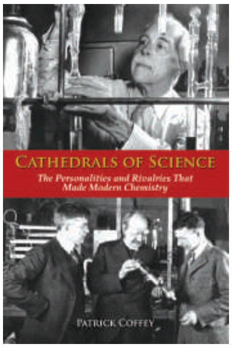
The legacy of Lewis



Cathedrals of Science: The Personalities and Rivalries That Made Modern Chemistry

by Patrick Coffey

OXFORD UNIV. PRESS: 2008. 379PP. £15.99

The central character in Patrick Coffey's book *Cathedrals of Science* is Gilbert Lewis. Indeed, it is a quote from the preface to one of Lewis's books *Thermodynamics and the Free Energy of Chemical Substances*, from which the title comes. Lewis asserts that the casual observer does not see the years of sweat and toil from the hundreds of workers involved in the building of a cathedral, and suggests that science has such 'cathedrals' of its own. Together with other protagonists in the book (such as Arrhenius, Haber, Langmuir, Nernst, Pauling, Seaborg and Urey), Lewis was — to continue the analogy — one of chemistry's most important architects.

For example, if you've ever drawn a Lewis-dot structure to depict the bonding in a molecule — and you probably have — it is unlikely that representing a covalent bond as two paired electrons has given you much pause for thought. Transport yourself back just a hundred years and this couldn't be further from the truth — the very idea that two negatively charged electrons would associate with one another was regarded by many as simply preposterous.

Unless the reader is very familiar with the history of the Nobel prizes, it will be surprising to note that Lewis never received one, especially because much of his work has now become such a central part of the chemistry landscape. The description of the chemical bond as two electrons led Lewis to an explanation of the behaviour of strong electrolytes, which was at the time the most pressing problem in physical chemistry. It later led to his theory of acids and bases, and also to his explanations of fluorescence and phosphorescence — two closely related effects in photochemistry. The fundamental importance of much of Lewis's work was only realized a few years after his untimely death, and this is perhaps the most significant factor in his never receiving the Nobel prize. The somewhat bizarre circumstances of Lewis's death only add to the mystery.

The book spans a period in history including both World Wars, and it is instructive to consider how these important events affected the history of the subject of chemistry. Would the fixation of nitrogen in the Haber process have been solved with quite so much urgency had it not been necessary to provide nitrates for the production of explosives during World War I? In a similar fashion, would the understanding of nuclear reactions ever have advanced so fast without the pressure of a race between two of the great scientific powers of the time — Germany and the USA?

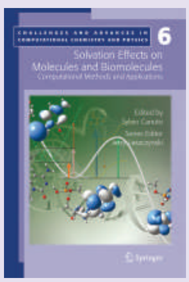
A second person with whom a reader will become very familiar is Irving Langmuir; and the contrasts in the careers of Lewis and Langmuir are striking. Whereas Lewis was something of a reclusive academic, Langmuir was an outgoing industrial chemist. That said, Langmuir's successes at General Electric led to his having essentially complete freedom in what to research. His outgoing nature and adept presentation skills probably led to his being widely credited with some of Lewis's theories. Lewis, in contrast, was known as a man who did not suffer fools gladly, and went to some lengths to explicitly point out the faults of others. A fascinating anecdote featuring Langmuir tells of his willingness to build a perpetual motion machine to allow a 12-year-old neighbour to learn for himself why this was not possible. Later, when Langmuir did receive the Nobel prize, this may have contributed to Lewis's apparent dislike of him, even to the point where a lunch with Langmuir could be regarded as the final straw on the day that Lewis died.

For anyone with even the smallest interest in the history of chemistry, this book provides a fascinating insight into the character of many of its most important personalities — how they both made history and were undoubtedly affected by it. It tells how their discoveries progressed from being seen as impossible, then accepted — and in many cases simultaneously attributed to the wrong person — then obvious and, ultimately, obsolete. It seems certain that without their years of sweat and toil, and the occasional petty argument, chemistry would not be where it is today.

REVIEWED BY STEPHEN DAVEY

Stephen Davey is an Associate Editor for Nature Chemistry.

ON OUR BOOKSHELF

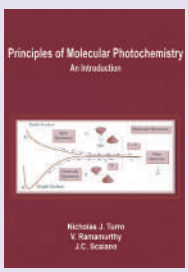


Solvation Effects on Molecules and Biomolecules

edited by Sylvio Canuto

SPRINGER: 2008. 546PP. £300.

With the emphasis on state-of-the-art computational methods, the book provides a comprehensive appraisal of the molecular modelling strategies commonly used to study the phenomena associated with the solvation of molecules.



Principles of Molecular Photochemistry: An Introduction

by Nicholas J. Turro, J. C. Scaiano & V. Ramamurthy

UNIVERSITY SCIENCE BOOKS: 2009. 520PP. £39.99.

Aimed at both students and specialists, this book takes the 30-year-old best-selling text of co-author Turro as a starting point. The basic underpinnings of the subject remain but more contemporary issues such as electron spin and electronic energy transfer are also discussed.