

BOT 6516 Plant Metabolism

Lecture 22

Natural Products

Slide sets available at:

<http://hort.ifas.ufl.edu/teach/guyweb/bot6516/index.html>

Some Big Ideas and Aspirations for Plant Natural Products

Why is natural product and secondary metabolism so widely variable?

Plants must evolve and exploit metabolic systems to create complex natural products that have adaptive benefit for survival.

Many of natural products provide adaptive advantage to the plant as these compounds can act as chemical cues for plants during their on-going interactions with physical and biotic factors in their environments.

In addition, plant natural products have the unintended consequences of positive and negative impacts on human and animal health and nutrition.

The complex structures of many natural products can require 20–30 enzymes and steps for their biosynthesis. Additionally, each biosynthetic pathway can be branched into a metabolic network that leads to a multiplicity of structurally related chemical structures.

Natural product biosynthesis and storage of plant compounds such as phenylpropanoids, terpenoids and alkaloids are complex processes that involve multiple subcellular compartments and specific cell types.

The question of how are reactivity, regio-chemistry and stereo-chemistry combined in multi-step conversion of substrates into products looms large for natural products.

How does the catalytic landscape change as an enzyme family acquires new substrate and/or product specificities?

Structural biology provides a means to uncover information about the structure–function relationships of metabolic enzymes at the molecular and atomic levels.

When combined with genomic and biochemical approaches, structural biology can provide an appreciation of molecular evolution and structural enzymology that have promise to help us better understand a wide number of questions relating to specialized secondary metabolism.