

Professor Stanley Greenfield CChem FRSC

25 March 1920 - 4 September 2019



Professor Stanley Greenfield, a Past President of the Analytical Division, died on 4 September 2019: he was in his 100th year, having been born in Walsall on 25 March 1920. His father died when he was quite young, and he left school at 14 to take a variety of jobs before starting work in the laboratories of Stewarts and Lloyds at the large Bilston steelworks in 1938. He also enrolled at Wednesbury Technical College to study metallurgy. Day release for this purpose was not available in those days, so Stan had to combine arduous shift work at the steelworks (and, on the outbreak of war, membership of a medical rescue team there) with study at home and at weekends - by no means an easy life. After studying metallurgy for four years, winning some student prizes and becoming a Licentiate of the Institute of Metallurgists, he turned his enthusiasm to chemistry, with further classes at technical colleges in Wolverhampton and Birmingham. He remained in the steel industry for 13 years, finishing at the GKN Group Research Laboratories: in his role as a Research Officer there he gained experience of a wide variety of analytical methods.

In 1951 Stan moved to Albright and Wilson to begin his long and remarkable association with that company. He started in the Phosphorus Development Department, looking at all aspects of phosphorus manufacture: he later published in conjunction with Martin Clift the book *Analytical Chemistry of the Condensed Phosphates*. This was a varied and interesting field, but it was when he moved a few years later to the Research Department as the leader of the Analytical Group that his most important work began. His research team included some outstanding individuals, and many of the ideas from Stan's fertile mind came to fruition as a result. Most famous of all was his development of a high frequency inductively coupled plasma (ICP) as a high temperature source for emission spectrometry. This work was published in the November 1964 issue of *The Analyst*, and with the benefit of hindsight that ground-breaking paper by Greenfield, Jones and Berry looks like a whale amongst minnows compared with much of the research in the journal at that time. The ICP source was subsequently patented in the UK and the USA. Although the first commercially available instruments did not appear until 1975 the combinations of the ICP with optical emission spectrometry (ICP-OES) and more recently with mass spectrometry (ICP-MS, which can

detect individual isotopes of a single element), are now used in many laboratories world-wide, often giving unrivalled sensitivity and selectivity with multi-element capability. Inevitably ICP methods have been combined with other sample introduction techniques (chromatography, flow injection, hydride generation) and other detection approaches such as atomic fluorescence. Geochemistry is a major application area for ICP-based methods: Stan was made an Honorary Life Member of the International Association of Geoanalysis.

On retirement from Albright and Wilson in 1980 Stan continued to promote and develop ICP methods. He consulted and lectured world-wide on his work, and had a fund of amusing stories about the conditions he encountered during some of these expeditions. Meanwhile he had obtained a PhD from Loughborough University, and (not before time, it might be thought) was awarded the SAC Gold Medal by the RSC in 1979. Some of his Albright's instruments were moved to Loughborough, where he continued his work as an Industrial Professor for several years: he later received a DSc degree from the University. He was also an Honorary Visiting Professor at the University of Plymouth and an Honorary Lecturer at Birmingham University, and published over 60 research papers.

Stan Greenfield's work for the RSC was enormous and varied. For many years he was a leading light in the Midlands Region of the Analytical Division, full of ideas for meetings on a wide range of novel topics. One such occasion was a well-attended meeting on centrifugal analysers, soon after this new approach to automatic analysis was introduced. Most memorable of all was a meeting staged as a mock trial of analytical techniques, in which several methods were put competitively to a judge and jury, with the ingenious addition of an *advocatus diaboli*. (The dinner that evening was also memorable for several reasons!). The 1977 SAC Conference, held in Birmingham, was widely felt to be one of the very best and biggest of that series of outstanding meetings: Stan chaired the Social Sub-Committee of the organising committee, and played a major role in the overall organisation of the event. One day of the one-week conference was set aside for visits to industrial and other sites of interest in the West Midlands, and Stan ensured that these were meticulously organised and conducted. At a national level he was President of the AD from 1982-1984: he was the first President elected by the popular vote of the members, following the selection reforms introduced by his predecessor, Professor Stu Bark. Stan later served two further terms as a member of the AD Council. His longest lasting contribution to the Society was in his role as the Founding Chairman of the Instrumental Criteria Sub-Committee of the Analytical Methods Committee. This group, with a membership that varied according to the analytical methods being surveyed, has so far produced 27 guides under the general title Evaluation of Analytical Instrumentation. The first (from 1984 but revised in 1998) covered instruments for flame atomic absorption spectrometry, and surveys of all the major techniques have followed. In each case the idea is to help analytical scientists who are considering purchasing equipment, and to promote the understanding of its benefits and limitations. The current Instrumental Analysis Expert Working Group is a direct successor to Stan's sub-committee: his commitment in this area continued into his last years and he remained an honorary member of the EWG until his death.

Stan Greenfield was a big man in every sense with a fine presence and a resonant speaking voice. He never hesitated to voice his firm opinions even when he knew they were quite controversial, but he was always delightful and courteous in company. He actively promoted and encouraged the work of younger scientists, though (no doubt remembering his own hard early years) he expected a corresponding work ethic and commitment from them. He was also a man of wide interests outside chemistry. For years his enthusiasm for and use of large

fast cars was legendary and a further source of engaging stories. Not the least of his contributions to the world of chemistry was his love and immense knowledge of good food and wine. He was an excellent chef in his own right, and he did his best to ensure that RSC meetings were followed by fine meals at his favourite restaurants, where he would give a fascinating commentary on how the dishes were - or should have been! - prepared, the most suitable wines for each course, and so on. It was typical of his individuality that when he came to give his Analytical Division Retiring President's address, he gave a talk on sauces of the culinary kind rather than sources of the spectroscopic kind. For many years he and his delightful wife Laura, who predeceased him, spent several months a year in Tuscany (driving across Europe to get there and back, naturally) and his recommendations of fine Italian wines were especially memorable.

Stan and Laura, who were married for over 50 years, are survived by two children, Guy and Fenella, and four grandchildren.

James Miller
October 2019