Book Reviews

Organic Synthesis Highlights II. Edited by H. Waldmann. VCH: Weinheim, 1995, 407 pp., hardback. DM 148. ISBN 3-527029200-4.

Organic Synthesis Highlights II follows a similar style to its predecessor *Organic Synthesis Highlights* which was published in 1991 and provides an illustrative guide to recent trends and accomplishments in the ever expanding field of synthetic organic chemistry. The book comprises a collection of forty articles from a team of young authors from universities and industry and is divided into two parts. Part I provides an update on the development of new methods and reagents for organic synthesis with broad coverage from the fields of asymmetric synthesis (which includes articles on the enantioselective epoxidation and hydroxylation reactions which have had a dramatic impact in recent years), organometallic chemistry (e.g. use of iron η^5-complexes, rhodium-catalyzed carbenoids, organolanthanides and aluminium enolates) and biocatalysis (e.g. enzyme aided carbon-carbon bond formation and *O*-glycoside formation). Part II reinforces the importance of the development of the elegant synthetic methodology outlined in Part I by describing the total syntheses of several complex natural products of biological relevance including the topical targets taxol, rapamycin, calicheamicin and CC-1065.

The overall style of the book is crisp and clear allowing the reader to "browse" and become more familiar with a new field without being overwhelmed by the intricate details which can always be followed up by reading the many references cited for each topic. In general the references not only highlight work by the key contributors but also provide informative reviews for the individual topics. It was disappointing, however, that the sections describing the synthesis of heterocycles using cyclization reactions based on iminium, oxonium and sulfonium systems did not provide any references post 1990.

The total synthesis section of the book provides an exciting repertoire of organic syntheses that one only needs to glance at to realise the power, elegance and sophistication of modern organic synthesis. Despite the complexity of the molecules involved, the presentation is lucid in that the emphasis is on the principal understanding of the strategic steps and is supported by retrosynthetic analysis in several instances (notably the article by Maier on the syntheses of morphine).

In summary, this is a book that graduate students and practitioners in the field should find exciting to read which conveys the creativity, excitement and resourcefulness of synthetic organic chemists.

Margaret Brimble, University of Sydney, Australia.

Taxane Anticancer Agents: Basic Science and Current Status. Edited by G.I. Georg, T.T. Chen, I. Ojima and D. H. Vyas. ACS Symposium Series 583. American Chemical Society: Washington, D. C., 1994 353 pp, hardback, $99.95. ISBN 0-8412-3073-0

"There is a tide in the affairs of men
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shadows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it leaves
Or lose our ventures." W. Shakespeare, Julius Caesar, Act 4, Scene 3.

The taxol story is now in "full flood", and it is one of the most exciting chapters in modern natural products chemistry. The toxic properties of yew leaves were known in ancient times, however, the structures of the taxane natural products which caused this toxicity were determined by Lythgoe, Nakanishi and Halsall in the 1960s. Heralded by the ringing phrase of President Nixon "*Now that we have got to the moon we can cure cancer*," the National Cancer Institute (NCI) in Washington started a screening programme to find new anti-cancer compounds. A publication in the Journal of the American Chemical Society in 1971 by Wall and Wani, modestly reported the structure and anti-leukaemia properties of a natural product they called taxol isolated from the pacific yew tree *Taxus brevifolia.* These two gentlemen were also responsible for the discovery of the anti-cancer compound camptothecin in 1966.

The stage was now set for the drama to unfold, almost all aspects of scientific life are present in the taxol story. The project has been championed over the years by Dr Mat Suffness who by a tragic stroke of irony recently died of cancer. The first chapter in the book is an overview by Dr Suffness. The unique mode of action of taxol was discovered by

Susan Horwitz who showed in 1979 that taxol stimulated the formation of microtubules and prevents their breakdown. A chapter on her current studies on photoaffinity labelling is included in the book. Laboratory and clinical trials were carried which showed that taxol had a significant effect on the solid tumours of the breast and ovary. Chapters on the current state of chemical trials, pharmacology, metabolism, microtubule dynamics by experts in these fields give a useful overview for the chemist interested in forming an overview of the topic.

As interest in taxol as a potential agent clinical chemotherapy increased so the problem of supply became important. Taxol is isolated from the bark of the pacific yew tree *Taxus brevifolia,* the tree has to be cut down and stripped of its bark; it has been estimated that two trees are required to treat one patient. Clearly the impact on the world's forests of pacific yew would be devastating, this situation is described in a chapter by Campbell and Whitney. An answer to this problem is described by a chapter written by another prominent woman scientist in the field Francois Guéritte-Voegelein who with her colleagues Daniel Guénand and Piere Potier worked out the semi-synthesis of taxol from 10-deacetyl baccatin III, a compound available from the leaves of the European *Taxus baccata.* The use of a renewable resource to prepare taxol was a major step forward, but also, during this work an alternative anti-cancer compound called taxotere was prepared. Several chapters on the synthesis of taxol analogues by Kingston, Georg, Commerçou, Chen, Ojima and Klein give the reader a clear picture of just how many compounds have been prepared in the search for a compound more active than taxol.

Finally the synthetic chemists have the last word, as the completed routes of Holton and Nicolaou are described by these authors. Two further chapters by Wender and Paquette give the state of play in their work on taxol synthesis. It took twenty three years from the report of the structure of taxol to its first synthesis. This demonstrates the amount of effort required to generate the new chemistry necessary to synthesise a molecule as complex as taxol. In 1989 Dr Sam Broder of the NCI decided the taxol project should be "taken at the flood" and focused the attention of that organisation on taxol. Taxol is now marketed by Bristol-Myers Squibb, it look likely that taxotere will soon be marketed by Rhone-Poulenc, the story has led to two new drugs for the treatment of cancer, and as a spin-off has generated a wealth of new chemical knowledge. This book is a collection of chapters written by the leaders of this field; it will be essential reading for all interested in the taxane anticancer agents.

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