School of Chemistry

Aims and Objectives: Session 2022-2023

Module CH5612: Natural Products, Biosynthesis and Enzyme Co-Factors

Lecturers: Dr G. J. Florence, Professor D. O'Hagan* and Professor T. K. Smith

(*Module Convenor)

Duration: 20 hours

Aims: To appreciate the origin of natural products and the diversity of enzyme reactions. In depth understanding of the role of co-factors at the mechanistic level, allowing a general understanding of metabolic processes and how we can study them.

Objectives:

1. General discussion of enzyme co-factors
2. NADH/NADPH and flavins (FAD/$FADH_2$) and other enzymes.
3. Pyridoxal 5'-phosphate (PLP) enzymes concentrating on their importance in amino acid metabolism including decarboxylation, racemisation and transamination.
4. Thiamin pyrophosphate (TPP) enzymes.
5. Co-enzyme B_{12} dependent enzymes.
6. How do we study biosynthesis- *in vivo* and *in vitro*?
7. Metabolic Pathways- "The power house" Glycolysis and the Kreb cycle.
8. Fatty acid and lipid metabolism.
9. The Mevalonate and non-mevalonate pathways- leading to polyisoprenoid (terpenes and steroid) biosynthesis.
10. Putting knowledge into practice- enzyme assays, high throughput screening, live / dead assays and the drug discovery pipeline.
11. The structure and biosynthesis of common plant alkaloids from amino acid building blocks will be covered including the tropane and morphine families of natural products and related alkaloids.
12. The origin of diversity of aliphatic and aromatic (Type I & II) polyketide structures, and use of labelled acetate precursors, to follow polyketide biosynthesis.
13. The biosynthesis of aromatic polyketides from 6-methylsalicilic acid to daunamycin will be reviewed starting from acetate as a building block.
14. Diversity in Type I polyketide biosynthesis through variation of starter units and building blocks. Detailed study of DEBS pathway and related polyketide macrolides.