

To accompany a reprint of the first edition of Marcet's *Conversations on Chemistry*, due to be issued by Thoemmes Press, Bristol, in January 2004. Please do not circulate, nor cite without author's permission.

INTRODUCTION TO JANE MARCET'S CONVERSATIONS ON CHEMISTRY (1806)

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About the year 1810, a nineteen year old bookbinder's apprentice became fascinated by one of the books he was binding. The two volumes were anonymous, but the title page announced the work as *Conversations on Chemistry; in which the elements of that science are familiarly explained and illustrated by experiments*. The young bookbinder read it (after work) with great curiosity. He began to 'question' the contents of the book, 'by such little experiments as I could find means to perform, and found it true to the facts as I could understand them'. As a result, 'I felt that I had got hold of an anchor in chemical knowledge, and clung fast to it'.¹ And thus, famously, Michael Faraday was introduced to the sciences.

Conversations on Chemistry was written by Jane Marcet (née Haldimand, 1769-1858), and had originally been published in January 1806, in two duodecimo volumes, for fourteen shillings. Faraday probably read the third edition of 1809. The volumes contained twenty-three conversations between Mrs B. and her pupils, Caroline and Emily, in which Mrs B. introduced the girls to chemistry. The conversations in the first volume focused on the characteristics of the elements, while the second volume examined compounds, particularly natural materials such as bitumen and gelatine. These later conversations also considered chemical processes in nature, such as breathing, fermentation, and decomposition. Given the cost of the work, and the way the author described her intended audience as fashionable young women, the young Faraday was not quite the reader anticipated by the author, yet his enthusiasm reminds us of the variety of ways in which books can be read. *Conversations on Chemistry* was part of the early nineteenth-century milieu of fashionable public lectures on the sciences, given by eminent men of science such as Humphry Davy, and attended by members of both sexes.² It was to enable women to attend these lectures, not simply to gasp at the spectacular demonstrations of electricity or laughing gas, but as participants in a

¹ Faraday to A. de la Rive, 1858, in Henry Bence Jones, *Life of Faraday*, 2 vols (London 1870), ii, 401. See also undated letter, in i, 11.

² Jan Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760-1820* (Cambridge 1992).

learning experience. The author explained that she had found her own first experience of demonstration-lectures deeply confusing, and claimed it had been ‘almost impossible to derive any clear or satisfactory information from the rapid demonstrations’ (vol. 1, v). Fortunately, a friend clarified her confusion, and showed her some simple experiments, so that when she subsequently attended Humphry Davy’s famous lectures at the Royal Institution, she was able to follow the proceedings with gratification. This familiar way of learning chemistry, in the home and through conversation with a friend, was what *Conversations on Chemistry* tried to replicate for its readers.

Although she repeatedly claimed to have no great knowledge of chemistry and ‘no real claims to the title of chemist’ (vol. 1, v), Marcet moved in London’s scientific circles. The ‘friend’ who helped her was surely her husband, Alexander John Gaspard Marcet (1770-1822, m.1799). Both Marcets came from Swiss merchant families, and retained strong links with Geneva. Alexander Marcet was a physician at Guy’s Hospital, and taught chemistry at the medical school there. His circle of friends and acquaintances included Humphry Davy, J.J. Berzelius and H.B. de Saussure, and many of them became visitors to the Marcet household. He was also a correspondent of Faraday. On the death of Jane’s father, the Marcets inherited a substantial amount of money, enabling Alexander to resign his positions at Guy’s and dedicate himself to the sciences. They also spent more time in Geneva. After Alexander’s early death in 1822, Jane lived mostly in London, although she and her three children kept up the link with Switzerland.

Marcet was well aware that chemistry in the early nineteenth century was a fast-changing subject, and that her book ran the risk of becoming out of date. She continuously revised and updated her work, and by the fifth edition (1817), the title page was announcing that the work was ‘considerably enlarged’. Many of the revisions involved adding the results of new discoveries, with their often far-reaching consequences for the naming of chemical bodies. Marcet was slow to adopt Dalton’s atomic theory, but she was an early user of Lavoisier’s nomenclature. In 1845, she was writing to Faraday to enquire about his latest discoveries in electromagnetism, for inclusion in the fifteenth edition.³ (He invited her to demonstrations of his discoveries, along with John Herschel and George Airy.⁴) Nomenclature, however, was a particular problem for the early editions of the book, as Davy and other chemists continued to

³ Marcet to Faraday, 24/11/1845, Frank A J L James, ed. *The Correspondence of Michael Faraday*, 4 vols (London 1991-), iii, letter 1791.

