

Alkaloid Biosynthesis in Plants

Sarah E. O'Connor, *The John Innes Centre, Department of Biological Chemistry,
Norwich, UK*

Plants are— arguably— the world's best chemists. All plants synthesise thousands of complicated molecules that they use to protect themselves from predators, attract pollinators and communicate with other plants. Thousands of years ago, humans realised that many of these plant-derived molecules also have a powerful impact on human health and well-being. Advances in genomic and transcriptomic sequencing have rapidly advanced our understanding of the complex metabolic pathways that produce these high-value chemicals. Here we show how transcriptomic and genomic data can be used to understand the secondary metabolism of Madagascar Periwinkle (*Catharanthus roseus*), a medicinal plant that produces Oncovin and Velbe, compounds that are used to treat a variety of cancers. Many enzymatic transformations are utilized in the biosynthesis of the monoterpene indole alkaloids, this group of structurally diverse natural products. The discovery, functional characterization and mechanistic study of several enzymes involved in the biosynthesis of the monoterpene indole alkaloids in *C. roseus* will be discussed. Also discussed are the implications of this work in the metabolic engineering of natural products.



Figure 1. *Catharanthus roseus* along with a representative monoterpene indole alkaloid.

