

Birth Bicentennial of

FAMED PHARMACIST: M. H. KLAPROTH

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**DECEMBER FIRST MARKS TWO
CENTURIES SINCE BIRTH OF
APOTHECARY WHO DISCOVERED
THREE ELEMENTS AND FOUNDED
OUR QUANTITATIVE ANALYSIS**

ON DECEMBER first just two centuries ago, in the small German town of Wernigerode, there was born the great pharmacist, Martin Heinrich Klaproth. The bicentennial is commemorated almost exactly a year after pharmacy similarly honored Klaproth's even more noted contemporary, Carl Wilhelm Scheele.¹

Klaproth survived Scheele for more than thirty years and, to some extent, took his place in the esteem of the contemporary chemical world. In dedicating the first German collection of Scheele's publications to M. H. Klaproth, S. F. Hermbstaedt, the apothecary-editor (1760-1833) wrote: "Who is the man who could deny that you are the only one to make good the loss of Scheele! Was it not the chemists of the whole of Europe that admitted this fact to you?"

Does that mean that Klaproth was the equal of Scheele? It does not. Scheele was a unique phenomenon. Klaproth was one great chemist among others standing in the first row—but nevertheless in a row. The difference between these two men cannot be characterized better than by quotations from H. Kopp's *History of Chemistry*:

Scheele: "What Scheele did for chemistry under circumstances which almost can be called poor, after an education little fit for giving him the command of scientific means, and during a short life cut off just when he was unfolding his highest capacity—entitles him to be recognized as the chemist who, regarding all these circumstances, has no equal either in the past or in the

present as to the number and importance of empirical discoveries."²

Klaproth: "It is beyond dispute that one German chemist of this time [about 1800], Klaproth, has his place among the foremost promoters of chemistry.³ . . . The work which was particularly his and became the pattern for all his contemporaries and those who followed was in analytical chemistry. It was he who impressed upon this branch of our science its present character."⁴

It is significant that Klaproth's scientific activity gained importance almost exactly at the same time at which failing health impeded and finally an early death closed the glorious career of Scheele.

To the chemical genius, Scheele, knowledge and experience came as a kind of natural life process. Being his own and sole teacher and learning while experimenting, he started research when he was still a youngster and almost entirely on an empirical basis. "Working by no formulated principles,"⁵ he occupied himself with every chemical problem that he encountered and opened new chemical worlds.

Methodical Mind

To the methodical mind of Klaproth systematic learning had to pave the way for research. He familiarized himself with current knowledge as completely as possible before he started research of his own. Then he specialized in a particular field. It took Klaproth many years of orientation and personal contact with excellent chemists, such as Johann Heinrich Pott (1692-1777) and the apothecaries Andreas Sigismund Marggraf (1709-1782) and Valentin Rose, Sr. (1736-1771), before he really began, in 1780 and at the age of 37, the systematic work which made him known throughout the world. At this time Scheele was at the height of his success and fame.

When the bad health of the aging Marggraf,

¹ Presented by title to Section on Historical Pharmacy, A. P. H. A., Columbus meeting, 1943.

after 1774, made the authorities in Berlin look for some one to succeed the renowned discoverer of beet sugar as chemist of the Royal Prussian Academy of Science, it was Scheele to whom this position was offered. There was at this time not the slightest idea in anyone's mind that it could be filled by Klaproth, who was then only locally known.

Meanwhile, Martin Heinrich Klaproth performed one important investigation after the other in the laboratory of his Pharmacy at the Bear in Berlin. It is interesting that in two of the earliest of these investigations Klaproth dealt with problems which Scheele likewise had made subject to examination, and that both men quite independently came to the same results which proved wrong the opinion of two generally recognized authorities, Torbern Bergman (1735-1784) and Joseph Louis Proust (1755-1826). In the first case Scheele as well as Klaproth proved that "the new metal" found by Meyer and Bergman in cold-short iron was a compound consisting of phosphorus and iron. In the second case both

of them proved the so-called "pearl acid" of Proust to be sodium biphosphate.

One of the main reasons for the sudden but lasting success of Klaproth after a slow, continuous preparation has been hinted at. It was Klaproth's capacity for self-restriction combined with a clear vision of what chemistry needed at just this stage of development. It was the fact that he, as one of the first chemists to do so, specialized and that he chose analytical chemistry as his specialty.

Discovered Elements

On this ground Klaproth became the founder of modern mineralogical chemistry and of exact quantitative analysis. He has been credited with the discovery of three elements, uranium (1789), zirconium (1789) and cerium (1803), and the verification of the elemental character of five others, strontium (1793), titanium (1795), chromium (1798), tellurium (1798) and yttrium (1801). It was finally he whom no less an authority than Berzelius (1779-1848) pronounced "the greatest analytical chemist of Europe."

