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Foreword

Foreword: Bill Davison tribute issue

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This special issue of *Environmental Chemistry* is dedicated to the career of Professor Bill Davison and was initiated to mark his recent retirement from his position as Professor of Environmental Chemistry at Lancaster University, UK.

Bill is perhaps best known for his invention and development, with colleagues, of two in-situ measurement techniques: Diffusive Gradients in Thin-films (DGT) and Diffusive Equilibration in Thin-films (DET). However, Bill's scientific career and research has encompassed far more. After completing undergraduate and doctoral degrees at the University of Newcastle-upon-Tyne, he became a research scientist and, later, Head of Chemistry at the Freshwater Research Institute at Windermere in the English Lake District, a perfect place to study lacustrine biogeochemistry. In 1991, he moved to the Lancaster University, UK, to take up a Professorship, spending a further 22 years developing his research field with a rigour and flare well known to, and appreciated by, his colleagues. In his time at both institutions, he pioneered several research areas including the improved development of a theoretical understanding of dynamic trace metal speciation and the application of in-situ voltammetry in redox systems. In addition, Bill provided a greater understanding of Fe and Mn biogeochemistry, a refined interpretation of pH particularly relevant in freshwaters and an advanced understanding of acid neutralisation processes in lakes, including the development of new neutralisation strategies for acid-affected lacustrine environments. In the process he published far in excess of 200 peer-reviewed papers, with seven in Nature.

Undoubtedly, Bill is best known for the development of DGT and DET, which he invented and, with colleagues, particularly Professor Hao Zhang, was able to refine the technique, to the mature and widely used device it is today. The methods are used in numerous other laboratories in more than 50 countries around the world. He played a critical role in bringing the techniques to maturity, not only through his own research, but also by commercialising the technology and collaborating with innumerable research groups worldwide. In the process, he developed a solid theoretical basis for the methods, advanced our understanding of trace element speciation, dynamics and mobility in waters and soils and provided the first high resolution 2-D profiling of sediment porewaters, revealing previously unknown local structure and geochemistry. In this latter research, he and his team developed new paradigms of sediment biogeochemistry by developing an understanding of the importance of heterogeneity at the microscale. Finally, the methods have been used to elucidate new understanding of the dynamic controls in soils that affect plant uptake of trace elements.

This issue begins with a review by Hao Zhang of DGT used for chemical speciation and bioavailability, which presents the perfect introduction to DGT.[1] Careful readers will note that Bill is a co-author. This is at the request of Professor Zhang, appreciating how uniquely placed he is to contribute to the definitive introduction to DGT. Two other papers develop ideas related to DGT, the first an application to arsenic speciation in waters and soils[2]; the second developing a theoretical interpretation of DGT measurements.[3] In addition, there are papers representing other areas of Bill's research including voltammetric studies of iron sulfide[4] and a paper exploring the role of soft particles in environmental chemistry.[5] Finally, there is a paper representing developments on the relation to man-made nanoparticles as emerging contaminants, with particular interests in their freshwater chemistry,[6] developments which build upon the fundamental solid-solution and redox freshwater chemistry pioneered by Bill Davison.

On a personal note, I joined Lancaster University to start my Ph.D. at about the same time as Bill joined as Professor of Environmental Chemistry. He played a role in supervising my Ph.D. (metal interactions with humic substances) and then co-supervised my first postdoctoral position (applying field-flow fractionation to metal-colloid complexes in freshwaters). This time in the early 1990s was a formative one in my scientific career and Bill had a very significant influence on my scientific development. Over and above his humour, his good will and his friendship, he played a critical role in developing my scientific approach and I very much appreciate this. I leave to others to judge to what extent I am a good scientist, but without his influence I would be far poorer.

Jamie Lead
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