Encounters with Chemistry

John Stuart Mill

William B. Jensen

Department of Chemistry, University of Cincinnati
Cincinnati, OH 53706

Many famous nonchemists have left behind accounts of their first encounter with chemistry. Whether the person in question was a psychologist, a writer, a critic, an artist, an economist, a mathematician or a philosopher, whether the experience was brief or prolonged, whether it was pleasant or unpleasant, the purpose of this series is to record these encounters and do to so in the person's own words whenever possible.

John Stuart Mill (figure 1) is considered by many to be "the most influential English-speaking philosopher of the nineteenth century." Subjected to an unusual home education at the hands of his father, the precocious Mill first learned Greek at age three and Latin at age eight. By age 12 he had read many Greek and Latin authors in the original, as well as a sizable amount of European literature, poetry, and history. His father, James Mill (1773-1836), was a friend and ardent disciple of the English philosopher and founder of modern utilitarianism, Jeremy Bentham (1748-1832), and both men hoped that the younger Mill would carry on their work.

A nonacademic who earned his keep as a civil servant in the employ of the East India Company, Mill's most important books – many of which are still in print – include *A System of Logic* (1843), *The Principles of Political Economy* (1848), *On Liberty* (1859), *Considerations on Representative Government* (1861), *Utilitarianism* (1863), and *The Subjection of Women* (1869).

In 1870 Mill wrote an autobiography which was published posthumously by his step-daughter in 1873.[1] This contains a detailed record of his unusual childhood education and reveals that he was first attracted to science – and to chemistry in particular – sometime between the ages of seven and eight:[2, 3]

During this part of my childhood, one of my greatest amusements was experimental science; in the theoretical, however, not the practical sense of the word; not trying experiments – a kind of discipline which I have often regretted not having had – nor even seeing, but merely reading about them. I never remember being so wrapt up in any book, as I was in Joyce's "Scientific Dialogues;"and I was rather recalcitrant to my father's criticisms of the bad reasoning respecting the first principles of physics, which abounds in the early parts of that work. I devoured treatises on chemistry, especially that of my father's early friend and schoolfellow, Dr. Thomson, for years before I attended a lecture or saw an experiment.

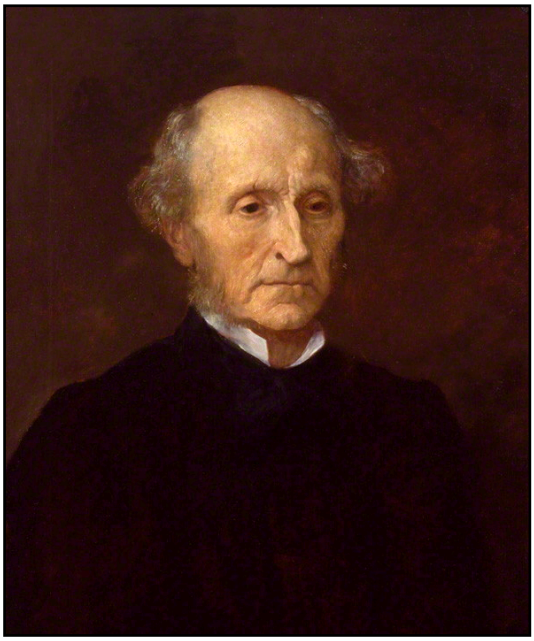

Figure 1. John Stuart Mill
(1806-1873)

The "Joyce" referred to in this quote is the Reverend Jeremiah Joyce (figure 2), a Unitarian minister and political radical who authored many books on natural theology, economics, mathematics, and popular science. His book, *Scientific Dialogues Intended for the Instruction and Entertainment of Young People in which the First Principles of Natural and Experimental Philosophy are Fully Explained*, was first published in five volumes between 1800 and 1805 and remained in print – most often as a single combined volume – well into the 1870s. Among his other books on popular science are his *Dialogues on Chemistry* (2 Vols., 1807) and his *Letters on Natural and Experimental Philosophy Addressed a Youth Settling in the Metropolis* (1810).

