

# FREDRICK ACCUM: AN IMPORTANT NINETEENTH-CENTURY CHEMIST FALLEN INTO OBLIVION

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## Abstract

The German-born Fredrick Accum (1769-1838), lecturer, author, analyst, industrial chemist, technical expert and trader of chemicals and apparatus was once one of the best-known scientists in the United Kingdom. His efforts to popularize chemistry and to bring it to people of all classes were highly successful as demonstrated by the large audiences of men and women that used to fill the amphitheater of the Surrey Institution to attend his public lectures. His books on chemistry, mineralogy, crystallography and the use of gas for public and home illumination (of which he was an early promoter) were so much appreciated that they were published in several editions and translated into various languages. Numerous distinguished students learned their practical skills in his private laboratory and school.

Despite this considerable success, the very few people who might still remember Accum probably owe that memory to his famous book from 1820 *A Treatise on Adulteration of Food and Culinary Poisons*. And some might also recall the odd events that followed the publication of the book, which eventually forced him to depart from London forever, the city where he had arrived almost three decades before as an assistant pharmacist.

This paper presents the work and legacy of this controversial and once-famous chemist, including a description of the events that precipitated his abrupt departure from the international scene.

## Introduction

In the article “The Past and Future of the History of Chemistry Division,” published in *Journal of Chemical Education* in 1937, after noting the scientific and pedagogical achievements of the once-famous German chemist Fredrick Accum (Figure 1), its author, Charles A. Browne, states that the latter “suffered the most tragic fate that can befall a scientist—that of going into sudden oblivion with a clouded reputation” (1). Eighty years after publication of that paper, the indifference concerning Accum has probably increased. The above-mentioned journal, for instance, is a good mirror of this fading memory considering that all together only seven papers have been published in which his name appears. Of these publications, only one is entirely dedicated to his biography: “The Life and Chemical Services of Fredrick Accum,” also by Browne, published in three parts due to its length (2).



London, Published for the European Magazine by J. Asperne, 33 Cornhill 1<sup>st</sup> July 1827.

Fredrick Accum Esq.<sup>re</sup>

D. F. & S. W. & C.

**Figure 1.** Fredrick Accum, 1769-1838 (Courtesy of the Edgar Fahs Smith Memorial Collection, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania).

Accum is not even the main subject of the other papers. One of these publications (3) describes the beginnings of the study of chemistry in the USA and confirms that some of the first American professors were trained in London by Accum (including for example Benjamin Silliman, Sr., of Yale, William Peck of Harvard and James Freeman Dana of Dartmouth). The author of this paper also identifies another student, Amos Eaton, whose role as a North American botanist, geologist, educator and disciple of Silliman, and whose contribution to the teaching of modern chemistry was described by another writer shortly afterward (4). In Eaton's private publication *Chemical Notebook for the Country Classroom* (circa 1820), intended for his students, he indicated the books of Accum as additional reading, placing them at the same level as the famous *Conversations on Chemistry* (London, 1805) of Jane Marcet. As to the three remaining articles they do indeed mention Accum's work. In one of them (5), on the subject of obtaining "silver trees" by the reduction of silver salts in solution, the author comments on the *Arbor Dianae*, one of the many experiments included in Accum's *Chemical Amusement* (London, 1817). In another (6), a short paper entitled "Crystal Model Kits for Use in the General Chemistry Laboratory," its

authors remind us that as early as 1813 Accum developed a commercial set of crystal models that accompanied his *Elements of Crystallography* (London, 1813). Finally, a paper from 2011 entitled "A Global Perspective on the History, Use, and Identification of Synthetic Food Dyes" (7) addresses a subject pioneered by the German chemist: food adulteration, on which he wrote a seminal treatise.

Still in *Journal of Chemical Education* Accum is also referred to in a news item (8), in two book reviews (9, 10) and in a list of paper topics (11). The news item announces the donation of Browne's "outstanding collection of the works of Frederick (12) Accum" to a library of the University of Pennsylvania. The older of the book reviews is actually a review of a sales catalog of alchemy and chemistry books. The review's author states that "In the galaxy [of authors] are such names as Accum, Albertus Magnus, Basilium Valentinus, Becher, Berzelius, Black, Boyle, Cavendish, Dalton, Davy, Faraday..." (9). Interestingly, Accum appears also in a list of "Topics for Papers in the History of Chemistry." Amidst 100 topics his name is in 97<sup>th</sup> position. (William Crookes is the last one.) Considering that two of these allusions to Accum are from 1926, one can imagine they were still an echo of the paper by Browne published the previous year.

A search for "Accum" in the Web of Science does not prove more fruitful, identifying only seven additional papers. Two of them are biographical (13, 14), two others are historical (15, 16), and the remaining publications are related to food safety (17-19), one of them written in Czech (19).

The few citations found in the scientific literature referring to the work of Fredrick Accum tend to be bipolarized: on one hand we find authors who praise him and his work, sometimes even giving him the status of a martyr; on the other hand there are those who consider that his absence from the history of chemistry is fair and understandable. Independently of the opinion that we might defend in this discussion, it is a fact that Accum was one of the most outstanding chemists during the second decade of the nineteenth century. His reputation, which encompassed laboratory practice, consulting, lecturing (privately and in public) and writing, was attested by the multiple editions and many translated versions his books have seen. John L. Comstock—the first author to introduce chemical formulae to secondary school students in the USA (20)—in the preface of his *Elements of Chemistry* (1831), identifies "the authorities which have been consulted in the composition" of his book, and includes the name of Fredrick Accum among

those of luminaries such as Humphry Davy and Michael Faraday (21).

