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Lewis N. Mander

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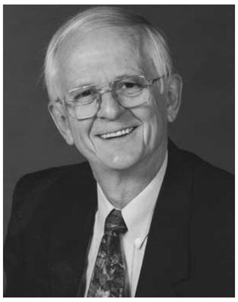


There can be personal relationships between scientists that are good from the outset and then develop and mature to become very special indeed, rather like a bottle of Penfold's Grange (to pick an Australian analogy). This well describes what happened between Lew Mander, honoured by this special issue of the *Australian Journal of Chemistry*, and myself, so I am really delighted that it has been possible for me to write this.

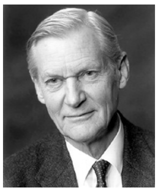
Lew elected for his sabbatical leave in 1971–1972 to join my group in Cambridge. We were at that time just starting what was later to become almost the entire focus of the Cambridge effort, the aim being to discover the pathways to the Pigments of Life. Lew knew, as did we all, that we were feeling our way at the edges of a massive problem, trying to find out how we could break in. Despite it being clear that this project was a very risky one and involved chemistry (pyrroles and porphyrins) that was quite new to him, Lew took it up and joined what was then a small team. It was a measure of Lew's scientific courage and adventurous spirit that he did so and these traits have shone out from his research efforts throughout his career. The findings from this small team, with Lew as the senior member, gave the first clues as to what Nature was doing and allowed entry into the 'black box' that had previously confronted us.

Lew also contributed massively to scientific life in Cambridge. We all know that he is quiet and undemonstrative, but his powerful intellect was rapidly recognized by the students and post-doctorals around him. Lew gave generously of his time to the many who consulted him and he was a tower of strength in our weekly group seminar. I lost count of the number of times he contributed, rather gently and diffidently, a precise mechanistic interpretation for the chemical observations under discussion.

My late wife Margaret and I saw a lot of Lew and Stephanie in Cambridge, and we became firm friends. We were always made very welcome on our subsequent visits to Canberra and since Lew knew that we shared his love of hiking, he always took us into the bush or on some similar trip. On one occasion, we stopped in the bush for drinks and Lew, as we did also, started to sit down. He was already well into a downward trajectory when, from the corner of his eye, he saw a poisonous snake partly covered by leaves on the spot where he was about to land. I have yet to understand how he did it, but he immediately went into levitation mode and seemed to hang, sliding sideways so dropping onto a snake-free zone. He appeared unperturbed and characteristically explained to Margaret and me that life in Australia was not like the UK. He then gave us clear instructions on what to do about snakes, spiders, or when caught in a bush fire; Lew is a man of many parts.

It is especially fitting that this celebration of Lew's career should in the form of a dedicated issue of the *Australian Journal of Chemistry* since most of his marvellous research on synthetic chemistry has been carried out in Australia. It is not my aim to give a survey of all Lew's work but one example must be included to act as a standard bearer for all the rest. His synthesis of gibberellic acid was a brilliant landmark achievement. This molecule is of daunting complexity and he developed two flexible routes to it, both depending on many ingenious and novel synthetic procedures. This work and his other advances rightly received international acclaim marked by many awards and, to my delight, election as Fellow of the Royal Society of London.

This Festschrift is a signpost on the road but also a mark of the immense respect and indeed affection we feel for Lew Mander. He will undoubtedly continue along the road contributing outstandingly, as he always has, to our science of chemistry.