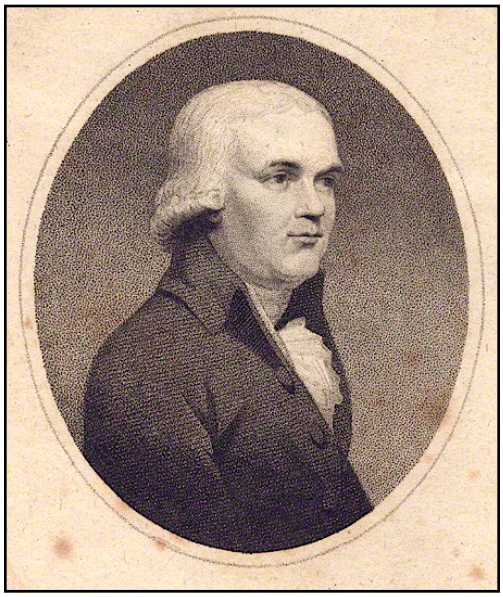

Figure 2. Jeremiah Joyce
(1763-1816)

"Dr. Thomson" was Thomas Thomson (figure 3), Regius Professor of Chemistry at the University of Glasgow and editor of the *Annals of Philosophy*, who is best remembered for his early support of John Dalton's atomic theory and as the author of an important history of chemistry (1830). The book read by Mill was almost certainly Thomson's well-known *System of Chemistry*, first published in 1802 and kept in print well into the 1830s. Originally occupying four volumes, by 1818 it was almost 1960 pages in length – a considerable reading commitment for a mere boy of eight.

In 1820, at age 14, Mill spent a year in France with family friends and it was there that he experienced his first formal chemical lectures and hopefully his first live chemical demonstrations as well:[2]

... at Montpellier I attended the excellent winter course of lectures at the Faculté des Sciences, those of M. Anglada on chemistry, of M. Provençal on zoology, and of a very accomplished representative of the eighteenth-century metaphysics, M. Gergonne, on logic, under the name of Philosophy of Science.

Alas, even the usually thorough four-volume history of chemistry by Partington is silent on the obscure subject of M. Anglada, though it is of interest to note that Mill's own book on logic is considered by many to be – like the lectures on logic by Joseph Diaz Gergonne (1771-1859) – an important contribution to the philosophy of science.

Mill would even go so far as to claim that, when writing his *System of Logic*, he had obtained an important insight into the reasoning processes used in the various branches of science from having read Thomson's textbook of chemistry:[2]

My practice (learnt from Hobbes and my father) being to study abstract principles by means of the best concrete instances I could find, the Composition of Forces, in dynamics, occurred to me as the most complete example of the logical process I was investigating. On examining, accordingly, what the mind does when it applies the principle of the Composition of Forces, I found that it performs a simple act of addition. It adds the separate effect of one force to the separate effect of the other, and puts down the sum of these separate effects as the joint effect. But is this a legitimate process? In dynamics, and in all the mathematical branches of physics, it is; but in some other cases, as in chemistry, it is not; and I then recollected that something not unlike this was pointed out as one of the distinctions between chemical and mechanical phenomena in the introduction to that favorite of my boyhood, Thomson's "System of Chemistry."

Unfortunately I can find no such discussion of additivity and the differences between mechanical and chemical phenomena in Thomson's text.[4] However, there is most certainly an entire chapter in Mill's *Logic* devoted to the inappropriateness of trying to apply the

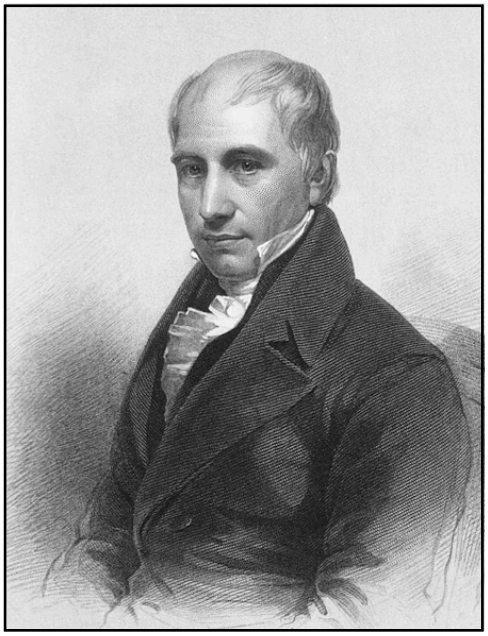

Figure 3. Thomas Thomson
(1773-1852)

"chemical or experimental method" of reasoning to the social sciences, largely because it is impossible to apply the method of experimentation to social phenomena and because it is impossible disentangle causality by comparing social phenomena which differ in one and only one aspect.[5]

References and Notes

1. J. S. Mill, *Autobiography*, Longmans et al: London, 1873.

2. All quotes are from the edition edited by Harold Laski: J. S. Mill, *Autobiography*, Oxford University Press; Oxford, 1924, pp. 14-15, 47, 48, 135-136.

3. Mill is regrettably rather vague about the exact date at which he read various books as a child and teenager.

4. The only contrast between mechanical and chemical forces mentioned by Thomson that I could locate is that the movements associated with former are visible and act over sensible distances, whereas in the latter case they are invisible and act over insensible distances.

5. J. S. Mill, *A System of Logic*, 8th ed., Harper: New York, NY, 18, pp. 608-613.