

Samuel Smiles OBE, FRS

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Never the sun crosses the face of the Earth, without passing over untold thousands of junior scientists and technicians, of no status or wealth, working under distant professors of little understanding, in cramped laboratories of no reputation, where they suffer great sorrows, revive equipment from the dead, pen feverish manuscripts and desperate funding applications for unseen hands to reject, and dream of fame and glory. Such are the foot-soldiers of science, whose career is one long charge across a no-man's land of ignorance, mined by jealous rivals, shelled by friendly-fire, which ends in a fox-hole for the lucky, and the enemy trench for the few who are left to grapple with Nature itself, and wrest from that most-guarded of adversaries the long-held secrets that Man, outcast from Eden, was never meant to know. This is one such story, small in its way, not told on the internet or held in dusty archives, but preserved, until this essay, by word of mouth alone.

Samuel Smiles was a famous Scottish author in his day, who penned several best-selling books, including *Self-help*, published in 1859, which emphasised the importance of character, need for thrift and above all self-reliance. Smiles had a son, also named Samuel, who became a tea merchant and lived for a time in Northern Ireland. His son, also named Samuel, was born in Belfast in 1877, and it is this Samuel who grew up in London, and as a boy showed great interest in chemistry. Samuel the merchant met Prof. Ramsay of University College London, and was so impressed that he persuaded his son to attend UCL instead of Cambridge. Samuel the grandson did extremely well, obtaining not only a first-class honours degree at UCL but also a silver medal and several scholarships.

Since Ramsay himself was deeply involved at this time in his research into noble gases (that would win him the Nobel Prize for Chemistry in 1904) there was little activity in the department related to organic chemistry. While most young recruits chose to follow the easy path and study gases with Ramsay, Smiles preferred to begin research work on esters under a Dr. Walker, who moved to Canada in 1898. Walker's departure left the 21-year-old Samuel Smiles BSc. to continue alone, and he chose to look for the first molecules with a chiral centre at a sulfur atom. At the time, across Europe, this was a much sought-after goal. It had been known since the famous work of Louis Pasteur in 1848 that some molecules can exist in mirror-image forms, distinguishable by their opposite rotation of the plane of polarised light. Pasteur came to fame for this work, separating the two forms of sodium ammonium tartrate crystals by hand, and showing that they rotated plane-polarized light in opposite directions. These molecules are called *chiral* after the Greek word for hand, χεῖρ. The Dutch chemist van't Hoff had explained in 1874 how a tetrahedral carbon atom would naturally give rise to left- and right-handed molecular forms, if each of the four groups attached to it are different. Le Bel in France independently published essentially the same idea later that year. Le Bel produced an optically-active ammonium base by fermentation of methyl-ethyl-propyl-*iso*-butyl-ammonium chloride in 1891, but his work remained controversial throughout the decade. By the late 1890s, no-one had reported a molecule whose chirality came from the spatial attachment of different groups to a sulfur atom. Such a result would clearly be a major advance, as it would prove that chirality arose from spatial arrangement and not some property of carbon atoms.

Working alone, Smiles very quickly produced an asymmetrical sulfonium salt, in advance of competitors elsewhere in London, Prof. William Jackson Pope and Dr. Stanley John Peachey. Still a long way short of achieving his doctorate, Smiles reported his results at a meeting of the Chemical Society in 1899. According to Smiles's official biography:

Aware that Pope and Peachey were working along similar lines, Smiles, with characteristic generosity, withheld his paper on the subject until they also had submitted their journal for publication. The two papers, therefore, appeared in the *Journal of the Chemical Society* almost side by side.

The truth is more interesting. By this time, Pope had been working in the field of chirality for several years, attempting among other things the separation of racemic mixtures (which contain equal

proportions of chiral molecules in the left- and right-handed forms). His principal method was to use a known chiral molecule, available in a pure chiral form (such as the natural compound D-camphor). Pope worked extensively with the crystallographer Sir Henry Miers FRS, and in 1897, aged only 27, he was made Head of the Chemistry Department of the Goldsmith's Institute. When Smiles submitted his paper to the Chemical Society, describing the optically-active compounds he had prepared, Pope was an obvious choice of expert to review the paper. Reviewing at the time was a rather simpler affair than today, but nevertheless senior officials of the journal would be requested to look over submitted papers within their own expertise. (Pope in fact served as President of the Chemical Society from 1917 to 1919, which underlines his credentials there).