Having been such an important figure in the chemical scene of the early 1800s, his name recognized from Europe to the Americas through his many books, why did he suddenly vanish? Why did he fall into a “sudden oblivion with a clouded reputation” (1)? These are questions that this paper will address.

### Life and Work

The main sources of information on Accum's life and work are Browne's paper from 1925 (2), complemented by another (22) based on data he acquired in Germany in 1930 (where he had the opportunity of meeting a great-grandson of the chemist), and Cole's paper from 1951 (13).

Son of a Westphalian soap-boiler of Jewish origin, he was born on March 29, 1769, at Bückeburg, close to Hanover in Germany, and he received the name of Friedrich Christian Accum. Observation of the process of soap manufacture at his father's shop may have inspired him to study chemistry as after completing his studies at the local secondary school, the young Friedrich started working as apprentice in Brande's Pharmacy in Hanover. This was made possible through the connection his parents had with the Brande family, apothecaries to George III of England (who was later also King of Hanover) (23).

The fact that the Brande family had a pharmacy in London, a city in which his scientific interests could be pursued, prompted him to move there in 1793. In his free time as an assistant pharmacist he studied and attended lectures at the Hunterian anatomy school (13). In this period he met William Nicholson and Anthony Carlisle (the two men who in 1800 would discover the electrolysis of water), who became his friends and with whom he collaborated for several years.

In 1798 Accum wrote his first paper (“On the Light Emitted by Supersaturated Borate of Soda, or Common Borax”) for the *Journal of Natural Philosophy, Chemistry and the Arts*, that recently had been founded by Nicholson (24). Among other subsequent contributions to this journal over the next few years, his study on the purity of drugs (25) and numerous short notes, such as the occurrence of benzoic acid in old vanilla pods (26), paved the way to the pioneering treatise on food adulteration he would publish in 1820.

At home Accum started conducting experiments and giving private tuition. Resident students with full board were accepted. Among his many students was William Thomas Brande (the son of his former employer), who would succeed Humphry Davy as Professor of the Royal Institution. For many years Accum's laboratory would be the only one of importance in England where students could obtain a practical knowledge of chemistry (2, pt 1).

In 1801 Accum was appointed as assistant chemical operator in the recently founded Royal Institution, almost at the same time that the young Humphry Davy was awarded the positions of lecturer in chemistry and director of the laboratory. Two years later Accum resigned from the Royal Institution (coinciding with the resignation of Count Rumford, one of the founding members of the Institution and a supporter of Accum's appointment).

From 1803 he began a prolific career as an author of scientific books and ultimately also started trading chemicals, apparatus, specimens, models and portable chemistry chests which supported the experiments described in his books, and in which they were advertised. Printed catalogs also described his apparatus, reagents, books, and lessons (27).

One of his many interests was the chemical analysis of mineral waters, and he published several papers on the subject in Alexander Tilloch's *Philosophical Magazine* from 1808 (28). His analytical results show how advanced he was in relation to previous studies of that kind (2, pt 1). His reputation as an exceptional analytical chemist led the inhabitants of Thetford, eager to promote the benefits of the local ferruginous waters, to call on his services. This association resulted in the construction, under Accum's supervision, of a thermal bath establishment endowed with modern conveniences.

In 1809 he was appointed professor of chemistry at the Surrey Institution, an organization dedicated to scientific, literary and musical education and research, founded in 1807 following the model of the Royal Institution. During seven seasons (1808-11, 1818-20) the chemistry course of the Institution was delivered by Accum. There his duties were to provide instruction “for the purpose of initiating into the principles of chemical philosophy those, who possess no previous knowledge of it” (16). His consecutive courses showed the relationship of chemistry with the phenomena of nature, mineralogy and metallurgy, and its application to manufacturing and the crafts. From year to year he changed his lectures, thus maintaining the interest of a regular audience, for whom he also issued a booklet listing the topics present-



ed. For example, his first course (allegedly given gratuitously) dealt with minerals, ores, metals, and their analysis (16). In 1810 he published a companion to his previous courses: *Manual of a Course of Lectures on Experimental Chemistry and on Mineralogy: ... Intended to Illustrate the Lectures Delivered ... in the Theatre of the Surry [sic] Institution ...* (29).

His public lectures became extremely popular, bringing him a great reputation. From that time there is a cartoon depicting him lecturing to an audience of both sexes. In the foreground one can see an old man with a book in his pocket on which is written "Accum's lectures" (Figure 2).

Another subject that caught Accum's great interest was the new gas lighting systems. The first public street illumination with gas was shown in London in Pall Mall, in January of 1807, and some renowned chemists considered it unsafe, including Humphry Davy. As consultant to a new street-lighting company, Accum performed an extensive series of experiments that he subsequently described in his testimony as chemical expert before committees of Parliament. He soon acquired a reputation as a coal gas expert and in 1812, when the "Chartered Gas-Light and Coke Company" was established, his name appeared on the board of directors (2, pt 2).

One of the great qualities of Accum was his capacity to foresee the industrial importance of many chemical novelties. Gas-lighting and the coal-gas industry are important examples, although many others can be found including the industrial processing of beet-sugar and the practical utilization of the distillate from coal tar, a by-product of gas manufacture. The latter would be of special relevance a few decades later, considering that mauveine, the coal tar derived dye accidentally discovered by William Perkin in 1856, was the origin of the British dyes industry (30).



