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## BOT 6516 PLANT METABOLISM

### Alkaloids

Alkaloid studies largely began with Sertürner in 1806 with the isolation of morphine, but Meissner coined the term alkaloid in 1819. So the study of alkaloids is rather old compared to almost every other topic covered in this course.

The old definition of alkaloids as pharmacologically active, nitrogen-containing basic compounds of plant origin, perhaps pre 1950s, is no longer sufficient.

Some 12,000 alkaloids have been isolated from plants and about 20% of angiosperms make one or more alkaloids.

What are the *in vivo* functions of alkaloids?

How is caffeine an anti-herbivory agent?

How does  $\alpha$ -solanine function as an anti-herbivory compound?

Where is nicotine produced in the tobacco plant?

What are some alkaloids useful in medicine today?

Quinolizidine alkaloids in *Lupinus*, known as lupine alkaloids are toxic to grazing animals. The greatest risk to farm animals occur during seed production where the lupine alkaloids occur in the highest concentration.

How has *in vitro* culture advanced alkaloid biology?

Does it surprise you that the pathway for morphine biosynthesis is still not understood?

Why has understanding alkaloid biosynthesis lagged behind advances in plant metabolism in general?

Can alkaloid production be influenced by wounding?

What approach or biochemical tool advanced the understanding of alkaloid biosynthesis?

Alkaloids are derived from a subset of amino acids, which ones?

Ajmalicine, indole-monoterpenoid, was the first alkaloid to be understood from a biosynthetic standpoint. What are its major precursors?

What is the first step in ajmalicine synthesis?

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What alkaloid has its biosynthetic pathway defined by the isolation of each enzyme, from precursor to final product?

Take note of the biosynthetic pathway for berberine. Appreciate the essence of the pathway, reactions along the way.

What is biomimetic?

Hyoscyamine and scopolamine inhibit what enzyme?

In what way may modern recombinant DNA methods be useful in commercial alkaloid production?