Essentially (events seem to tell us) Pope was given privileged access to the manuscript that Smiles had submitted to the journal for publication. Seeing that the procedure was not difficult, Pope and Peachey quickly managed to repeat this work, and produce a paper of their own. If Smiles had submitted his paper with his former supervisor at UCL, or with William Ramsay, perhaps Pope might have acted otherwise, but Walker was long departed and Ramsay was yet to be knighted or otherwise exalted.

The official history is very clear. Pope's lengthy obituary published by the Royal Society simply states that, early in 1900, Pope and Peachey announced the first resolution of a compound in which the centre of asymmetry was a sulfur atom. After a brief summary of their paper, the writer tersely notes in brackets, with no explanation: (Compare Smiles, 1900, *Trans. Chem. Soc.*, 77, 1174). It is of note that the Pope and Peachey paper was published in the same issue of the same journal, with the first page number 1072. It made no reference of any kind to Smiles. In other words, the Smiles paper was published just a few dozen papers behind the Pope and Peachey paper, and the similarity between the compounds they describe is shown in Figure 1.



Pope and Peachey's methyl-ethyl-thetine bromide.

Smiles's methyl-ethyl-phenacyl-sulfonium bromide.

Figure 1: Optically active sulfonium salts described in 1900.

The career of the 30-year-old Pope took off at this point. In 1901 he was appointed to a chair of chemistry in Manchester, and the following year he was elected a Fellow of the Royal Society (FRS). In 1908 he was appointed to a chair in Cambridge, where he remained until his death in 1939. Modern accounts present the Pope-Peachey paper as the decisive demonstration of chirality at sulfur. Smiles's work is frequently mentioned as a small part of the same sequence of discoveries establishing that sulfur, like carbon, could serve as a stereogenic centre. It is difficult to believe that, had Smiles freely offered prior knowledge of his work to Pope, the latter would not have acknowledged this fact in his own paper. Nor would it had been difficult for the two authors to arrange publication of their papers side-by-side in the journal. A minor bit-player in the official record, Smiles took none of the plaudits showered on Pope in the years immediately following their publications. The story has a happy ending however.

UCL awarded Smiles a DSc. for his thesis in 1901. Sir William Ramsay, as he had become, arranged for Smiles to spend a year in Germany followed by a year in France with an 1851 Exhibition grant that Smiles had won. UCL opened a department of organic chemistry, to which Smiles returned, and where he became Assistant Professor in 1911. While at UCL, he contributed a volume to a series of physical chemistry textbooks edited by Ramsay. During the First World War he helped develop tracer bullets for the Ministry of Munitions, for which work he received the OBE. He was elected FRS in the same year. In 1933 he moved to King's College, where he proved highly popular with staff and students. After a career that saw him publish 120 papers in all, and find a chemical rearrangement named after him, he retired in 1938. A quiet modest man, he was a highly skilled photographer and formidable tennis-player.

Pope seems to have had some qualms of conscience, especially when in 1908 he moved to Cambridge.

Perhaps to atone, or at least to smooth things over, Pope invited Smiles to give the public lecture to the assembled Chemistry department and Cambridge city dignitaries at his inauguration as Chair. The 31-year-old Smiles was still at this point a mere demonstrator at UCL, while Pope had risen to the very pinnacle of British science. Smiles stood before the assembly, and began his talk with the following address:

I am very glad to be invited here today, to talk about some of the work I have done together with my two great friends, Professor Peep and Doctor Poachy.

History does not record if he ever visited Cambridge again. Samuel Smiles OBE FRS was gathered to the bosom of his forefathers in 1953. He embodied all the qualities his grandfather had so eulogised on paper, but today the grandfather is much the more celebrated of the two. Samuel Smiles the social commentator died in 1904. His biographical pages in the internet generally make no mention at all of his scholarly grandson, and perhaps that is just the way the grandson would have liked it.

Addendum

This brief essay is dedicated to Prof. Brian F.G. Johnson FRS, from whose scintillating first-year Chemistry lectures at Cambridge in the early 1980s I learned of Samuel Smiles. My own rendition of the story to my own students is clearly not of the same standard ("Will that be in the exams?"), and, not trusting to the frail memory of a younger generation raised with little expectation of recall, I have committed to a more permanent form of record these few lines, in the hope that Providence will preserve them, until they meet appreciative eyes and ears, perhaps as yet unborn. The sun passes across the face of the Earth, and yea, there is no new thing under it. But at the going down of the sun, and in the morning, may we remember Samuel Smiles, and all who face adversity as he did.

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