**Figure 2.** Thomas Rowlandson's cartoon of Fredrick Accum in one of his public lectures at the Rotunda in the Surrey Institution (Courtesy of the Edgar Fahs Smith Memorial Collection, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania).

## Books

Among his many other activities Accum was a prolific author of books, an activity that he pursued to an extent that is still impressive by today's standards. His first work, *A System of Theoretical and Practical Chemistry*, was published in 1803 (31). This was one of the earliest general chemistry text-books in English presenting Lavoisier's new principles (2, pt 2). In Section III, "History of Chemistry,"

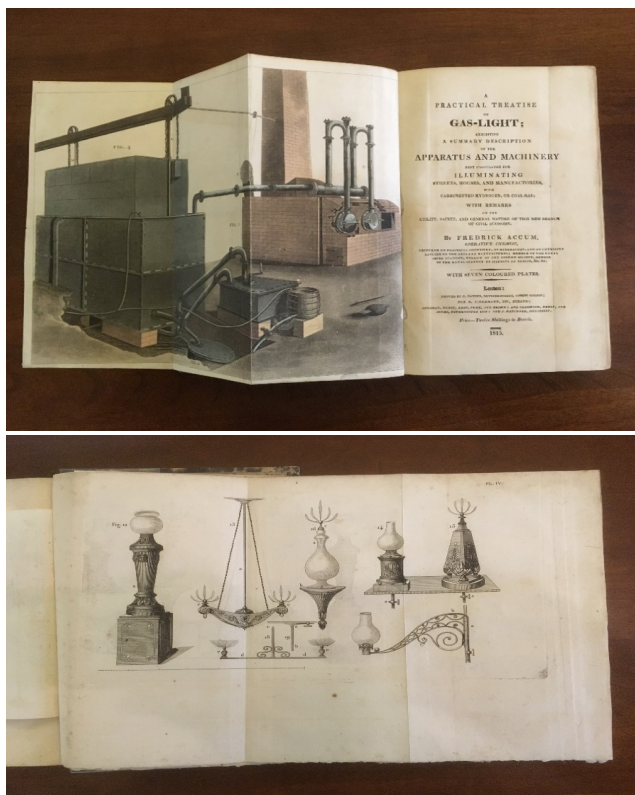
his praise of the great French chemist is still worth reading. In this book, intended for beginners, the attention the author gave to the chemistry of the simple phenomena of daily life and to that of several crafts (manufacture of soap, conversion of wine into vinegar, silvering of mirrors, etc.) is quite remarkable.

Between 1804 and 1809 he published two works, *A Practical Essay on the Analysis of Minerals* (32) and *An Analysis of a Course of Lectures on Mineralogy* (33). In 1810 the latter would be extended giving rise to his *Manual of a Course of Lectures on Experimental Chemistry and Mineralogy* (29) mentioned above.

Accum's devotion to mineralogy, together with the increasing popular interest in natural sciences led him to publish in 1813 *Elements of Crystallography after the Method of Haüy* (34), the first of its kind in English, also intended for a public with no prior knowledge of the subject.

His publication *A Practical Treatise on Gaslight* saw daylight in 1815 (35) and was the very first work on the subject of illuminating streets and buildings with gaseous hydrocarbons or coal gas. Within three years it was printed in four English editions. Like many of his books, it is handsomely illustrated, with some plates in color (Figure 3). In 1819 he rewrote this treatise, publishing the new version under the title *Description of the*

*Process of Manufacturing Coal Gas, for the Lighting of Streets, Houses and Public Buildings* (36).



**Figure 3.** Above: Illustration and frontispiece of Accum's *A Practical Treatise on Gaslight* (London, 1815); below: illustration from the French translation *Traité Pratique de l'Éclairage par le Gaz Inflammable* (Paris, 1816). (Courtesy of Science History Institute)

In 1816 Accum published *A Practical Essay on Chemical Re-Agents or Tests Illustrated by a Series of Experiments* (37), which also had wide dissemination. After revision, a new version was published in 1818 as *Practical Treatise on the Use and Application of Chemical Tests with Concise Directions for Analyzing Metallic Ores, Metals, Soils, Manures and Mineral Waters* (38).

The first edition of his extremely popular *Chemical Amusement, Comprising a Series of Curious and Instructive Experiments in Chemistry, Which are Easily Performed, and Unattended by Danger* (39) sold out in two months in 1817. The second edition disappeared from the bookshops in just one week, and several subsequent editions in English were printed, including one in Philadelphia. The translation of his works into other languages, especially into French and German, was already common, but the popularity of this book surpassed all his previous publications: it was translated into Italian,

Spanish and Portuguese in addition to French and German. In this work the author described more than 150 experiments that could be performed at home, providing in each case an accompanying theoretical explanation. It should be added that while these descriptions are now completely out of date, they are still fascinating to read.

In connection with his work related to the ferruginous waters of Thetford, in 1819 he published the *Guide to the Chalybeate Spring of Thetford* (40). In 1820 he published two books dealing with alcoholic drinks: *A Treatise on the Art of Brewing* (41) and *A Treatise on the Art of Making Wine from Native Fruits* (42). A French translation of the former was first reprinted in Paris in 1825 and continued as late as 1853. The latter was as popular as many of his previous publications, offering a general description of fermentation and the manufacture of home-made wines from several fruits. It was printed in London as late as 1860 (and in 1851 in the case of the French version). During the twentieth century, there was a renewed interest in this book in the United States due to Prohibition (2, pt 2), which lasted between 1920 and 1933.

