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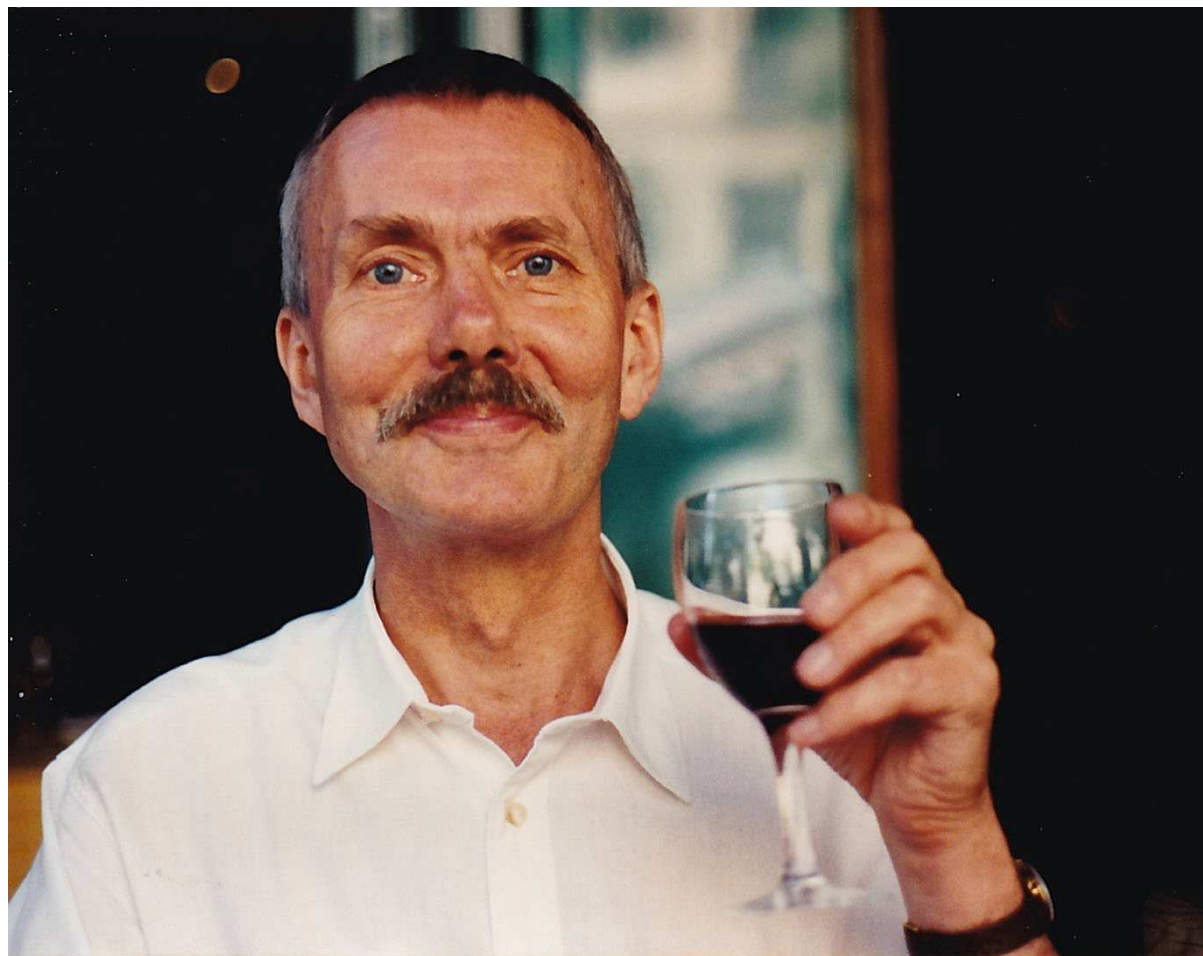
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Stuart Warren

24 Dec 1938 - 22 Mar 2020



Varinder K. Aggarwal, Susan K. Armstrong, Lorenzo Caggiano, Kelly Chibale, Jonathan Clayden*, Iain Coldham, Nicholas Greeves, Richard C. Hartley, Julian G. Knight, Nikolai Kuhnert, Helen J. Mitchell, Adam Nelson, Peter O'Brien, Stephen P. Thomas, Paul Wyatt.

Stuart Warren, who died at the age of 81 on 22 March 2020, transformed the way we teach organic chemistry, and had an immense influence on the British academic landscape in the field of chemical synthesis. In more than 40 years of teaching chemistry in Cambridge, and of nurturing a small, dedicated research group, he developed what might now be called a 'student-centred approach' to teaching. Educational theory may have caught up since, but Stuart's teaching style was a natural extension of the way he saw the world around him and of the importance he placed on education and people.

Stuart approached chemistry, as he did many things in life, by questioning why things were done the way they were, just as any newcomer would. He never lost that ability to see science in an almost childlike way, seeing things with fresh eyes and taking delight in the smallest of discoveries. He had no time for rules of thumb, slick explanations, named reactions, memorisation – he wanted students to think out a problem, to see links between things, and never just to 'know' the answer. His response to a student's 'I can't remember...' was 'Don't remember; think!'.

To be taught by Stuart was to be brought into his confidence, to discover things not as master and pupil, but together. Stuart had no 'chemical ego'. He was as happy to treat a student as a fellow academic, accepting from them sound, scientific explanations, and he would willingly defer to a colleague if he thought they had a better understanding of the matter in question. He would point out mistakes and shortcomings, but it was up to the student to find their own way through to understanding. If he saw a student had a gap in their knowledge that needed to be filled, he'd use a particular turn of phrase: 'You do know, don't you, that...' Beautifully constructed, it gently says, without embarrassing the student: you really should know what I am telling you, but I suspect you don't, so go away and read about it.

