Professor Sarah O'Connor at John Innes Center, UK

Sarah's research focuses on elucidating biochemical pathways in plants including those involved in the synthesis of the monoterpenes and the alkaloids, the enzymes involved and the evolution of these pathways. She works on plants in the mint family (Lamiaceae) and uses modern sequencing and bioinformatics to characterise pathways and identify new genes. This work has led to the development of platforms which allow fast, inexpensive production of compounds.

Monoterpene and alkaloid synthesis
Evolution of biochemical pathways in plants
Synthetic biology for compound production

Plants produce hundreds of thousands of complex metabolites called "natural products" that have many uses: Anti-cancer agents such as vinblastine and taxol, the analgesic morphine, and the anti-malarials artemisinin and quinine are each natural products that are produced by a plant. Despite the importance of these compounds, it is unclear how many of these complicated molecules are made by the plant.

The O'Connor group elucidates and engineers the metabolic pathways that construct these compounds from simple building blocks. An understanding of these pathways allows us to harness the wealth of compounds and biocatalysts that plants have provided. Moreover, the group can also begin to speculate how and why plants evolved to produce some of these molecules. They take a multi-disciplinary approach to answering research questions, using plant molecular biology, enzymology and chemical strategies in their group.

Group page: https://www.saraheoconnoratjic.org/

VILLUM Plant Plasticity Seminar:
HARNESSING THE CHEMISTRY OF PLANT NATURAL PRODUCT BIOSYNTHESIS
Sarah E. O'Connor. John Innes Centre, Department of Biological Chemistry, Norwich, NR4 7UH, UK

Plants, which make thousands of complex natural products, are outstanding chemists. Through the concerted action of enzymes that are assembled into metabolic pathways, nature creates chemical complexity from simple starting materials. I will highlight some of the unusual enzymatic transformations that plants use to make complex, bioactive natural products, and will also discuss methods by which these pathways can be harnessed for metabolic engineering. The focus is on the biosynthesis of the monoterpenes called iridoids, and the alkaloids derived from iridoids, known as the monoterpene indole alkaloids. The discovery, functional characterization and mechanistic study of enzymes involved in the biosynthesis of these important compounds in several medicinal plant species will be discussed.