Accum's continued interest in Food Chemistry led him to publish two other books in 1821: *A Treatise on the Art of Making Good and Wholesome Bread* (43) and *Culinary Chemistry* (44). While the first describes the chemical composition and nutritive value of different types of bread prepared from several cereals, in the second book the author explains how to prepare a variety of foods. Among other topics, the latter book describes the preparation of pickles, vinegar, cured meat, preserves, jellies, and marmalades, accompanied by observations on the chemical constitution of these products and the underlying scientific principles of the respective preparative processes. Additionally in *Culinary Chemistry* there are interesting remarks on the origin of some foods (tea, coffee, etc.) as well as historical details, for instances on eating habits in ancient civilizations. The book also includes a section on kitchen fire-places and cooking utensils. Curiously, on page 17 (first edition) the difference between an epicure and a glutton is presented (!).

An important feature of *Culinary Chemistry* is the author's intention to show that culinary processes such as boiling, baking, roasting, stewing, frying and preserving are all chemical transformations. In the preface one may read (44, pp iii-iv):

The following pages are intended to exhibit a popular view of the philosophy of cookery, to enable the reader to understand the chemical principles, by means of which alimentary substances are rendered palatable



and nutritious. The subject may appear frivolous; but let it be remembered that it is by the application of the principles of philosophy to the ordinary affairs of life, that science diffuses her benefits, and perfects her claim to the gratitude of mankind.

The art of preparing good and wholesome food is, undoubtedly, a branch of chemistry; the kitchen is a chemical laboratory; all the processes employed for rendering alimentary substances fit for human sustenance, are chemical processes ...

In this book, Accum also calls the attention of his readers to the fact that the inappropriate preparation of food is a common cause of disease. Examples include the denunciation of recipes from contemporary cooking books that described procedures including boiling greens with verdigris (basic copper acetate) to improve their color (p 4), or the inappropriate use of copper cooking utensils (pp 331ff).

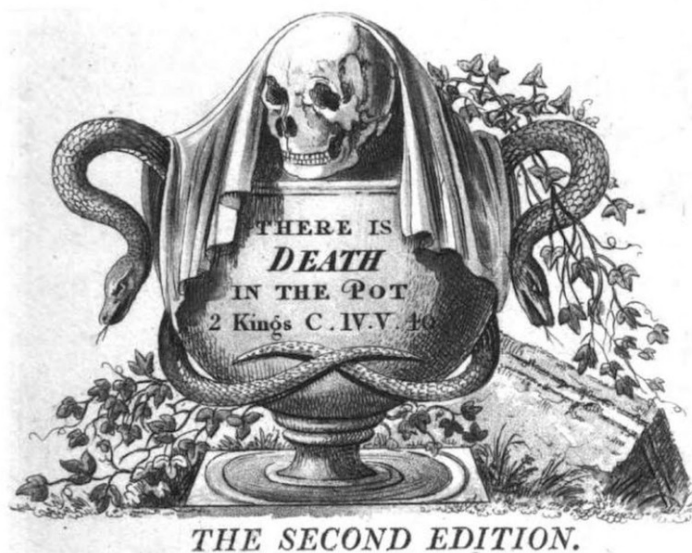
Also in 1821 his *Dictionary of the Apparatus and Instruments Employed in Operative and Experimental Chemistry* was published (45).

### “Death in the Pot”

In the first page of the preface of his *A Treatise on Adulterations of Food, and Culinary Poisons* (46), published in January 1820 (with a second edition in April), Accum wrote (p iii):

This Treatise, as its title expresses, is intended to exhibit easy methods of detecting the fraudulent adulteration of food, and of other articles, classed either among the necessaries or luxuries of the table; and to put the unwary on their guard against the use of such commodities as are contaminated with substances deleterious to health.

The first book of its genre ever published, this publication appeared after a quarter of a century of enormous developments in chemistry (which actually could favor both the contamination of food and the detection of contaminants). It also introduced the domain of food chemistry, predating other authors' publications by approximately a quarter of a century. This is certainly Accum's most famous book but it may also have contributed to his downfall by creating enemies.



**Figure 4.** Left: cover of the first English edition of *A Treatise on Adulterations of Food and Culinary Poisons*. Above: The biblical quotation “There is death in the pot,” with somewhat different imagery, was moved onto the title page in the second English edition. Note that the citation of the verse is given incorrectly on the cover of the first edition: it is in chapter 4 of 2 Kings, not chapter 6.

In this text Accum not only exposed fraudulent practice and toxic contamination in food and drink, providing methods for their detection, but he also identified several traders who had been convicted of fraud, including druggists and grocers who had supplied illegal ingredients. Among the many food adulterations and contaminations of that time one can identify the following examples: the use of alum for whitening bread (p 134), addition of potassium bicarbonate to beer to conceal the effects of acetic fermentation (204), the use of sulfuric acid for fortifying vinegar (311), the addition of copper compounds for coloring pickles (pp 306ff), vermilion (mercurous sulfide—which in turn was often adulterated with red lead,  $Pb_3O_4$ ) for coloring confectionary products (315f), sugar of lead (lead acetate) for sweetening poor quality wine (109), starch for thickening cream (313f), spices which contained floor sweepings (300), etc.