Alan Battersby wove together isolation work, structure determination, synthesis, isotopic labelling, and spectroscopy also with enzymology and molecular biology to elucidate the detailed biosynthetic pathways to the tetrapyrrolic 'Pigments of Life', a family containing haem and vitamin B_{12}*. He held the Chair of Organic Chemistry at Cambridge University from 1969 until his retirement in 1992.*

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Lew Mander: Biography

Lew Mander was born in Auckland, New Zealand, completed his M.Sc. degree at the University of Auckland (with R. C. Cambie) and obtained his Ph.D. in 1964 at the University of Sydney under the supervision of C. W. Shoppee, E. Ritchie, and W. C. Taylor. After two years of post-doctoral studies in the USA with R. E. Ireland, initially at the University of Michigan and then at the California Institute of Technology, he returned to Australia as a lecturer in organic chemistry at the University of Adelaide. He moved to the Australian National University in 1975 as a senior fellow in the Research School of Chemistry and was appointed as Professor in 1980, serving also as Dean for a total of eight years between 1981 and 1995. He was a Nuffield Fellow at Cambridge University (1972) with (A. R. Battersby), a Fulbright Senior Scholar at the California Institute of Technology (1977), and at Harvard University in 1986 (with D. A. Evans on both occasions), an Eminent Scientist of RIKEN, Saitama, Japan (1995–1996), and a Distinguished Alumnus Professor, University of Auckland (1992). As well, he has been a visiting professor at the Universities of Cambridge, Alberta, Colorado, and Canterbury (NZ).

The major focus of Mander's work has been concerned with the synthesis of polycyclic natural products, especially the gibberellins. With the latter compounds he has extended his interests to encompass an understanding of their role in the regulation of plant growth and development. He has made numerous contributions to new strategies and methodology for the construction of complex organic molecules. A major theme in his research has been the utilization of aromatic synthons as precursors to alicyclic systems by employing dearomatization processes which conserve much of the latent functionality contained within benzenoid molecules. The first major landmark in his work was the total synthesis of gibberellic acid, a molecule of daunting complexity that has intrigued organic chemists since its initial isolation in 1938. Two separate and flexible approaches were successfully completed and were characterized by the introduction of numerous new synthetic procedures. Many of his syntheses have depended on the novel use of a diazoketone function to effect alkylation of π-bonds. In one variation the intramolecular *ipso*-alkylation of aromatic rings was used not only to construct the molecular skeleton, but also to liberate the latent functionality contained within the anisole moiety. Novel variants of the classical aldol, Michael, and *C*-acylation reactions have been employed including, in the last case, the use of methyl cyanoformate, a reagent that now bears his name. A more general contribution, however, has been his refinements of the Birch reduction (usually combined with in situ alkylation) as applied to benzoic ketones, acids, and esters. The conventional wisdom of the previous four decades had been that ring-reduction of the latter compounds was not feasible. The reaction conditions defined by Mander were not only successful for esters, but could be applied to the treatment of other functionalities which had also been previously intractable (e.g. aromatic amides and α-tetralones).

The routes to gibberellins were completely general for almost all of the more than 140 known derivatives. Later work successfully addressed the important task of converting the more readily available fungal analogues into gramme amounts of several rare derivatives obtained from higher plants. The semi-synthetic approach allowed the introduction of isotopic labels into positions that would have been inaccessible even if larger quantities had been available from natural sources. Thus far, approximately 100 rare gibberellins have been prepared by the Mander group (many of them isotopically labelled) and used to confirm putative structures, determine biosynthetic and metabolic pathways, and structure–function relationships. Some 50 groups worldwide interested in the biology of gibberellins are completely dependent on the availability of these materials.

A number of gibberellin-like substances are formed by fern prothallia and have been implicated in biological mechanisms which appear to have evolved to promote cross-fertilization. They typically induce spore germination and antheridia formation, but in one case, suppression of archegonial growth has also been observed. These compounds are, on average, produced in picogram quantities (per organism) and some are biologically active at femtomolar concentrations. Despite considerable efforts over several decades, little progress had been made towards elucidating their chemistry. Through a combination of synthetic and spectroscopic procedures, Mander and his coworkers have been able to deduce the structures of these compounds from scant evidence, confirm the assignments by synthesis from a readily available fungal gibberellin, and elucidate their probable biosynthesis. In one case a total of 40 nanograms represented the total supply from natural sources. The antheridiogens are now available in good quantities, including isotopically labelled derivatives, allowing the possibility of systematic biological exploration of the area for the first time.

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