Naturally this self-restriction to one specialty would not have resulted in such success had it not been based on three features of Klaproth's character predestining him for just this type of work: industry, honesty and that rare and special kind of responsibility that forces those blessed (or afflicted) with it to use their talents in the way that serves society best.

It was Klaproth's industry to which we are indebted for the abundance of detailed investigations proving the usefulness of his methods and making their adoption by the chemical world at large a matter of necessity. It was due to his honesty that he became the great purifier of the way of obtaining and reporting experimental results, thus decisively helping to make chemistry an exact science. Under these circumstances it is no wonder that the scientific world and the governmental authorities turned to him for confirmation of results obtained by others.

It was Klaproth who, in 1792, at the height of the heated argument for and against the new theory of Lavoisier, suggested an experimental check by the Prussian Academy of Science of Lavoisier's investigations concerning combustion and calcination. Finding the statements and conclusions of Lavoisier correct, Klaproth in contrast to Scheele and especially to Priestley, did



not hesitate to immediately abandon the phlogiston theory which had been the basis of his work and success. It was primarily on his initiative that the *Pharmacopœia Borussica* of 1799 was built upon the theories of Lavoisier and employed the nomenclature of the new French school of chemistry.

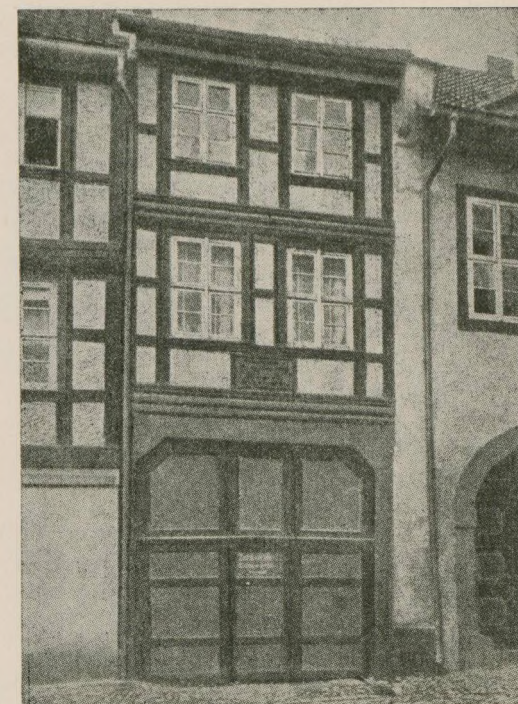
According to H. Kopp, Klaproth was the first to introduce, as a matter of principle, the publication of not only "the opinion of the investigator about the composition of a compound, but also and completely the details of the experiments concerned. The conformity of the total weight of the resulting substances with the weight of the employed amount of the analyzed material became now a means of checking the accuracy of the investigation and the adequacy of the methods employed. . . . The progress made in analytical chemistry since this time, the discovery of many new substances, are based solely on this way of carrying through and reporting the investigation."⁶

It was Klaproth who taught the chemists to pay attention to the possible contamination of the substances to be analyzed by minute parts of the apparatus concerned; for example, by iron originating from the iron mortars in which the material was ground. He devised methods for preparing pure reagents and is credited with having been the first to dry precipitates before weighing in order to obtain definite results.

This genuine pharmacist occupied himself not only with purely chemical problems but with pharmaceutical chemistry as well. Thus he published "Directions for the Preparation of Artificial Carlsbad Salt" and a critical study of "Bestucheff's tincture." It was the ethereal tincture of perchloride of iron of Klaproth which was adopted in most of the Continental pharmacopœias.⁷

Family Was Poor

Like many famous pharmacists, Klaproth came from a poor family. He became an apprentice in Quedlinburg in 1759 and clerked in the Court Pharmacy at Hannover from 1766 to 1768. In the library of this pharmacy he encountered books of Torbern Bergman and the Strassburg pharmacist, J. R. Spielmann (1722-1783). It was here, Klaproth states that his "love of scientific study of chemistry and pharmacy was awakened for the first time."⁸ From



KLAPROTH'S BIRTHPLACE is in the small German town of Wernigerode.

1768 until his death on January 1, 1817, Klaproth lived in Berlin with only half a year interruption, from fall 1770 to spring 1771, when he occupied a position as a prescription clerk in the renowned "Ratsapotheke" at Danzig. In 1771 he became the collaborator of the owner of the Pharmacy at the White Swan at Berlin, Valentin Rose Sr. When the owner died after only four weeks of this association, Klaproth became the manager of the Pharmacy. In 1780 he purchased the Pharmacy at the Bear at Berlin, formerly owned by the family Marggraf, and remained a practicing pharmacist for another twenty years in spite of all the offices and honors which were bestowed upon him in rapid succession. And most of these offices were by no means sinecures, but asked for much work and carried heavy responsibilities.

