Darren Dixon

Darren J. Dixon was born and raised in Scarborough, North Yorkshire, UK. He obtained his first degree (First Class Honors) and D. Phil from Oxford, where he worked with Prof. Stephen G. Davies on the first total synthesis of the pseudopeptide antibiotic Moiramide B, and its close relative Andrimid. In 1997 he moved to the University of Cambridge to carry out post-doctoral work with Professor S. V. Ley FRS at the Department of Chemistry, working on the development of new carbon-carbon bond forming methodologies for natural product synthesis, new chiral building blocks for stereodefined alcohol and polyol production, and total synthesis. He began his independent career in 2000 at the University of Cambridge before moving in September 2004 to a Senior Lecturership at The University of Manchester, UK. In August 2007 he was promoted to Reader and in October 2008 he moved to his current post as Professor of Chemistry at the University of Oxford where he holds the Knowles-Williams Tutorial Fellowship in Organic Chemistry at Wadham College.

His research interests lie predominantly in the field of asymmetric catalysis where he has ongoing research programs developing practicable and synthetically powerful methodologies. These are based on the harnessing of new chemical reactivity or cascades of chemical reactivity, that allow the highly enantio- and diastereocontrolled formation of difficult-to-access, structural/stereochemical motifs common to biologically relevant complex natural products and pharmaceutical or agrochemical compounds.

He has received several awards including a prestigious EPSRC Leadership Fellowship (2008-2013), the AstraZeneca Research Award in Organic Chemistry (2010), the Royal Society of Chemistry's inaugural Catalysis in Organic Chemistry Award (2010), the Novartis Lectureship in Central Europe (2011) and the Andrew S. Kende Distinguished Lectureship at the University of Rochester (2013). He is a member of the scientific advisory boards of AVRA laboratories (Hyderabad) is a scientific consultant for a number of pharmaceutical companies and serves as an Associate Editor for the Beilstein Journal of Organic Chemistry.

Lecture 1: Enantioselective Cooperative Catalysis With and Without Metals

Monday, September 30, 3:00 pm
University Hospital Auditorium A (room B3-246)

The addition of a carbon- or heteroatom-centred acid to an electron deficient carbon-carbon (C=C), or carbon-heteroatom (C=X) double bond is a reaction of fundamental importance in organic synthesis. Such reactions offer perfect atom economy, are often energetically favourable, and can generate products that are chiral. Brønsted basic reagents can be employed to catalyze the addition by generating the ion-paired conjugate base as the key nucleophilic entity, and, asymmetry in the Brønsted base can relay through to the product via energetically discriminated transition states. To this end, a plethora of chiral single enantiomer Brønsted bases have been developed for a wide range of enantioselective addition reactions, such as Michael, aldol and Mannich reactions.

Over the last decade, one particular class of base catalyst that has received considerable attention is that of the bifunctional Brønsted basic / H-bond donor organocatalyst. These catalysts possess both a tertiary amine group and a hydrogen-bond donor group appropriately located on a chiral scaffold. Further organization of the transition structure of the addition reaction through stabilization of developing negative charge by the H-bond donor can result in increased reaction rates and/or enantioselectivity relative to H-bond donor-free analogues. Such cooperative catalyst systems, with their capacity to activate simultaneously electrophilic substrates and pro-nucleophilic reagents towards one another, offer numerous opportunities for the discovery of powerful new catalytic asymmetric carbon-carbon and carbon-heteroatom bond forming reactions. In this presentation, our work leading to the discovery and development of a new family of cinchona-derived bifunctional organocatalysts and their use in highly enantioselective Michael addition, Mannich and aldol reactions as well as other synthetically relevant transformations, will be described.

Although this class continues to demonstrate synthetic utility, it is not without its limitations. Reaction times are often long even with the most reactive reagent combinations, and arguably the range of pro-nucleophiles and electrophiles amenable to asymmetric union is narrow. These limitations provide new opportunities in cooperative catalyst design and development. The Dixon group's strategies and tactics to overcome these inherent reactivity issues make up the second half of the presentation. For example, we have made contributions to the dual catalysis field where appropriate transition metal ions work in a cooperative manner with matched organocatalysts allowing the attainment of new reactivity profiles not possible with either catalyst alone. Using this approach we have developed highly enantioselective cyclisomerization, aldol and Mannich reactions. Furthermore, and in recognition that the low catalytic activity of the bifunctional cinchona catalysts often stems from the relatively weak Brønsted basicity of the tertiary amine moiety, we have developed a new class of bifunctional organocatalysts that possess a much stronger and tunable Brønsted basic group. Through the synergistic effects of the stronger Brønsted base and the H-bond donor, good reactivity and selectivity in new and challenging enantioselective organocatalytic addition reactions have been achieved. Similarly, we have invented a new class of asymmetric phase transfer catalyst possessing a strong H-bond donor group. These catalysts allow the use of strong external bases to activate less acidic pronucleophiles whilst maintaining transition structure organisation through H-bonding interactions resulting in high enantiocontrol.