The cover of Accum's treatise (Figure 4) is, to say the least, peculiar: at the top it shows a skull and below it one can read the biblical quotation "There is Death in the Pot" (2 Kings 4:40); in the center it displays a cobweb with a spider attacking with its fangs a fly; and surrounding the entire composition there are twelve snakes entwining their tails. With such imagery, it is not surprising that the book contains clear moral judgments. For instance, Accum writes (pp 15f)

The man who robs a fellow subject of a few shillings on the high-way is sentenced to death; while he who distributes a slow poison to a whole community, escapes unpunished.

The treatise, popularly known as "There is Death in the Pot" (a nickname that was also given to its author), immediately became a best seller. It sold 1000 copies of the first edition in one month, and this led to a second edition in 1820 and two further editions by 1822. The book was also published abroad, in several languages. It immediately attracted the attention of the press, which published many reviews (both in favor and against). In the 1920s, Browne alleged that "in all probability [it is] the most extensively reviewed book upon chemistry ever written" (2, pt 2).

If identification of fraudulent practitioners was not enough to create enemies, Accum intensified their hostile response to the second edition by adding (pp x-xi):

To those who have chosen anonymously to transmit to me their opinion concerning this book, together with their maledictions, I have little to say; but they may rest assured, that their menaces will in no way prevent me from endeavouring to put the unwary

on their guard against the frauds of dishonest men, wherever they may originate; and those assailants in ambush are hereby informed that in every succeeding edition of the work, I shall continue to hand down to posterity the infamy which justly attaches to the knaves and dishonest dealers, who have been convicted at the bar of the Public Justice of rendering human food deleterious to health.

### The Fall

Before the end of 1820 Accum found himself unexpectedly involved in a scandal that ultimately would force his permanent departure from the UK, which may have taken place between December 23, 1820, and beginning of April, 1821. Seventeen years after his escape, the text of Accum's London obituary described in a very clear and concise way the incidents of 1820 (47):

... his career was prematurely closed by its having been discovered that, to save himself the trouble of transcription, he had mutilated many valuable books at the latter establishment [Royal Institution's library].

As a sequel to this unfortunate episode, after an initial trial for robbery had failed to condemn Accum, the managers of the Royal Institution turned to the alternative accusation of mutilating property, a charge of which they expected a successful prosecution. The trial was scheduled for April 5, 1821. In January 1821, Accum's friends published a public letter in the *London Times*, addressed to the president of the Royal Institution, in an attempt to persuade him to withdraw the charge. Probably the mentor responsible for this unsuccessful act was Sir Anthony Carlisle. On April 5 Accum failed to appear at the court and apparently no one knew his whereabouts. By that time he probably had already secretly left the country.

Upon his return to his native Germany in 1822, he obtained a double position as Professor of Technical Chemistry and Mineralogy at the Royal Industrial Institute and as Professor of Physics, Chemistry and Mineralogy at the Royal Academy of Construction, in Berlin. His final book, published in 1826, *Physische und Chemische Beschaffenheit der Baumaterialien*, a work in two volumes on building materials, was written as a supporting text for his new activity in Berlin. Accum continued his career as Professor until his death on June 28, 1838.

In the UK, the status of Accum had definitely changed to *persona non grata*. In 1824 one of his former publishers omitted the author's name from the title page

of a reprint of his dictionary on chemical apparatus (45). In later years Accum seemed to accept this situation and either wrote anonymously, or published under the pseudonym of Mucca (the letters of his name in reverse order).

### Conclusion

Fredrick Accum, one of the most remarkable chemists working in the UK in the early nineteenth century, in contrast to other famous chemists, for example Humphry Davy or William Hyde Wollaston, two of his contemporary London colleagues, did not leave a consensual mark on the official history of chemistry. To some perhaps, he did not leave any mark at all.

It is certainly true that Accum did not make any important contributions to pure chemistry. Yet some of his vast experimental research and his capacity to foresee the industrial relevance of chemical and technical novelties should be enough to ensure him some recognition. If that is not totally guaranteed, his mercantile inclinations (including selling chemicals and apparatus, renting accommodation with full board to his disciples at his private school or giving remunerated scientific consultancy) may have played a role. And to the list of negative influences in Accum's career we might also add the enemies he provoked by the publication of the *Treatise on Adulterations of Food* and, above all, the book scandal from which he ultimately suffered.

Mercantile activities were certainly not well regarded within the context of the normal public chemistry of that time, largely determined by Davy's behavior which set the model of the disinterested and free chemist (48). From the critical viewpoint of Davy, Accum was considered to be "a cheat and a Quack" (49) although this appreciation deserves to be regarded with some caution as it is well known that Sir Humphry's comments about colleagues could be quite scornful (49; 48 p 246). Nevertheless, in Accum's defense it should be remembered that some of the aspects related to his alleged mercenary behavior were not unprecedented. Regarding the acceptance of private students paying full board, the chemist Thomas Thomson implemented a similar procedure in Glasgow (48). In selling articles publicized in his books he was not alone either. In William Henry's book *An Epitome of Chemistry* (London, 1800), the author advertises two different portable chemical chests: "Invented by William Henry and sold by him at his laboratory in Manchester," giving their description and prices (50). In regard to commercial consultancy, some might consider he was also a pioneer in that respect.