Stuart's innovations extended to his writing for students: over his career he transformed the landscape for undergraduate organic chemistry textbooks. Not only did he approach the material from a fresh perspective, but his writing style was also ground-breaking and strikingly clear. His first book for undergraduates, on carbonyl chemistry, has the interactive, question-and-answer style reminiscent of an online workshop, despite being written 20 years before the invention of the world-wide web. It was in Stuart's hands that the arcane terminology of the disconnection approach introduced by E J Corey was transformed into a practical way of thinking about and designing synthetic routes, and indeed of placing organic chemical reactions in their synthetic context. His books, which some of us were privileged to be involved in writing, are noted by many readers for the way in which they communicate *with* the student, not *at* them. Stuffy, didactic writing is replaced with informal, approachable language to better engage the student and encourage them to read on and take their own route to discovery.

Stuart saw his research as a natural extension of his teaching – his research projects were for probing interesting questions, all about trying out new ideas ('what happens if...?') and much less about a big answer or an overall challenge. He was more interested in the journey of getting to the goal than the goal itself. And if that journey took a more interesting direction than had initially been planned then so be it. Group meetings, like undergraduate supervisions (tutorials) were a matter of sitting around a table and a blackboard with pots of tea and coffee and thinking together about chemistry. For most of Stuart's career he ran two parallel streams of research in the organic chemistry of sulfur and of phosphorus, with control of stereochemistry at the centre of each. A general plan for the aim of the work was laid out at the start of a project, but very early on Stuart relinquished to his students the responsibility for the direction of their own projects.

One of us recalls the first time he went to Stuart's office (Stuart never, ever came to the lab) to show him the spectrum of the starting material he had made for a key reaction (an asymmetric epoxidation): "I asked him what I should do next. He seemed disappointed in me that I had even asked: 'Well, if I were you, I'd want to try out the epoxidation!'. From then on, I definitely didn't ask, I just did things. I showed results to Stuart, and gauged from Stuart's responses (which ranged from delight to annoyed irritation) whether he thought what I was doing was interesting or not."

Stuart's particular way of doing research, nurturing a group without hierarchy more as benevolent oracle than as director, may explain why so many of his former postgraduate students – all of us included – entered academic careers. Learning to plan a project, to choose productive directions, to write papers, and most of all, how to be entirely self-motivated – these were all part of life as a postgraduate in his group. As an example of the success of this approach in training academics, the years 1991-1996 saw 9 out of a total of 11 graduating PhD students subsequently enter academic positions. In total, about one third of all postgraduates from Stuart's group have had careers within University education and research.

Many found life in Stuart's research group a sink-or-swim experience. Expectations were high, and if you weren't meeting them you could expect to be told where improvement were needed. After that it was up to you – and some certainly sank. But, conversely, if Stuart saw the potential for you to do something new and challenging, his faith in your abilities empowered you just to get on and do it.

When you were in a meeting with Stuart it was clear that you were important. Other more senior colleagues who might come to the door were dismissed because he was in a meeting with *you*. Stuart's dedication engendered a sense of loyalty, but working with him was not always easy. He certainly had no time for laziness or excuses. He was charming and witty, marvellous company, and an endless source of anecdotes and merciless impressions of his colleagues. If you hit the right note with a joke he would laugh loudly. But he could at times also be brutally honest and even viciously sarcastic. Ideas or comments that fell short of his standards of clarity would be dealt the sharpest blows, although his most critical and unfiltered comments were usually reserved for those he rated the most highly.

When it came to using the right words to convey ideas, and grammar to articulate meaning, most students found themselves falling well short of Stuart's level of precision. He could take this to extremes, delighting in perversely literal answers to questions. One of us recalls asking Stuart for help as an undergraduate: "I've done some practice exam questions: would you like to mark them?" "No." Then, after a pause: "Will you mark them?" "Yes." Then there was the difficult issue of how to ask Stuart if he had time to spare. "Are you busy?" was no good: "I'm always busy." One of us took to saying "May I ask you another question?" since the answer to "May I ask you a question?" was "You already have."

Stuart was in so many ways an innovator, but his distaste for 'rules' could become a dogma in itself. Some conventional niceties – even as simple as knocking on the door and then waiting to be invited in for an appointment that had already been arranged – were viewed with disdain. Some clumsy modern 'innovations' were certainly *not* approved. Careless use of the word 'hopefully', for example. Powerpoint slides with multicoloured backgrounds. Over-enthusiastic use of the word 'like'. Reading out words already projected onto a screen. Moving a laser pointer in circles. Those who knew Stuart well would watch in open-mouthed horror as new members of the group (and indeed visiting Departmental seminar speakers) waded unwittingly into these minefields. It was not necessary to agree with Stuart on everything, but his opinions were impossible to ignore.

Stuart's legacy lives on in many ways – in his ground-breaking books, in the diverse careers of those of us who were privileged to work with him, and in his transformation of organic chemistry from a collection of memorised reactions and rules into a coherent collection of mechanistically organised concepts, where more complex ideas build naturally from simpler ones. He will be missed by all of us as an advisor, a mentor, a source of endlessly stimulating topics of conversation, and as a friend.

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