Sarpong Group Research Description

The development of new strategies and methods to address complex molecule synthesis are central to our interests. Approaches to natural products inspire us to invent new strategies and also discover unexpected reactivity. Shown below are some natural products of interest to our group.

**Natural Product Targets**

![Decurvisine](image)

![Phalarine](image)

![Pauciflorine A](image)

![Solanoeclepin A](image)

Targets are chosen not only for their sheer complexity, which drives our creative solutions to their total synthesis, but also for their interesting biological activity. Our ability to achieve an efficient synthesis enables us to access large quantities of a natural product for biological testing, which is often the most practical recourse to these compounds. Furthermore, a well-designed synthesis allows ready access to synthetic analogs that may prove to be more selective and efficacious as a chemotherapeutic.

**New Synthetic Methods**

Our total synthesis pursuits have already provided the basis for new reaction discovery. Using Group 10 transition metal complexes, we have identified several interesting pentannulations and anomalous C-C bond-forming process.\(^1\,^2\)

\[ \text{Pt-Catalyzed Pentannulations} \]

![Pt-Catalyzed Pentannulations](image)

While the pentannulation reactions were designed to provide precursors for a natural product synthesis, the anomalous Heck transformation was unanticipated and was discovered during the pursuit of a natural product class related to
solanoeclepin A. Thus, there is a synergy between total synthesis and methods development that aids discovery.

The Anomalous Heck Reaction

\[ \text{PdCl}_2(\text{PPh}_3)_2 \text{ (3 mol %)} \]
\[ \text{i-Pr}_2\text{NEt} \text{ (3 equiv)} \]
\[ \text{Et}_4\text{NCl} \text{ (1 equiv)} \]
\[ \text{DMA} \text{ (0.2 M), 120 °C, 8 h} \]

83% yield

Pyrans are known to readily undergo 6-π oxa-electrocyclic opening to the corresponding dienone tautomer. Recently, our group has discovered an alternate reaction path of pyrans that leads to new carbon-carbon bond-forming processes via the dienone tautomer.

The utility of these newly discovered methods in the syntheses of natural products are an active area of research in the group at this time.

**Biology**

We have a number of collaborations in place to study the effects of small molecules on various diseases. One of these collaborations has already produced a paper that will appear in the journal *Nature*. As we gain access to biologically important natural products from our synthetic studies, this area of our work is expected to grow.