It is recognized that Accum did a great deal of work as a pedagogue and disseminator of chemistry, both orally and in written form. Browne, a great advocate of this idea, stated that "no author understood better than Accum the practical appeal of chemistry to the popular mind and his books acted towards this appeal both as stimulus and a response" (2, pt 2). At the other extreme, others claim that he "leant conspicuously towards the scissors-and-paste school of literary production" (51). His books at least were written in an elegant English and the explanations are clear and concise. Additionally they are beautifully illustrated.

As to his *A Treatise on Adulteration of Food*, which from any point of view is a milestone in the history of the defense of public health, one might say it appeared too soon as the UK only implemented legislation a few decades later. John Mitchell's *Treatise on the Falsifications of Food, and the Chemical Means Used to Detect Them*, published in 1848 (52), and the work of the physician, chemist and microscopist Arthur Hill Hassall contributed to this change. In 1851, together with the Analytical Sanitary Commission, Hassall initiated a series of investigations and, like Accum, made public the names of firms who sold adulterated foods (53). At the time the situation was no better than that exposed by Accum thirty years before. Most of the samples of coffee, bread, cayenne pepper and candies that were analyzed were adulterated or contaminated with toxic heavy metal salts. These results provided grounds for the introduction of the Adulteration Act of 1860, which unfortunately proved to be of limited effectiveness. Eventually in 1875 the Sale of Foods and Drugs Act was passed, which, with the subsequent amendments, proved to be an effective law against frauds in food and drink (54).

Lastly, a further comment should be included about Accum's mutilation of books, which apparently did indeed take place. In view of the nature of the act little can be said in his defense but Browne, his only effective biographer so far, notes that "these faults, however, were the result of thoughtlessness, or neglect, and not of natural depravity," adding that (2, pt 3)

... those who knew Accum were aware that he was singularly indifferent in the treatment of his own books and never hesitated to despoil them of leaves if it suited his conveniences. Some of his friends believed that, in the almost childish simplicity of his character, he would treat the books of other people in a similar way without any intention or consciousness of wrong doing.



Contrary to the strong statement of Browne that Accum went into “sudden oblivion with a clouded reputation” (1) we only can speak of an almost total forgetfulness in the last eight decades. Accum’s reputation was in fact quite weakened when he disappeared from England in 1821 but in what concerns a real oblivion this would take more than one century to happen.

Even if the assessment of his effective contribution to the development of chemistry is not an easy task (especially if one bears in mind prevailing prejudices, such as the belief that his disappearance from the public scene helped to strengthen the concept of pure chemistry, devoid of any commercial interests (51)), it is now time to recognize his scientific and technical skills and his contribution to popularizing chemistry. The man and the scientist surely deserve a deeper comprehensive and unbiased biography.

Nice to have met you Mr. Accum!

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### References and Notes

- C. A. Browne, “The Past and Future of the History of Chemistry Division,” *J. Chem. Educ.*, **1937**, *14*, 503-515.
- C. A. Browne, “The Life and Chemical Services of Fredrick Accum,” *J. Chem. Educ.*, **1925**, *2*, 829-851, 1008-1034, 1140-1149.
- L. C. Newell, “Chemical Education in America from the Earliest Days to 1820,” *J. Chem. Educ.*, **1932**, *9*, 677-695.
- H. S. Van Klooster, “Amos Eaton as a Chemist,” *J. Chem. Educ.*, **1938**, *15*, 453-460.
- D. I. Gleim, “Silver Trees,” *J. Chem. Educ.*, **1953**, *30*, 151-154.
- N. K. Kildahl and L. H. Berka, “Crystal Model Kits for Use in the General Chemistry Laboratory,” *J. Chem. Educ.*, **1986**, *63*, 62-63.
- V. Sharma, H. T. Mckone and P. G. Markow, “A Global Perspective on the History, Use, and Identification of Synthetic Food Dyes,” *J. Chem. Educ.*, **2011**, *88*, 24-28.
- “Gift of Charles A. Browne Collection to the Edgar Fahs Smith Memorial Library, University of Pennsylvania,” *J. Chem. Educ.*, **1945**, *22*, 542.
- E. A. Vuilleumeir, “Catalog of Science and Technology No. III, Part VIII, Chemistry” (book review), *J. Chem. Educ.*, 1926, *3*, 1090.
- A. J. Ihde, “*Engineering Education: A Social History*” (book review), *J. Chem. Educ.*, **1975**, *52*, A388-A389.
- L. C. Newell, “A Tested Method of Teaching the History of Chemistry,” *J. Chem. Educ.*, **1926**, *3*, 166-169.
- Accum’s given name in English was usually rendered Fredrick. That is how it appears on the title page of his books. But sometimes it appeared as Frederick, even during his lifetime.
- R. J. Cole, “Friedrich Accum (1769-1838). A Biographical Study,” *Ann. Sci.*, **1951**, *7*, 128-143.
- C. Bing, “Fredrick Accum—A Biographical Sketch,” *J. Nutr.*, **1966**, *89*, 3-8.
- R. Burgess, “Humphry Davy or Friedrich Accum: A Question of Identification,” *Med. Hist.*, **1972**, *16*, 290-293.
- F. Kurzer, “A History of the Surrey Institution,” *Ann. Sci.*, **2000**, *57*, 109-141.
- B. L. Oser, “Impact of Analytical Chemistry on Food Science,” *Food Technol.*, **1975**, *29*, 45-47.
- H. G. Day, “Food Safety—Then and Now,” *J. Am. Dietetic Assoc.*, **1976**, *69*, 229-234.
- H. Cizkova, R. Sevcik, A. Rajche, J. Pivonka and M. Voldrich, “Trends in Food Authenticity and Detection of Food Adulteration,” *Chem. Listy*, **2012**, *106*, 903-910.
- K. Tolley, *The Science Education of American Girls – A Historical Perspective*, RoutledgeFalmer, New York, 2003, p 65.
- J. L. Comstock, *Elements of Chemistry ... Designed for the Use of Schools and Academies*, D. F. Robinson & Co., New York, 1831, p iv.
- C. A. Browne, “Recently Acquired Information Concerning Fredrick Accum, 1769-1838,” *Chymia*, **1948**, *1*, 1-9.
- L. G. Matthews, “London’s Immigrant Apothecaries, 1600-1800,” *Med. Hist.*, **1974**, *18*, 262-274.
- F. Accum, “On the Light Emitted by Supersaturated Borate of Soda, or Common Borax,” *J. Natur. Philos. Chem. Arts*, **1798**, *2*, 28.
- F. Accum, “An Attempt to Discover the Genuineness