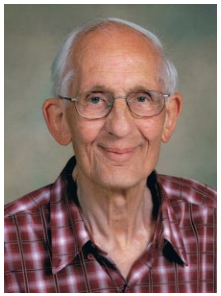
Lecture 2: Catalysis and Cascades in Complex Natural Product Synthesis

Tuesday, October 1, 11:00 am
University Hospital Auditorium A (room B3-246)

Catalysts that provide new reactivity and stereocontrol in efficient bond-forming reactions, are essential tools for converting low cost starting materials into high value, structurally complex, stereochemically defined product materials. Combining sets of such catalysts and their reactions with complexity building cascade reactions provide the perfect approach to synthesising complex target molecules as single stereoisomers in the shortest number of steps and time.

In this presentation a new generation of powerful bifunctional catalysts, catalyst controlled sequences and new reaction cascades to common and synthetically relevant heterocyclic motifs will be described. Their strategic application, in addition to the collaborative development of new highly Z-selective olefin RCM catalysts, as pivotal carbon-carbon bond forming steps in the total synthesis of Nakadomarin A, Manzamine A, Ircinol A, Ircinal A and daphniyunnine B, will be discussed.

Fred L.M. Pattison



(1923–2010) Fred Pattison was born in Scotland, where he received his early education. He enrolled at the University of Cambridge in England in 1941 to study Natural Science. Fred remained there to obtain a Ph.D. in Organic Chemistry under the supervision of Dr. B.C. Saunders. He then moved to Halifax, Nova Scotia to lecture at Dalhousie University for a year before joining Western in 1948 as an Assistant Professor of Chemistry.

Fred established a Ph.D. program in the department. His research on biologically active organic fluorine compounds produced many scientific papers, garnered the award of an Sc.D. by the University of Cambridge, and resulted in the publication of a book, *Toxic Aliphatic Fluorine Compounds*. In 1959, he became Professor and Head of the Department, and he presided over the expansion of the department and its move to new facilities.

In 1965, Fred decided on a career change. At the age of 42, he enrolled at Western as a first-year medical student. After completing his M.D. four years later, he interned at St. Joseph's Hospital in London and served for a year as resident in the Family Practice Program. As well, he was enrolled in a diploma program in venereology at the University of Liverpool. In 1971–73, Fred followed up a long-standing interest in the peoples of Canada's North by working with the International Grenfell Association. He provided solo medical care to about 6,000 people scattered along 120 miles of the Atlantic coast of Newfoundland.

Fred returned to London in 1973, when he joined Western's Student Health Services, holding the position of Director at his formal retirement in 1988. During the same period, he was a clinical assistant professor in the Faculty of Medicine, giving instruction in venereology, and director of the Middlesex-London Sexually Transmitted Disease Clinic.

After retiring, Fred was able to resume his connection with the Chemistry Department as Professor Emeritus. In light of his long service and many contributions to chemistry and medicine at Western, it is entirely fitting that the department dedicate a lecture series bearing his name.

Contact Information

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Previous Fred Pattison Senior Lectureships

1992	Sir Derek Barton, Texas A & M University
1993	Barry Trost, Stanford University
1995	Stephen J. Benkovic, Penn State University
1996	Steven V. Ley, University of Cambridge
1997	Anthony J. Kirby, University of Cambridge
1998	Larry E. Overman, Univ. of California, Irvine
1999	Sir Fraser Stoddart, Northwestern University
2000	Dennis Curran, University of Pittsburgh
2001	Joseph Lambert, Northwestern University
2002	Anthony Barrett, Imperial College
2003	Richard Wolfenden, UNC Chapel Hill
2004	Victor Snieckus, Queen's University
2005	Lutz F. Tietze, Georg-August University, Göttingen
2006	Juan C. (Tito) Scaiano, University of Ottawa
2007	François Diederich, ETH Zürich
2008	Erik J. Sorensen, Princeton University
2009	Chad A. Mirkin, Northwestern University
2010	Dennis A. Dougherty, CalTech
2011	Guy Bertrand, Univ. Of California, Riverside

Light snacks and refreshments will be served 15 minutes prior to each lecture.

ACCESSIBILITY
The University of Western Ontario

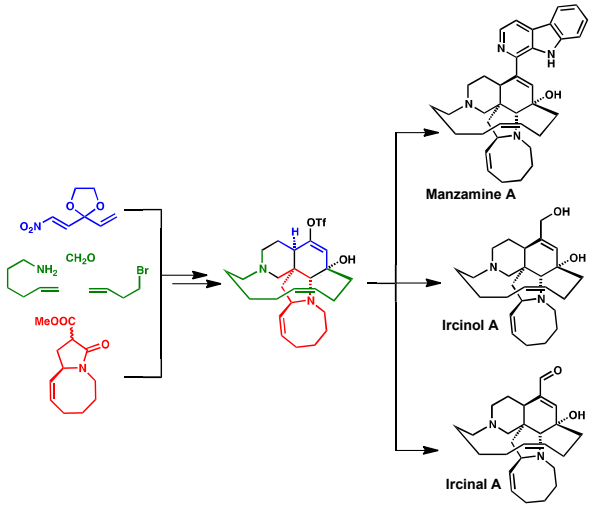
If you require this information in an alternate format, or if any other arrangements can make this event more accessible to you, please contact us.

The Department of Chemistry
presents the
2013 Fred Pattison Senior Lecturer

DARREN DIXON

Professor of Chemistry

University of Oxford



A two-part lecture series
September 30 and October 1, 2013

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