The Prussian government took advantage of the knowledge and experience of this apothecary in making him a member of the medical administration. Scarcely two years in business on his own, he was appointed "Assessor" at the Obercollegium Medicum, steadily advancing to higher positions within this governmental department and entrusted with the inspection of pharmacies

and the examination of pharmacists. Klaproth became professor of chemistry at the Royal Prussian Artillery School and taught likewise at the Royal Institute of Mineralogy and Mining. The Royal Prussian Academy of Science elected him a member of the physical class in 1788. In 1800 his hour of triumph arrived when he was entrusted with the office of chemist of the Prussian Academy of Science as successor to Fr. K. Achard. The incumbent of this position was to reside in the house in which the laboratory of the Academy was lodged. It was for this and only for this reason that M. H. Klaproth sold his pharmacy and at 57 ceased to be a practicing pharmacist. That he did not cease to consider himself a member of the profession becomes obvious from the fact that he remained president of the Association of Pharmacists of Berlin until 1806.

When the University of Berlin was founded in 1810, the then 67-year-old pharmacist became the first full professor of chemistry at this new center of learning.

Showed Courage

George Edmund Dann gives an example of the sense of justice and the courage with which the modest Klaproth more than once surprised his contemporaries. Without any reason other than his antisemitic feelings a student at the new University of Berlin struck the face of a Jewish fellow student with a dog-whip in the presence of many other students. The case came before the senate of the University for judgment. Klaproth was the only member of the senate who insisted upon the relegation of the culprit from the University, while all his colleagues pleaded for leniency.⁹

There is another little-known event proving the courage and, simultaneously, the scientific curiosity of Klaproth. In 1783 the first balloon manned by human beings ascended at Paris. The scientific circles of Berlin were eager to see this experiment repeated in the German capital and to make it subject to scientific investigation. The difficulty was to find some individual equipped with the scientific knowledge required and courageous enough to take the risk of the ascension. "Finally there was found," says a contemporary report, "the daring individual wanted in the person of the Assessor Klaproth." This Assessor Klaproth who, on October 16, 1784, ventured the flight in a montgolfière armed with instruments for the determination of air

pressure, etc., was no one else but the then 40-year-old apothecary, Martin Heinrich Klaproth. As the balloon was torn and rose only to a height of ten meters, the flight did not yield the scientific results hoped for. The venture, however, added another deed to the many performed by Klaproth and made him the first German aeronaut. It is a peculiar coincidence that the very first human beings to dare a balloon ascension, the Frenchman Pilâtre de Rozier, was likewise an apothecary.¹⁰

Merit Recognized

Although in 1814 a stroke diminished Klaproth's capacity for work, he retained his office at the University until his death on January 1, 1817. The esteem that he enjoyed was so great that for two years the authorities concerned were to seek for a chemist great enough to be considered an adequate successor to Klaproth. When finally the merited Berlin apothecary, S. F. Hermbstaedt, was given the position it was only because nobody of greater stature was available.

J. J. Virey, himself an apothecary with remarkable merits in chemistry, stated in paying homage to the achievement of the deceased that, "We know how often the erudite Vauquelin, his most dignified competitor, rendered justice to the profound work of Klaproth."¹¹

The great pharmaceutical educator and journalist, J. B. Trommsdorff (1770-1837), certainly expressed the opinion of the contemporary world of chemistry when in his obituary on Klaproth he wrote:

"The first day of the current year [January 1, 1817] has deprived us of a man to whom the sciences and especially chemistry are indebted immensely, whose merits are generally recognized, and whose important discoveries have secured for him the palm of immortality . . ."¹²

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- ³ *Ibid.*, 1 (1843), 343.
- ⁴ *Ibid.*, 1 (1843), 345.
- ⁵ Urdang, G., Letter of A. J. Retzius, *loc. cit.*, p. 7.
- ⁶ Kopp, H., *op. cit.*, p. 347.
- ⁷ Wootton, A. C., "Chronicles of Pharmacy," London, 1910, Vol. 1, p. 322.
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- ⁹ *Ibid.*, (1931), p. 27.
- ¹⁰ Kremers, E., Urdang, G., "History of Pharmacy," 1940, p. 355.
- ¹¹ *Jour. de Pharm.*, 3 (1817), 96.
- ¹² *Neues Jour. de Pharm.*, 1 (1917), 381.