- and Purity of Drugs and Medical Preparations,” *J. Natur. Philos. Chem. Arts*, **1798**, 2, 118-122; **1800**, 4, 33-36; **1800**, 4, 159-163.
26. F. Accum, “Entertaining Chemical Experiments; with Notices of Various New Facts and Observations Respecting the Products of Nature and Art,” *J. Natur. Philos. Chem. Arts*, **1802**, 1 [2<sup>nd</sup> ser.], 295-302.
27. F. Accum, *Catalogue of Chemical Preparations, for Philosophical Chemistry, and Apparatus and Instruments, Manufactured and Sold by Fredrick Accum*, Hayden, London, 1805?, 24 pp. F. Accum, *Descriptive Catalogue of the Apparatus and Instruments Employed in Experimental and operative chemistry, in analytical mineralogy, and in the pursuits of the recent discoveries of electro-chemical science*, G. Hayden, London, 1812, 60 pp.
28. The first was F. Accum, “Analysis of the Lately Discovered Mineral Waters at Cheltenham; and also of Other Medicinal Springs in its Neighbourhood,” **1808**, 31, 14-28, 81-93, 208-213; 32, 57-62.
29. F. Accum, *Manual of a Course of Lectures on Experimental Chemistry, and on Mineralogy; Containing in the form of Axioms and Concise Outlines the Elements and Fundamental Truths of Chemical and Mineralogical Science. Intended to Illustrate the Lectures Delivered on these Branches of Knowledge in the Theatre of the Surry Institution, with an Account of the Action of Chemical Tests and Modes of Applying them in the Practice of the Science*, G. Hayden, London, 1810.
30. W. H. Perkin, *On the Aniline or Coal Tar Colors* (Cantor Lectures), W. Trounce, London, 1869. Available online at <https://archive.org/details/onanilineorcoal00perkrich> (accessed Oct. 5, 2018).
31. F. Accum, *A System of Theoretical and Practical Chemistry*, G. Kearsley, London, 1803 (2 vol.). Available online at <https://catalog.hathitrust.org/Record/008630469> (accessed Oct. 5, 2018).
32. F. Accum, *A Practical Essay on the Analysis of Minerals*, G. Kearsley, London, 1804.
33. F. Accum, *An Analysis of a Course of Lectures on Mineralogy*, R. Edwards, London, 1809.
34. F. Accum, *Elements of Crystallography after the Method of Haiiy*, Longman, Hurst, Rees, Orme and Brown, London, 1813. Available online at <https://babel.hathitrust.org/cgi/pt?id=nyp.33433066417662> (accessed Oct. 5, 2018).
35. F. Accum, *A Practical Treatise on Gas-Light*, R. Ackermann, London, 1815.
36. F. Accum, *Description of the Process of Manufacturing Coal Gas, for the Lighting of Streets, Houses and Public Buildings*, T. Boys, London, 1819.
37. F. Accum, *A Practical Essay on Chemical Re-Agents or Tests Illustrated by a Series of Experiments*, J. Callow, London, 1816. Available online at <https://babel.hathitrust.org/cgi/pt?id=uiug.30112069138474> (accessed Oct. 5, 2018).
38. F. Accum, *A Practical Treatise on the Use and Application of Chemical Tests with Concise Directions for Analyzing Metallic Ores, Metals, Soils, Manures and Mineral Waters*, T. Boys, London, 1818.
39. F. Accum, *Chemical Amusement, Comprising a Series of Curious and Instructive Experiments in Chemistry, Which are Easily Performed, and Unattended by Danger*, Thomas Boys, London, 1817. Available online at <https://babel.hathitrust.org/cgi/pt?id=osu.32435018392365> (accessed Oct. 5, 2018).
40. F. Accum, *Guide to the Chalybeate Spring of Thetford*, T. Boys, London, 1819. Available online at <https://babel.hathitrust.org/cgi/pt?id=nyp.33433071385912> (accessed Oct. 5, 2018).
41. F. Accum, *A Treatise on the Art of Brewing*, Longman, Hurst, Rees, Orme and Brown, London, 1820. Available online at <https://babel.hathitrust.org/cgi/pt?id=uc1.31175035557696> (accessed Oct. 5, 2018).
42. F. Accum, *A Treatise on the Art of Making Wine from Native Fruits*, Longman, Hurst, Rees, Orme and Brown, London, 1820. Available online at <https://babel.hathitrust.org/cgi/pt?id=nyp.33433009381231> (accessed Oct. 5, 2018).
43. F. Accum, *A Treatise on the Art of Making Good and Wholesome Bread*, Thomas Boys, London, 1821. Available online at <https://babel.hathitrust.org/cgi/pt?id=osu.32435005922034> (accessed Oct. 5, 2018).
44. F. Accum, *Culinary Chemistry, Exhibiting the Scientific Principles of Cookery*, R. Ackermann, London, 1821. Available online at <https://babel.hathitrust.org/cgi/pt?id=osu.32435010401578> (accessed Oct. 5, 2018).
45. WorldCat (<http://www.worldcat.org/>) has no record of the 1821 edition. WorldCat lists the 1824 edition: *An Explanatory Dictionary of the Apparatus and Instruments Employed in the Various Operations of Philosophical and Experimental Chemistry*, Thomas Boys, London, 1824. The WorldCat record notes “First published in 1821 under title: Dictionary of the apparatus and instruments employed in operative and experimental chemistry.” The 1824 edition is available online at [https://babel.hathitrust.org/cgi/pt?id=uc1.\\$b619807](https://babel.hathitrust.org/cgi/pt?id=uc1.$b619807) (accessed Oct. 5, 2018). In light of the discussion of Accum’s oblivion, it is interesting to note that the title page of this edition does not name an author; it says “By a Practical Chemist.”
46. F. Accum, *A Treatise on Adulterations of Food, and Culinary Poisons, Exhibiting the Fraudulent Sophistications of Bread, Beer, Wine, Spirituous Liquors, Tea, Coffee, Cream, Confectionary, Vinegar, Mustard, Pepper, Cheese, Olive Oil, Pickles and other Ar-*