decompose substances previously thought to be elements. The list of elements (see vol. 1, p. 9) kept changing, and names of compounds had to change to match the new names of their constituent elements. For instance, in her first edition, Marcet described ‘muriatic acid’ as one of the as-yet undecomposed acids (vol. 2, p. 19), although her subsequent inclusion of ‘muriatum’ in the list of elements (e.g. fifth edition, vol. 1, p. 13) indicated her firm conviction that this acid would eventually yield to chemists’ efforts. Yet, by the eleventh edition (1828) ‘muriatic acid’ was now known as the element ‘chlorine’, which not only meant another change in the list of elements, but also had a knock-on effect on the names of all the other ‘muriatic’ compounds. Marcet found it very difficult to maintain consistency throughout her text.⁵

In its various British editions, *Conversations on Chemistry* sold 20,000 copies by 1865.⁶ It was also reprinted in America, where publishers took advantage of the lack of international copyright to revise, amend and add to the work much more extensively than Marcet herself did. With new discoveries, extra notes, glossaries, and study questions, the twenty-three American editions (plus nine imitative works) were widely used as chemistry textbooks in women’s colleges.⁷ Sales had allegedly reached 160,000 copies by 1874, and although this figure has been questioned, American reprints did tend to be published more cheaply and in larger numbers than their British originals, so it is extremely plausible that *Chemistry* sold far more copies in America than in its home country.⁸ (It was also printed at least once in Geneva.) One of the curiosities about the success of the *Chemistry* in a school environment is that it did not contain many references to the wisdom or goodness of the Creator, as would have been typical for the time, and particularly desirable to many educators in antebellum America. The students admired the design of Providence in arranging for plants to revitalise the atmosphere for humans to breathe (vol. 2, p. 194), but it was only at the very end that Marcet more pointedly reminded her readers of ‘the Divine Source’ from which all the works of creation derived (vol. 2, p. 289).

⁴ On Marcet’s visits to the Royal Institution, see James 1991-, iii, letters 1852-4, 1872-3 and 1888 (all March to June 1846).

⁵ David Knight, "Accomplishment or Dogma: Chemistry in the Introductory Works of Jane Marcet and Samuel Parkes" *Ambix* 33 (1986): 94-98.

⁶ Sales are listed in the Longman division ledgers, which survive in the archive held at Reading University Library. The ledgers have also been microfilmed, and an index is available (Alison Ingram, ed. *Index to the Archives of the House of Longman, 1794-1914*, Cambridge 1981).

⁷ M Susan Lindee, "The American Career of Jane Marcet's *Conversations on Chemistry*, 1806-1853" *Isis* 82 (1991): 8-23.

⁸ Lindee cites, but queries, the figures from Sarah J. Hale, *Woman’s Record* (1874), see Lindee 1991, 16, n.18.

Marcet's work was strikingly illustrated by eleven plates drawn by Marcet herself. She had become interested in painting when she toured Italy before her marriage, and had later taken lessons with Joshua Reynolds. Most of the plates came in the first volume, to illustrate instruments with which readers would be unfamiliar, and to demonstrate experimental set-ups, such as those for preparing oxygen and hydrogen (plates V and VI). They occasionally include the hands of the experimenter (e.g. plates VII and IX). Experiments were one of the attractive features of chemistry lectures, but carrying them out in one's own home had to be carefully managed, for the sake of propriety and safety. Samuel Parkes, the author of the competing *Chemical Catechism* (1806), was criticised by a reviewer for his enthusiasm for introducing 'explosive or detonating substances'.⁹ Marcet's experiments were suggested by her husband, and she claimed (in her preface) to have carried them out herself. They ranged from relatively simple experiments, such as adding water to quicklime (vol. 1, p. 318), to the more complicated preparation and collection of gases over water, to the moderately dangerous demonstration of holding a candle to soap bubbles filled with a mix of hydrogen and oxygen (vol. 1, p. 171-5). All these experiments were carried out by Mrs B., with help from Caroline and Emily, thus emphasising Marcet's conviction that experiments were perfectly suitable for women.

