PERKIN 1 COVER FEATURE

Professor Gerald Pattenden *

Recipient of the 1997 RSC Industrially-sponsored award for Natural Product Chemistry (Roche Products)

Career

Professor 'Gerry' Pattenden is the Sir Jesse Boot Professor of Organic Chemistry and also Pro Vice-Chancellor for Research at the University of Nottingham.

He studied for his doctorate at Queen Mary College, London and moved to University College, Cardiff as Lecturer in Organic Chemistry in 1966. Thereafter he held a similar appointment at Nottingham University, before becoming Reader (1975), Professor of Chemistry (1980), and Sir Jesse Boot Professor in 1988.

Pattenden researches in the broad area of design and development of new and novel organic synthesis methods, addressing the total synthesis of natural products and problems at the biology/chemistry interface. He has published over 400 papers and written several review articles. His contributions have been recognised by numerous Awards including the Corday–Morgan, Simonsen, Tilden and Pedler Medals of the Royal Society of Chemistry and the Society's special awards for Synthetic Organic Chemistry and for Heterocyclic Chemistry. In addition, he has received many named Distinguished Lecturer Awards, both in academe and in Industry. Pattenden was elected Fellow of the Royal Society in 1991.

Research

Although the main impact of Pattenden's researches has been in the area of synthesis of target natural products, these studies have been interwoven with structural, biosynthetic and biomimetic research work associated with a variety of biologically important natural substances. Thus, his early research uncovered the structures and biogenetic relationships of the striking poly-*cis* carotenoids found in Tangella tomatoes[1] and other mutant lines of tomato fruits,[2] and he was the first to study the biosynthesis of the novel cyclopropane terpene chrysanthemic acid found in pyrethrin insecticides[3] using tissue culture techniques[4]—research which was complemented by extensive structural and synthetic studies. These latter studies blossomed into extensive structural and synthetic investigations of the squalene precursor presqualene,[5] its prenylogue prephytoene, and casbene,[6] the cyclopropane diterpene precursor of such important natural products as taxane, phorbol, ingenol, *etc*., which has been an enduring program in Pattenden's research laboratories.

Pattenden's synthetic work uncovered the stereostructures of the novel ylidenebutenolide and ylidenetetronic acid families of pulvinones, pulvinic acids, aspulvinone, and multicolanic acids,[7] together with the related aspertetronins, gregatins,[8] grevillins and calythrone.[9] The biogenetic relationships between these families of natural products were investigated, and the studies were extended to natural tetramic acids and pyridones.

Over the period 1978–1983, Pattenden developed the use of the intramolecular de Mayo–Grob fragmentation process and other photocycloadditions in the synthesis of a wide range of important sesquiterpenoid compounds including zizaane, capnellane, hirsutane, taylorione and pentalenene.[10] From these early fundamental studies, other significant target terpene natural products were later synthesised including cedrene, alliacolide,[11] isoamijiol,[12] allamcin,[13] capnellenediol[14] and forskolin.[15]

Another enduring area of natural product research Pattenden has pursued, largely *via* synthesis, is the biogenetic interrelationships between the ether–polyene–pyrone natural products citreoviridinoids, aurovertins and asteltoxins.[16] Total synthesis work based on biogenetic lines from poly-epoxide precursors made a significant contribution to unravelling the intricacies of the origins of these important mycotoxins.[17]

In 1986 Pattenden began studies of the free radical chemistry of the cobalt-based vitamin coenzyme B_{12} which culminated in several publications,[18] demonstrating the scope for the carbon–cobalt bond in synthesis, including important targets such as the β-lactam antibiotic thienamycin.[19] Recent work has extended these studies into enantioselective synthesis involving "cobalt π-cation" intermediates,[20] mimicking still further the novel biological role of this important co-enzyme.

Pattenden's recent and extensive studies of the scope for free radical intermediates in the synthesis of complex terpenoid ring systems and steroids, based on cascade macrocyclisation–transannulation reactions and consecutive 6-*endo*-*trig* processes[21] have their origins in his underlying interests in biomimetic synthesis. Many polycyclic ring syntheses have been achieved during these studies including a route to the taxanes,[22] to the full steroid system, and to several important natural products, *e.g.* spongianone, modhephene, zearalenone, mukulol,

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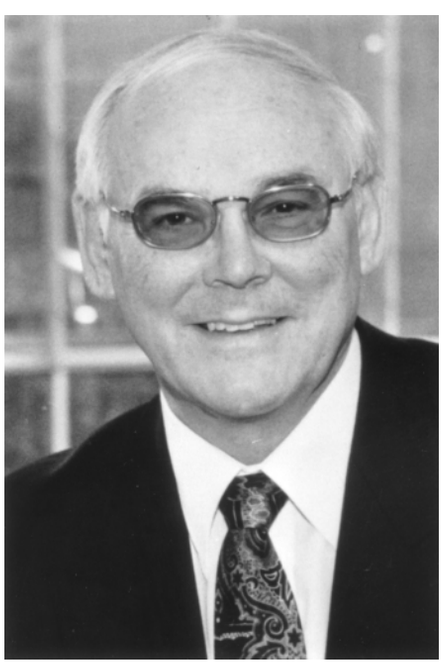

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pentalenene.[23] A cascade of seven consecutive 6-*endo-trig* radical cyclisations from a polyene precursor, leading to a unique all-*trans*,*anti* heptacycle, demonstrates the power of this chemistry in contemporary synthesis.[24]

Over recent years, Pattenden and his group have widened and extended their interests into the areas of polythiazoline, polyoxazole macrolide, and heterocyclic-based cyclopeptide natural products, many of marine origin. These studies underlie the group's interest in metal recognition and transport in the marine milieu and the importance of these phenomena in natural product assembly and their *modus operandi*. A definitive review was published in 1993,[25] and extensive synthetic studies of the mirabazoles/tantazoles and thiangazole[26] families of natural polythiazolines, together with the cyclopeptides lissoclinamide, cyclodidemnamide and mollamide,[27] the trisoxazole macrolide-based ulapualide,[28] phorboxazole,[29] curacin A and pateamine[30] have been published.

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