- tics Employed in Domestic Economy, and Methods of Detecting Them*, Longman, Hurst, Rees, Orme and Brown, London, 1820. Except where explicitly stated, references are to this (first) edition. Available online at <https://babel.hathitrust.org/cgi/pt?id=uc2.ark:/13960/t5fb4zb64> (first edition) and <https://books.google.com/books?id=GIQ5AQAAMAAJ&pg=PP5> (second edition); both accessed Oct. 5, 2018.
47. "Mr. Frederick Accum," *Gentleman's Magazine*, **1838**, 10 (Oct.), 448.
  48. J. Golinski, *Science as Public Culture – Chemistry as Enlightenment in Britain, 1760-1820*, Cambridge University Press, Cambridge, UK, 1992, pp 193 and 259.
  49. J. Z. Fullmer, "Davy's Sketches of his Contemporaries," *Chymia*, **1967**, 12, 127-156.
  50. W. Henry, *An Epitome of Chemistry in Three Parts*, J. Johnson, London, 1803 (3<sup>rd</sup> edition), p 281.
  51. J. Sumner, "Retailing Scandal: The Disappearance of Friedrich Accum," in A. M. Caleb, Ed., *(Re)creating Science in Nineteenth-century Britain*, Cambridge Scholar Publishing, Newcastle, UK, 2007, pp 32-48.
  52. J. Mitchell, *Treatise on the Falsifications of Food, and the Chemical Means Used to Detect Them*, Hippolyte Bailliere, London, 1848.
  53. A. H. Hassall, *Food and its Adulterations: Comprising the Reports of the Analytical Sanitary Commission of "The Lancet" for the Years 1851 to 1854*, Longman, Brown, Green, and Longmans, London, 1855.
  54. A. J. Ihde, *The Development of Modern Chemistry*, Dover Publications, New York, 1964, pp 440f.

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### 2019 Is International Year of the Periodic Table

The United Nations General Assembly and its Educational, Scientific and Cultural Organization (UNESCO) have declared 2019 to be the International Year of the Periodic Table. Why 2019? It is the 150<sup>th</sup> anniversary of Dmitri Mendeleev's first periodic table. For more information, see [www.iypt2019.org](http://www.iypt2019.org).

The declaration was the initiative of the Mendeleev Chemical Society (Russia). Several international scientific organizations are serving as founding partners, including the International Union of Pure and Applied Chemistry (IUPAC), International Union of Pure and Applied Physics (IUPAP), and the European Chemical Society (EuChemS). Many national chemical societies, including ACS are sponsors.

An opening ceremony will take place on January 29 at the UNESCO House in Paris ([www.iypt2019.org/opening-ceremony](http://www.iypt2019.org/opening-ceremony)). An international symposium titled "Setting their Table: Women and the Periodic Table of Elements" will be held at the University of Murcia, Spain, February 11-12 ([www.iypt2019women.es/scientific\\_topics.php](http://www.iypt2019women.es/scientific_topics.php)). The Fourth International Conference on the Periodic Table, Mendeleev 150, is scheduled for July 26-28 in St. Petersburg, Russia ([mendeleev150.ifmo.ru](http://mendeleev150.ifmo.ru)).

The ACS divisions of the History of Chemistry and Inorganic Chemistry are organizing a symposium on the history of the periodic table for the Fall 2019 National Meeting of ACS, set for San Diego, California, August 25-29.