

BCHM 421/422 – 2022/2023

Project Outline: Used as medicines, in agriculture and for the production and preservation of food; natural products are extremely important and valuable chemical commodities that are made by living organisms including bacteria. Understanding how they are made allows us to identify new enzymatic reactions and to potentially engineer enzymes to make new products. This project will focus on understanding the biosynthetic steps involved in producing the bioactive alkaloid known as Tambjamine BE-18591. In this project the student will use heterologous expression and protein purification to access several enzymes in the BE-18591 biosynthetic pathway, gel electrophoresis experiments will be used to assess the purifications. Ultimately the pure enzymes will be used to assay the predicted chemical reactions and for X-ray crystallographic characterization of the enzymes.

Supervisor: Avena Ross

Project Title: Investigating the biosynthesis of tambjamine natural products

Project Goals: To elucidate the enzymatic reactions carried out during the biosynthesis of tambjamine natural products

Experimental Approaches:

- Heterologous Expression of tambjamine biosynthetic genes in *E. coli*
- Purification of tambjamine biosynthetic enzymes
- In-vitro assay of tambjamine biosynthetic enzymes with proposed substrates
- Elucidate the structure of products generated in enzymatic reactions

References:

1) Picott, K. J. *, Deichert, J. A. *, Dekemp, E. M. *, Snieckus, V., Ross, A. C. , Purification and kinetic characterization of the essential condensation enzymes involved in prodiginine and tambjamine biosynthesis, *ChemBioChem*, **2020**, *21*, 1036-1042

2) Picott, K. J. *, Deichert, J. A. *, Dekemp, E. M. *, Schatte, G., Sauriol, F., Ross, A. C., Isolation and characterization of tambjamine MYP1, a macrocyclic tambjamine analogue from marine bacterium *Pseudoalteromonas citrea*, *MedChemComm*, **2019**, *10*, 478-483