Although the thousand copies of the first edition of *Conversations on Chemistry* sold out within a year, and the work had earned her £362 by 1813, Marcet did not publish again for a decade, perhaps because of the demands of her young family.¹⁰ In 1816, she published *Conversations on Political Economy*, reflecting her family connections in finance and banking, and which her contemporaries widely regarded as her most important work. Three years later, she published *Conversations on Natural Philosophy* (1819), which was the 'tract' on natural philosophy mentioned in the preface of *Chemistry* (vol. 1, p. ix-x). Her other major work on the sciences was her *Conversations on Vegetable Physiology* (1829), written after attending the lectures (in Geneva) of Augustin de Candolle. All of these works, and almost all of her twenty-two other works, were published by the long-established house of Longman, where Marcet must have become a favoured author. The *Chemistry* was constantly re-issued until 1853, by which time it had sold 19,000 copies, and made a profit of

⁹ *Monthly Review* 53 (1807): 64-7 (quotation at 66). Parkes was also reviewed in *Philosophical Magazine* 25 (1806): 76-81, but neither journals reviewed *Conversations on Chemistry*, perhaps because it was by an unknown woman, rather than a named industrial chemist.

¹⁰ Longman division ledgers, A1 285, through to A2 105.

just over £4,600.¹¹ *Natural Philosophy* was as successful. The profits were shared equally between Marcet and Longman, which was not unusual in the literary world, yet Alexander Marcet had done well to secure such a generous deal for the *Chemistry*, an elementary education work by an untried author.

The conversational format had been a typical format for introductory works since the late eighteenth century. It particularly appealed to female writers, who found in its imitation of private domestic conversations a forum in which they could participate in subjects otherwise dominated by men.¹² Conversations were supposed to be good for learning because breaking up information into small chunks of dialogue, and interspersing it with interplay between the fictional characters, made it more palatable. In their printed format, the reader was expected to identify with the fictional students, and follow them through the course of learning. Marcet's Emily was serious and knowledgeable, but Caroline was as disruptive and easily bored as any reader. Marcet was not the first to use the format, and she specifically acknowledged having seen Jeremiah Joyce's *Scientific Dialogues* (published serially, 1800-03) while writing her own work, although she did emphasize that she gave it only a 'quick perusal' (vol. 1, p. x). Joyce published his own *Dialogues on Chemistry* in 1807. Marcet's importance lies in the way she and the publisher Longman created something akin to a modern brand from the 'Conversations on...' format. Until about 1830, 'Conversations on...' became a sure way for writers, often women, to sell works of introductory natural science.

The brand was particularly associated with Longman, who published almost all of the 'Conversations on...' which appeared in a flood after 1816. The timing suggests that it was more likely to be Marcet's *Political Economy* than her *Chemistry* which provided the stimulus, but her name was clearly associated with the genre. Many of Longman's works in this form (on mineralogy, botany, animal economy, even the English Constitution) were by other authors, yet were sometimes attributed to Marcet (particularly the 1817 *Conversations on Botany*, probably by Sarah and Elizabeth Fitton). By 1830, however, the success of the format was waning. That year, Longman published *Conversations on Chronology and*

¹¹ Longman division ledgers, up to A5 43.

¹² Ann B. Shteir, *Cultivating Women, Cultivating Science: Flora's Daughters and Botany in England 1760-1860* (London 1996), 99-103; Greg Myers, "Fictionality, Demonstration, and a Forum for Popular Science: Jane Marcet's *Conversations on Chemistry*" in Barbara T Gates and Ann B Shteir (eds) *Natural Eloquence: Women Reinscribe Science* (Madison WI, 1997), 43-60.

History by Jane Webb (later Loudon), but could sell only 747 copies. It made a loss of £36.¹³ Marcet's own *Conversations on Vegetable Physiology* (1829) did better (perhaps helped by being advertised as 'by the author of *Conversations on Chemistry*'), but since it went into only three editions, compared with fourteen for her *Natural Philosophy* and sixteen for her *Chemistry*, it must have been a slight disappointment.¹⁴

Although the hey-day of the conversational format was over, it did not completely die out for several more decades. It was increasingly used, as Marcet herself later used it, in works for younger children. None of Marcet's later works had the success of her first three 'Conversations on...', yet those works secured for her a respected position in the literary world, alongside her friends, Mary Somerville and Harriet Martineau. In the world of science, she was widely respected as a writer of reliable and reputable introductory works, and she remained highly regarded by Michael Faraday until her death in 1858, as witnessed by his invitations to lectures and demonstrations. Crucially, she provided a literary format for writing on the sciences, the imitation of which helped many other women to get their words into print.

¹³ Longman division ledger, A4 63.

¹⁴ Although there are surviving imprints bearing 'sixteenth edition', the Longman archives have details for only fifteen printings. There was either no seventh edition, or some unsold copies of the sixth edition were re-issued as a 'seventh' edition.